REGION H
Water Planning Group

2016 REGIONAL WATER PLAN
INITIALLY PREPARED PLAN

Prepared by:
Region H Water Planning Group

Prepared for:
Texas Water Development Board

with assistance from:
Freese and Nichols, Inc.
LBG-Guyton Associates
Ekistics Corporation

April 2015

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TBPE Reg. No. F-2144

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Ekistics Corporation

DRAFT
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List of Abbreviations

AWWA	American Water Works Association
BAWA	Baytown Area Water Authority
BBASC	Basin and Bay Area Stakeholder Committee
BBEST	Basin and Bay Expert Science Team
BEG	Bureau of Economic Geology
BRA	Brazos River Authority
BWA	Brazosport Water Authority
CHCRWA	Central Harris County Regional Water Authority
CLCND	Chambers-Liberty Counties Navigation District
CLCWA	Clear Lake City Water Authority
COA	Certificate of Adjudication
COH	City of Houston
CRP	Clean Rivers Program
CRU	Collective Reporting Unit
DCP	Drought Contingency Plan
DFC	Desired Future Condition
DOR	Drought of Record
EPA	Environmental Protection Agency
FBSD	Fort Bend Subsidence District
FSA	Farm Service Agency
FWSD	Fresh Water Supply District
GAM	Groundwater Availability Model
GCD	Groundwater Conservation District
GCWA	Gulf Coast Water Authority
GMA	Groundwater Management Area
GRP	Groundwater Reduction Plan
HGSD	Harris-Galveston Subsidence District
IWA	International Water Association
iWUD	Integrated Water Utility Database
LAWA	La Porte Area Water Authority
LNVA	Lower Neches Valley Authority
LSGCD	Lone Star Groundwater Conservation District
LVGUs	Large Volume Groundwater Users
MAG	Modeled Available Groundwater
MCL	maximum contaminant level
mg/l	milligrams per liter
MUDs	Municipal Utility Districts
NCWA	North Channel Water Authority
NFBWA	North Fort Bend Water Authority
NHCRWA	North Harris County Regional Water Authority
PDSI	Palmer Drought Severity Index
PWS	Public Water Supply
Region G	Brazos G Regional Water Planning Group
Region I	East Texas Water Planning Group
RHWPG	Region H Water Planning Group
RWP	Regional Water Plan

RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SAM-Houston	Small Area Model Houston
SDC	State Data Center
SJRA	San Jacinto River Authority
SWIFT	State Water Implementation Fund for Texas
SWP	State Water Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TRA	Trinity River Authority
TTWP	Trans-Texas Water Program
TWC	Texas Water Code
TWDB	Texas Water Development Board
UHCPP	University of Houston Center for Public Policy
UNESCO	United Nations Educational, Scientific and Cultural Organization
WAM	Water Availability Model
WHCRWA	West Harris County Regional Water Authority
WMS	Water Management Strategy
WRAP	Water Resources Analysis Package
WUD	Water Utility Database
WUG	Water User Group
WWP	Wholesale Water Provider

Water Measurements

Acre-foot (AF) = 43,560 cubic feet = 325,851 gallons

Acre-foot per year (ac-ft/yr) = 325,851 gallons per year = 893 gallons per day

Gallons per minute (gpm) = 1,440 gallons per day = 1.6 ac-ft/yr

Million gallons per day (mgd) = 1,000,000 gallons per day = 1120 ac-ft/yr

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ES – Executive Summary

ES.1 INTRODUCTION

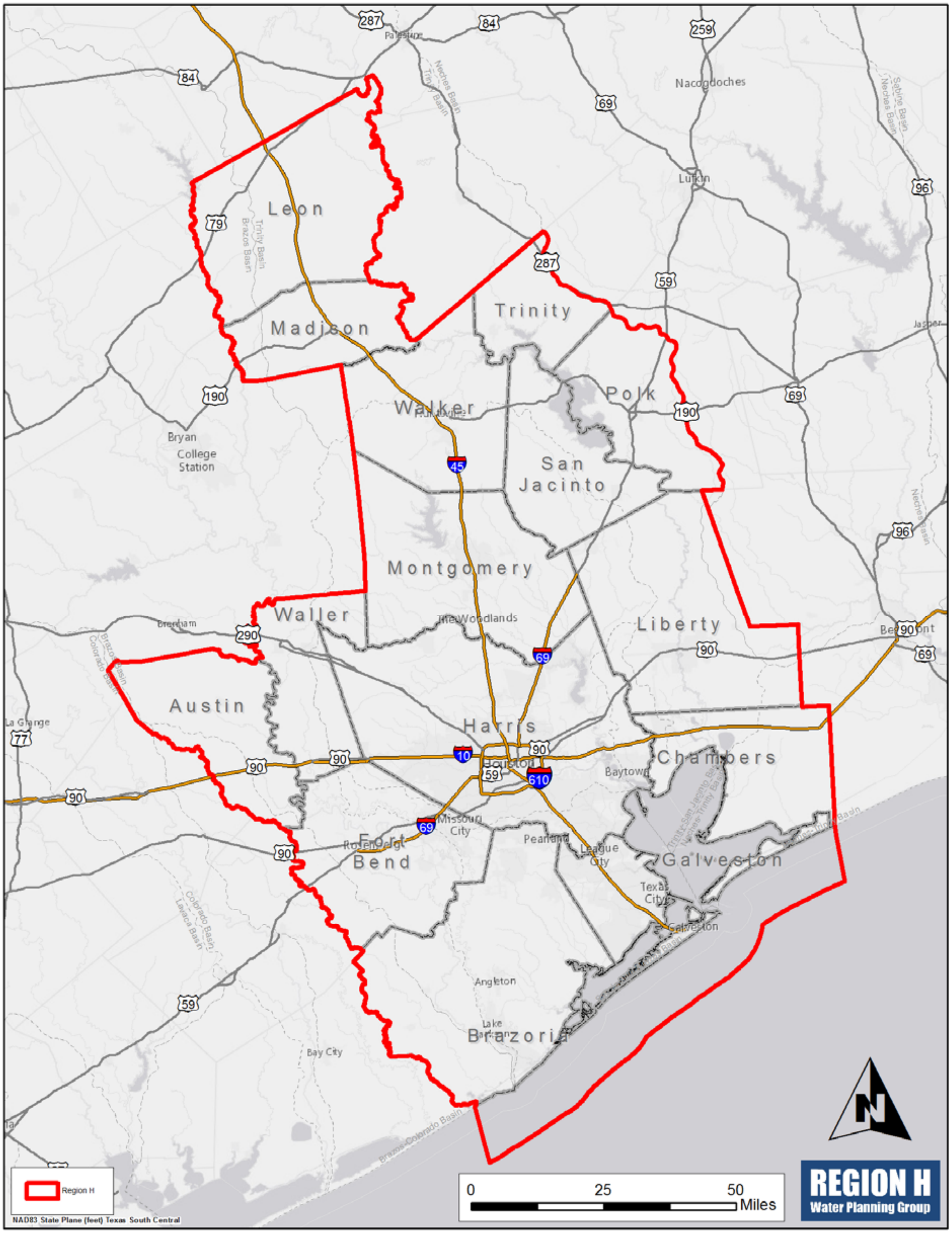
In 1997 the State Legislature, through Senate Bill 1, determined that the Texas State Water Plan for the 2000 - 2050 time frame would be developed through a regional water planning approach. To accomplish this task, the Texas Water Development Board (TWDB) divided the state into 16 regional water planning areas and appointed representational Regional Water Planning Groups (RWPG) that have guided the development of each region's plan. In 2001 a new set of rules and guidelines from the TWDB were enacted through Senate Bill 2. With the help of the Senate Bill 2, the 2002 State Water Plan received enormous public involvement compared to previous plans. The planning process is cyclic, with updated Regional Water Plans (RWPs) and State Water Plans (SWPs) produced every five years. The 2011 Region H Water Plan and the 2012 State Water Plan were created during the third planning cycle and are now being updated and extended to the 2070 decade as part of the fourth round of regional planning

Region H encompasses all or part of fifteen counties in southeast Texas and includes the majority of the San Jacinto River basin and the lower reaches of the Brazos and Trinity River basins. A location map showing the regional boundaries is included in *Figure ES-1*. The Region H Water Planning Group (RHWPG) consists of 26 voting and 10 non-voting members that represent a diverse range of backgrounds and interests. Additional information about Region H and the RHWPG can be found in ***Chapter 1*** of the 2016 RWP or on the Region H Water website, http://www.regionhwater.org. Regional Water Planning is conducted under the oversight of the TWDB. Information on Region H and the State Water Plan can be found at the TWDB website, http://www.twdb.texas.gov.

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

Any large-scale water supply or conveyance projects will require the close cooperation of political entities in the affected areas. While municipal and county governments are most visible in Region H, there are numerous other governmental and regulatory agencies with jurisdiction over aspects of water supply development in the region. These include approximately 14 river and water authorities, six groundwater-regulating entities, three councils of governments, eleven soil and water conservation districts, and hundreds of utility districts and water supply corporations that outnumber any other region in the state.

Figure ES-1 – Region H Location Map



ES.2 PROJECTED POPULATION AND WATER DEMANDS

Population in Region H is projected to grow from approximately 7.3 million in 2010 to approximately 11.7 million in 2070. The almost doubling of population over the fifty-year planning period represents an annual growth rate of slightly less than one percent.

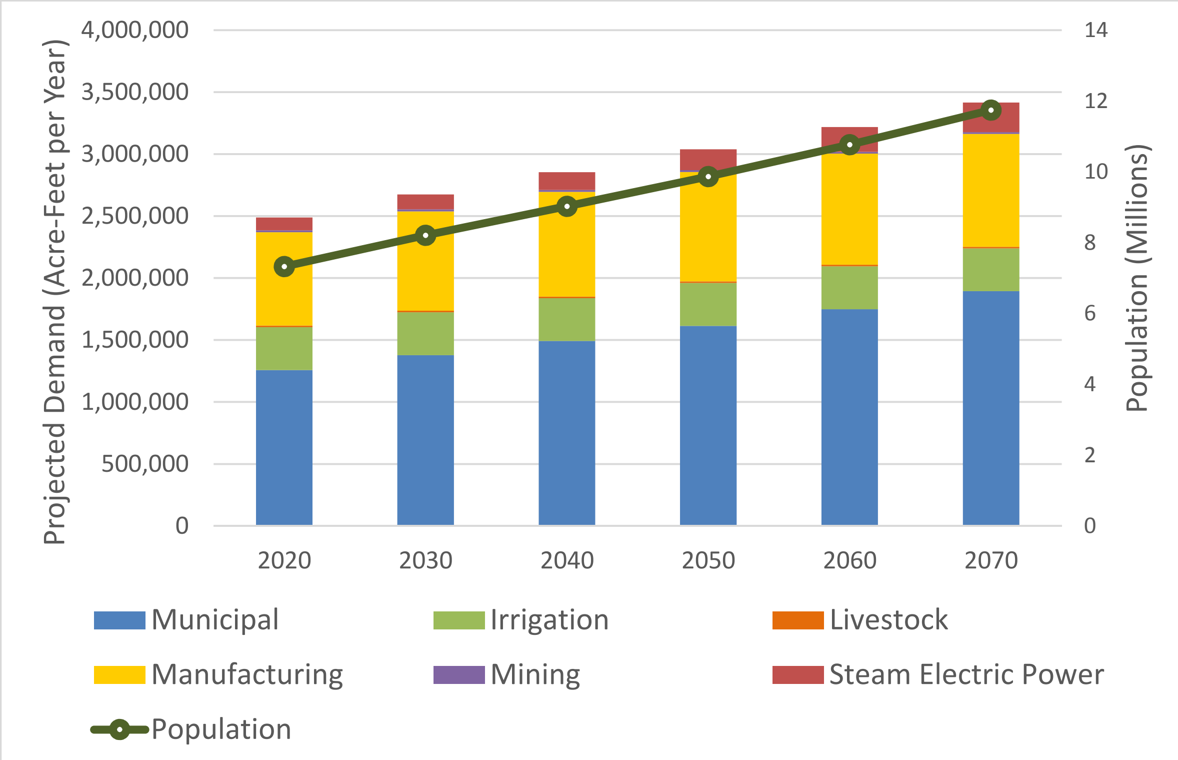
Population data are presented for each of the fifteen counties in the region, for cities of more than 500 persons, water districts providing 280 ac-ft/yr or more (0.25 mgd), and for collective reporting units (CRUs) consisting of grouped utilities having a common association. Demands are divided and allocated across accounting units known as Water User Groups (WUGs). Within Region H, there are numerous municipal WUGs plus 15 county-other WUGs, further divided by basin and county. All smaller communities and rural areas, aggregated at the county level, are considered a WUG and are referred to as "County-Other" for each county.

Population projections for Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties were developed through an outside study to examine population growth based on the 2010 United States Census and projected on the basis of an economically-driven growth model. This five-county area accounts for almost 95 percent of the region's population. Population projections for other areas were developed based on a standard cohort-component methodology applied by TWDB. Population-based demands were developed from these population projections based on recorded water use information compiled by TWDB and adjusted for future adoption of passive water conservation measures.

Water use in other sectors also represents significant demands within Region H. This is most notably true for the Irrigation and Manufacturing sectors. These demands, along with Livestock, Mining, and Steam Electric Power segments. Projections from the 2011 RWP were reviewed and amended to generate the 2016 RWP projections based on observed historical trends in water use. Irrigation demands were found to be significantly lower than previous projections. This trend is consistent with recent trends in crop acreage that have dwindled in the region as farm area has been reduced as population growth occurs.

Population and water demand projections by WUG category are shown in *Figure ES-2*. Additional information regarding the projection of population and demand can be found in ***Chapter 2*** of the 2016 RWP.

Figure ES-2 – Population and Water Demand Projections by WUG Category



ES.3 ANALYSIS OF CURRENT WATER SUPPLIES

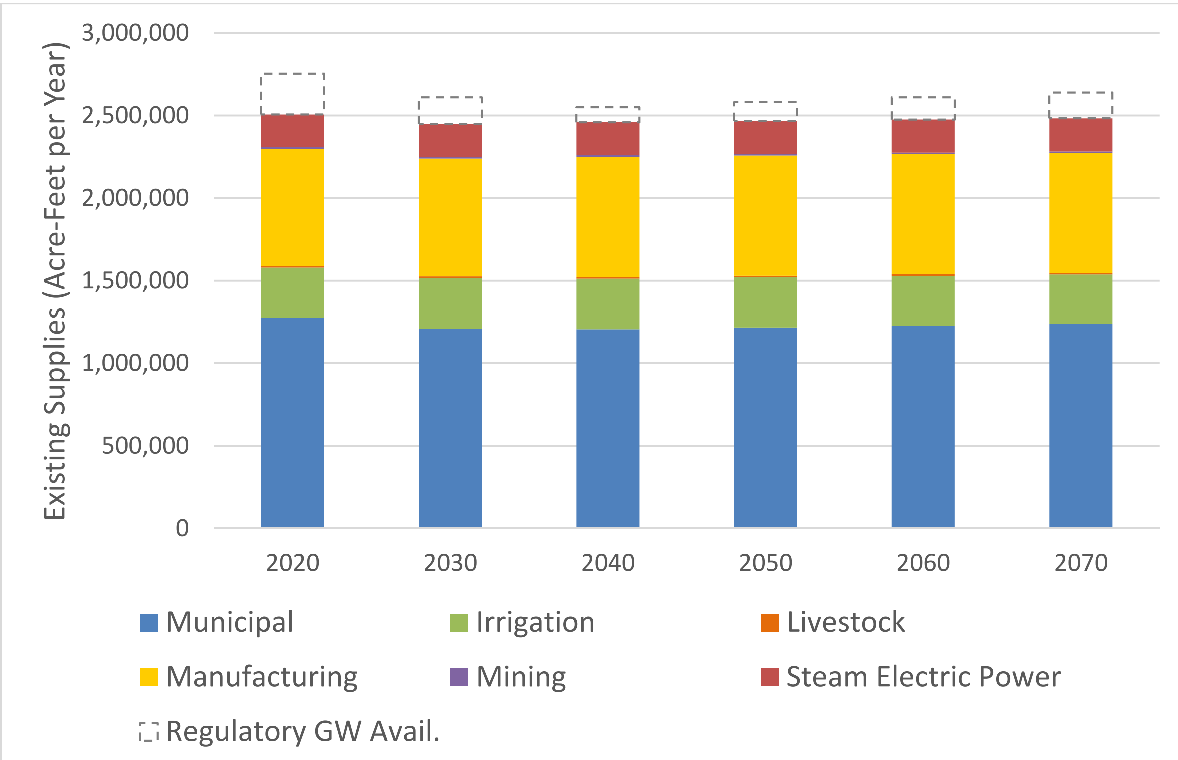
The total amount of water supply currently available to Region H from existing water sources is 3.3-million acre-feet per year (ac-ft/yr) in 2020. Of that amount, about two-thirds is surface water. By the year 2070, the available supply will be approximately 3.15-million ac-ft/yr. The reduction in supply between 2010 and 2070 reflects restrictions on the use of the Gulf Coast Aquifer, instituted to combat subsidence in a large part of the region. Reduced reservoir yields due to sedimentation also contribute to the reduction in supply over time. The predominant sources of surface water supply are derived from three reservoirs: Lakes Conroe and Houston within the San Jacinto River basin and Lake Livingston within the lower Trinity River basin.

Surface water supply was determined using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM), which analyzes permitted diversions against the historic rainfall record, which includes the drought of record period in the 1950's. In the Trinity and Brazos River Basins, limited wastewater return flows were included in the model, based on expectations that full reuse would not occur during the planning period. For all other basins, the yields are based upon the no-return-flow scenario used for water rights permitting.

Groundwater supply projections were largely derived from estimates of Modeled Available Groundwater (MAG) that are developed as a result of the Groundwater Management Area (GMA) process. Regional planning groups are required to use these availabilities for planning purposes for all applicable aquifer layers. During the development of the 2016 RWP, Region H recognized that these availabilities do not correspond well with the actual, regulatory availabilities permitted in Region H. This issues poses a risk of potentially overestimating needs for new water supplies and artificially inflating the need for water projects. In order to avoid this issue, Region H made the decision to disregard the artificial needs brought about by this Rule-Based Groundwater Disparity. Additional information regarding this issue can be found in ***Chapter 3***.

A detailed analysis of the entire water supply is found in the ***Chapter 3*** of the 2016 RWP. A summary of available water supply allocated by WUG category is provided in *Figure ES-3*.

Figure ES-3 – Existing Water Supplies by WUG Category and Decade

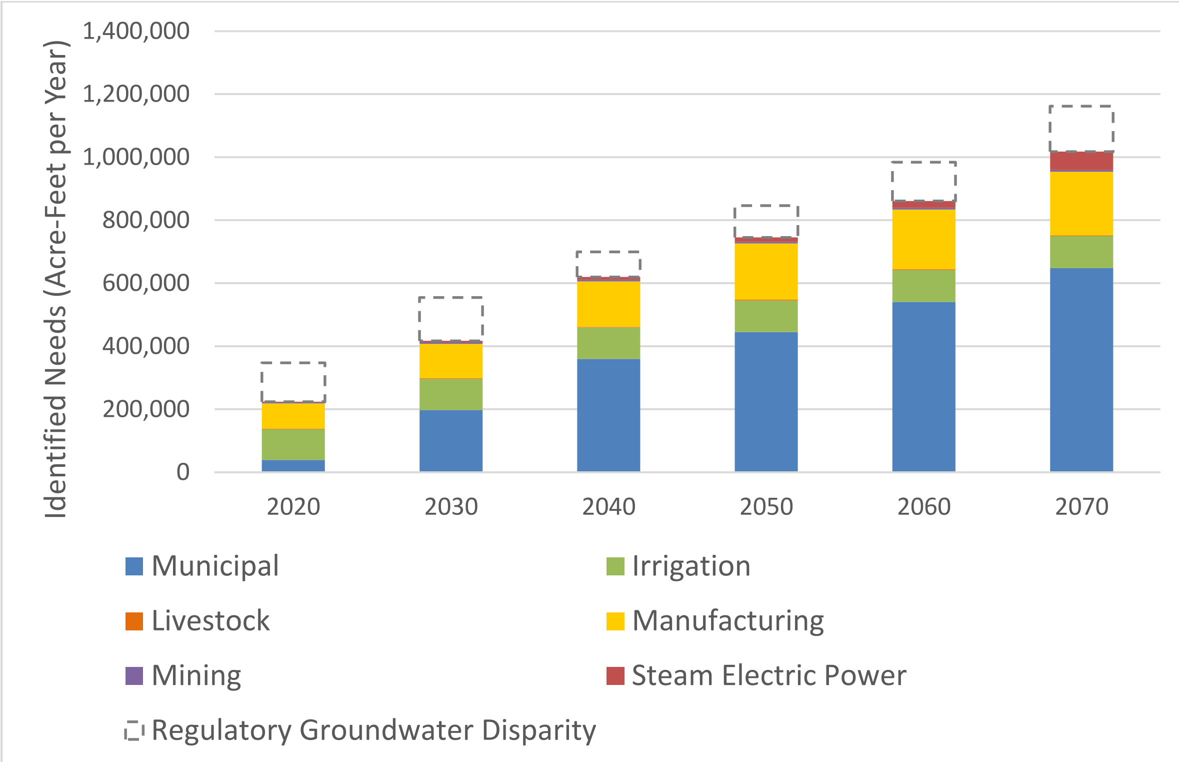


ES.4 ANALYSIS OF NEEDS

Water supplies were compared to water demands to determine if any areas in the region are expected to experience water shortages during the planning period. Despite adequate overall water supplies for Region H through the year 2070, the RHWPG has identified communities that will experience water shortages during the planning period unless they take action to increase their supplies. Some of these communities will be able to meet their demands simply by extending or increasing existing water supply contracts.

The projected shortages identified in the year 2020 totaled 224,217 acre-feet per year, increasing to as much as 1,017,548 acre-feet per year in the year 2070. These needs are exclusive of the needs identified with the Rule-Based Groundwater Disparity identified during the evaluation of existing water supplies. Overall needs are shown in *Figure ES-4*. The projections estimate lower needs compared to the 2011 RWP, largely due to the implementation of infrastructure projects such as Groundwater Reduction Plans (GRPs) in the 2010 decade. Needs identified in the 2016 RWP are discussed in further detail in ***Chapter 4***.

Figure ES-4 – Identified Water Needs by WUG Category by Decade



ES.5 WATER MANAGEMENT STRATEGIES

State statute and TWDB rules specify that RWPGs shall identify potentially feasible Water Management Strategies (WMS) for all WUGs and Wholesale Water Providers (WWPs) with future water supply needs. As a growing region with expanding populations and increased economic development, Region H projects substantial needs over the planning horizon through the 2070 decade. In order to address these needs, consideration was given to a wide range of data in developing recommendations for WMS and associated projects (specific infrastructure or measures used to increase or manage water supplies). Potentially feasible WMS were identified in three ways. First, strategies recommended in the 2011 Region H Water Plan for either implementation or additional study were considered potentially feasible. Next, new strategies were solicited during the scope development period for the 2016 Water Plan. Finally, sponsoring agencies that conducted independent strategy studies could bring their reports to the planning group and request they be considered in the plan. The list of potentially feasible WMs and projects considered by the RHWPG are listed in *Table ES-1*.

Table ES-1 – Region H Potentially Feasible WMS and Projects

Conservation
Industrial Conservation
Irrigation Conservation
Municipal Conservation
Contractual Transfer
TRA to COH Transfer

Conveyance
CHCRWA Transmission and Distribution Expansion
COH/NHCRWA/CHCRWA Second Source Pipeline
East Texas Transfer
GCWA Treated Water from LNVA
Lake Livingston to SJRA Transfer
Luce Bayou Transfer
NFBWA Distribution Expansion
NHCRWA Distribution Expansion
NHCRWA Transmission Line
Old Galveston Road Transmission Improvements
WHCRWA Distribution Expansion
WHCRWA/NFBWA Transmission Line
Groundwater Development
Aquifer Storage and Recovery
Brackish Groundwater Supplies
BWA Brackish Groundwater
Conroe Brackish Reverse Osmosis
Expanded Use of Groundwater
Forestar Houston County Project
Forestar Liberty County Project
Groveton Groundwater Expansion
SJRA Catahoula Aquifer Supplies
Groundwater Reduction Plans
CHCRWA GRP
City of Houston GRP
City of Missouri City GRP
City of Richmond GRP
City of Rosenberg GRP
City of Sugar Land GRP
Fort Bend County MUD 25 GRP
Fort Bend County WCID 2 GRP
NFBWA GRP
NHCRWA GRP
Panorama Village and Shenandoah GRP
Porter SUD GRP
River Plantation MUD GRP
SJRA GRP
WHCRWA GRP
Reuse
City of Conroe Reuse
City of Houston Reuse
City of Pearland Reuse

GCWA Reclaimed Water from COH
Grand Lakes Reclaimed Water System
Montgomery County MUDs #8 and #9 Reuse
Regional Return Flows
SJRA Conroe Reuse Project
Wastewater Reclamation for Industry
Wastewater Reclamation for Municipal Irrigation
Surface Water Development
Allens Creek Reservoir
BRA System Operation Permit
Dow Expansion to Harris Reservoir
Freeport Seawater Desalination
Lake Somerville Augmentation
Little River Off-Channel Reservoir
Lone Star Lake
Treatment
BWA Water Treatment Plant Expansion
City of Houston Treatment Expansion
CLCND West Chambers System
COH Northeast Water Purification Plant Expansion
Pearland Surface Water Treatment Plant
Other Infrastructure
Brazos Saltwater Barrier

Depending on the information available, Region H may adapt information directly from detailed studies developed by project sponsors or develop a high-level analysis of a concept for inclusion in the RWP. In other cases, Region H has performed more in-depth planning studies to evaluate the potential of projects that may yield great regional benefits to water supply. Evaluations of potentially feasible WMS included assessment of supply quantity and reliability, cost, and impacts to cultural and environmental resources. WMS evaluation and selection for recommendation also incorporated a dual-phased selection process, with one phase focused on the applicability of a WMS or project to the needs of individual WUGs and the other phase focused on evaluating a set of criteria applied to the overall WMS or associated project(s).

Due to extensive geographic area within Region H and the diverse nature of demands, a variety of WMS were recommended to meet needs including water conservation, development of conveyance infrastructure and contracts to more fully utilize existing supplies, development of groundwater resources within areas with sufficient groundwater availability, reuse, development of new surface water supplies, development of treatment infrastructure, and a number of other approaches. *Table ES-2* below summarizes the key projects selected as part of recommended WMS along with their total potential yield, capital cost, and decade of implementation. WMS and project evaluation and recommendation in the 2016 RWP are discussed in further detail in ***Chapter 5***.

Table ES-2 – Key Project Overview

Project	Potential Volume[1] (ac-ft)	Capital Cost ($)	Unit Cost ($/ac-ft)		Start Decade
			Start Decade	2070	
Conservation					
Industrial Conservation[2]	65,261	$0	$0	$0	2020
Irrigation Conservation	86,123	$1,155,709	$113	$112	2020
Municipal Conservation (incl. Loss Reduction)	150,655	$1,699,918,210	$726	$726	2020
Contractual Transfer					
TRA to COH Transfer	150,000	$0	$5	$5	2020
Conveyance					
CHCRWA Transmission and Distribution Expansion	4,682	$23,207,659	$409	$44	2020
COH/NHCRWA/CHCRWA Second Source Pipeline	148,042	$150,325,381	$83	$9	2020
East Texas Transfer	250,000	$388,064,210	$145	$15	2040
Lake Livingston to SJRA Transfer	50,000	$166,710,892	$311	$32	2050
Luce Bayou Transfer	450,000	$360,004,806	$143	$23	2020
NFBWA Distribution Expansion	62,496	$65,450,062	$95	$7	2020
NHCRWA Distribution Expansion	143,360	$922,549,086	$307	$50	2020
NHCRWA Transmission Line	143,360	$155,993,406	$86	$6	2020
Old Galveston Road Transmission Improvements	24,300	$99,886,253	$322	$25	2020
WHCRWA Distribution Expansion	91,896	$293,290,000	$299	$32	2020
WHCRWA/NFBWA Transmission Line	154,392	$642,986,052	$340	$34	2020
Groundwater Development					
Brackish Groundwater Supplies[3]	Varies	Varies by project	Varies	Varies	2020
BWA Brackish Groundwater	3,136	$34,016,950	$600	$346	2020
Conroe Brackish Reverse Osmosis	5,600	$40,691,342	$857	$323	2020
Expanded Use of Groundwater[3]	30,000+	Varies by WUG	Varies by WUG	Varies by WUG	2020
Groveton Groundwater Expansion	161	$2,195,000	$1,277	$136	2020
SJRA Catahoula Aquifer Supplies	7,840	$10,980,367	$213	$96	2020
Groundwater Reduction Plans					
CHCRWA GRP[4]	4,682	$0	$0	$0	2020
City of Houston GRP[4]	130,544	$0	$0	$0	2020
City of Missouri City GRP	12,656	$50,959,636	$329	$33	2020
City of Richmond GRP	1,465	$32,167,109	$1,761	$146	2020
City of Rosenberg GRP	826	$12,469,012	$1,242	$131	2020
City of Sugar Land GRP	20,160	$148,650,964	$900	$283	2020
Fort Bend County MUD 25 GRP	744	$2,148,043	$282	$40	2030
Fort Bend County WCID 2 GRP	6,720	$36,668,844	$800	$343	2020
NFBWA GRP[4]	62,496	$0	$0	$0	2020
NHCRWA GRP[4]	143,360	$0	$0	$0	2020
Panorama Village and Shenandoah GRP	472	$1,619,114	$469	$132	2040

Project	Potential Volume[1] (ac-ft)	Capital Cost ($)	Unit Cost ($/ac-ft)		Start Decade
			Start Decade	2070	
Porter SUD GRP	2,240	$22,061,536	$1,250	$426	2020
River Plantation MUD GRP[5]	92	$0	$0	$0	2030
SJRA GRP	100,000	$834,931,018	$245	$81	2020
WHCRWA GRP[4]	91,896	$0	$0	$0	2020
Reuse					
City of Conroe Reuse[4]	3,694	$0	$0	$0	2020
City of Houston Reuse	197,467	$78,121,149	$56	$12	2040
City of Pearland Reuse	1,154	$5,895,808	$517	$90	2020
GCWA Reclaimed Water from COH	33,712	$56,379,232	$187	$47	2020
Grand Lakes Reclaimed Water System	661	$13,148,843	$2,276	$612	2020
Montgomery County MUDs #8 and #9 Reuse	1,680	$15,351,774	$1,360	$595	2020
Regional Return Flows[4]	150,994	$0	$0	$0	2020
SJRA Conroe Reuse Project[4]	6,807	$0	$0	$0	2020
Wastewater Reclamation for Municipal Irrigation	38,940	$103,454,114	$290	$161	2030
Surface Water Development					
Allens Creek Reservoir	99,650	$316,226,894	$321	$33	2020
BRA System Operation Permit[4]	25,350	$0	$0	$0	2020
Dow Expansion to Harris Reservoir	80,000	$255,865,694	$303	$36	2020
Freeport Seawater Desalination	11,200	$132,937,747	$2,454	$1,461	2040
Treatment					
BWA Water Treatment Plant Expansion	8,400	$15,951,976	$353	$194	2020
City of Houston Treatment Expansion	116,258	$288,529,429	$386	$183	2040
CLCND West Chambers System	2,800	$24,657,839	$1,354	$617	2020
COH Northeast Water Purification Plant Expansion	358,400	$1,263,612,418	$784	$489	2020
Pearland Surface Water Treatment Plant	22,400	$112,947,347	$839	$230	2020
Other Infrastructure					
Brazos Saltwater Barrier	72,396	$55,771,408	$69	$5	2020

1. Volumes listed in this table represent the maximum anticipated volume associated with the projects rather than new increments of yield. Volumes shown in this table may overlap and are not necessarily additive.
2. Insufficient information to determine cost.
3. Includes brackish groundwater projects implemented under Expanded Use of Groundwater. Costs vary by WUG.
4. Costs included under associated infrastructure projects.
5. Supply generated through expanded use of existing infrastructure. Cost estimated to be minimal.

Following the application of WMS and key projects, some identified needs were found to remain. Under drought of record scenarios, it was determined that needs would persist in the Irrigation and Livestock demand sectors within some portions of Region H without the availability of some interruptible water supply to provide a low-cost options for meeting demands. These sectors are particular sensitive to the cost of water and are also unable to easily develop long-term contracts for water on a firm yield basis that are required for development of water supply projects. Each of these sectors will continue to rely on low-cost, interruptible supplies of water as well as local supplies and conjunctive groundwater and surface water resources when they are available. However, according to the guidelines for RWP development, these supplies are not permissible for planning purposes and may not be shown in the RWP. For this reason, the needs identified in *Table ES-3* are shown as unmet although, in reality, cost-effective solutions exist that may provide water to these demands and the development of firm yield projects within the RWP may also provide additional interruptible supplies to meet these demands in most, if not all, years.

Table ES-3 – Remaining Unmet Needs

WUG Name	County	Basin	Unmet Needs (ac-ft)					
			2020	2030	2040	2050	2060	2070
IRRIGATION	BRAZORIA	B-C	0	0	0	0	-217	-479
		SJ-B	-49,022	-49,539	-49,906	-50,308	-50,743	-51,143
	FORT BEND	SJ-B	-1,186	-1,186	-1,186	-1,186	-1,186	-1,186
	GALVESTON	N-T	-11	-11	-11	-11	-11	-11
		SJ-B	-4,300	-4,300	-4,300	-4,300	-4,300	-4,300
LIVESTOCK	BRAZORIA	B	-9	-17	-23	-29	-35	-42
		B-C	-137	-159	-175	-192	-211	-228
		SJ-B	-93	-164	-216	-272	-332	-388
	GALVESTON	N-T	-51	-51	-51	-51	-51	-51
		SJ-B	-177	-177	-177	-177	-177	-177
	HARRIS	SJ	-522	-939	-1,213	-1,214	-1,214	-1,215
		T-SJ	-112	-114	-120	-119	-119	-118

N-T = Neches-Trinity, T-SJ = Trinity-San Jacinto, SJ = San Jacinto, SJ-B = San Jacinto-Brazos, B = Brazos, B-C = Brazos-Colorado

ES.5.1 Conservation Recommendations

Water conservation plays an important role in meeting future water needs across the State of Texas. Because of this, guidance for the 2016 round of regional water planning dedicates a subchapter of ***Chapter 5*** to conservation recommendations for each region. This section contains information related to not only the importance of water conservation implementation but its challenges within Region H and the state as a whole.

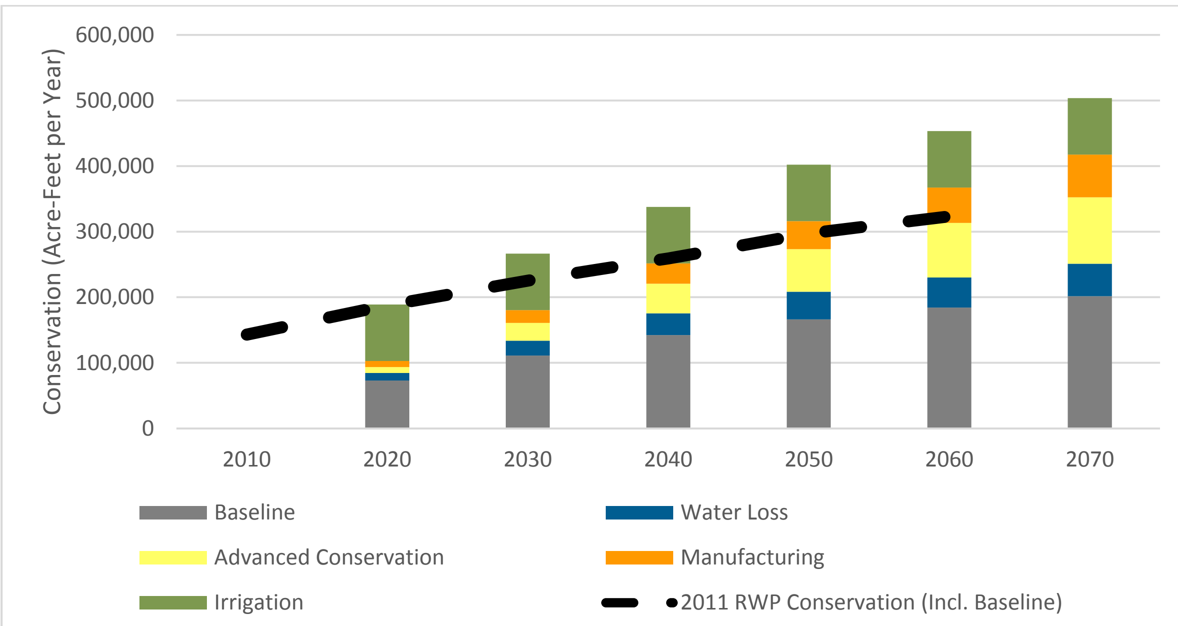
Current conservation efforts were evaluated for the region using the conservation plans developed for each water utility. This analysis demonstrated that Region H focuses much of its conservation resources toward outreach, conservation rates, and water system audits, leak detection, and repair.

Water conservation in the 2016 RWP was developed in conjunction with the efforts of the Goldwater Project of the Texas Water Foundation. The project is an ongoing effort to reach out to water utilities in Region H and gather information on their existing conservation practices and achievements and use this information to guide future, cost-effective approaches to meeting the region's conservation targets. Long-term projections developed from the Goldwater Project were combined with estimates of potential savings related to water loss reduction to provide a comprehensive water conservation program for WUGs in Region H.

Conservation was also applied to non-population-based demands such as Irrigation and Manufacturing. Region H enhanced the approach to Irrigation conservation applied in the 2011 RWP by evaluating the extent of existing conservation measures in the region in order prevent overestimation of potential saving. Region H also adopted its first comprehensive conservation strategy for Manufacturing water use through evaluation of long-term trends in industrial water use within the region. Both of these practices provide a significant water savings due to the magnitude of these demands in Region H.

The comprehensive water conservation applied in the 2016 RWP is compared against the conservation in the 2011 RWP in *Figure ES-5*. Additional information related to conservation can be found in ***Chapter 5*** and ***Chapter 5B***.

Figure ES-5 – Total region H 2016 RWP Conservation vs 2011 RWP



ES.6 IMPACTS OF THE REGIONAL WATER PLAN

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

Agricultural areas in Region H are generally served by a combination of groundwater and surface water supplies depending primarily on the location of use and the application. The groundwater use is not projected to change during the planning period. Surface water used for irrigation is typically contracted on a year-to-year basis and often originates from supplies that are not firm during the drought of record. The 2016 RWP recognizes this trend in water use by irrigation and the sensitivity of agriculture to more expensive water supplies that are not available on a regular basis during these conditions. Although these supplies cannot be used in the RWP per planning guidance, these interruptible supplies will continue to be an important resource in meeting the needs of irrigation users in Region H.

The management strategies recommended in this plan will fully utilize the currently available water rights in all basins. Virtually all projects in the plan will require some environmental mitigation due to habitat impacts. However, the plan strives to identify the most feasible projects from standpoints of economics and sustainability. The recommended reuse of wastewater will further reduce instream flows, particularly during drought conditions. Some of this reduction will be mitigated by an overall increase in wastewater discharges beyond the current level and the reduction in need for developing new raw water supplies.

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

Additional information related to impacts of the plan can be found in ***Chapter 6*** of the RWP.

ES.7 DROUGHT RESPONSE

Drought is the primary driver behind water planning in Texas. The drought of record serves as a fundamental basis for evaluating the supplies and needs in the development of each RWP and, in the 2016 guidance for RWP development, TWDB has added additional material related to preparation for and response to drought conditions.

The drought of record in Region H has consistently been the drought of the 1950s. Although recent dry years have eclipsed the severity of the 1950s drought for short periods of time, the long-term severity of the 1950s drought has, so far, not been exceeded. Current drought contingency plans for surface water supplies take into account this drought as a basis for assigning triggers and responses to drought. Region H recommends adoption of the triggers and responses prescribed by project owners and sponsors for management of surface water supplies such as reservoirs. For groundwater supplies, identification of drought conditions generally requires evaluation of other factors in order to recognize and respond to drought. For these supplies, Region recommends the regular review of the Palmer Drought Severity Index (PDSI) as a basis for recognizing drought conditions and taking appropriate measures to respond.

Some drought conditions are of a severity that they pose risks to life safety and economy. This is particularly true for small water system that have limited sources of water available or rural communities that are distant from alternative supplies that may serve to meet needs during emergency conditions. As part of the evaluation of drought response, Region H proposed a number of emergency measures for these utilities to consider, should drought conditions deem emergency response necessary. These measures include use of additional surface water supplies, development of additional local groundwater or brackish groundwater, or utilization of existing or potential interconnections with neighboring systems. It should be noted that these approaches may become necessary during either hydrologic drought periods or emergency conditions brought about by failure of water source or infrastructure.

Additional information related to drought response can be found in ***Chapter 7*** of the RWP.

ES.8 UNIQUE STREAM SEGMENTS, RESERVOIR SITES, AND OTHER RECOMMENDATIONS

The Texas Water Code guides the RWPGs to adopt recommendations on Unique Stream Segments, Unique Reservoir Sites, and legislative policy. ***Chapter 8*** of the 2016 RWP describes these recommendations in depth and a summary is provided below.

ES.8.1 Unique Stream Segments

The Texas Water Code offers the opportunity to identify river and stream segments of unique ecological value. Stream segments designated by the legislature as having unique ecological value cannot be developed as reservoir sites by the State or any political subdivision of the State. After consideration of the above factors during the development of the 2011 RWP, the eight streams listed in *Table ES-4* were recommended as Streams of Unique Ecological Value in Region H. These segments were subsequently designated by the Texas State Legislature. No additional sites were nominated for designation in the 2016 RWP. Additional information is contained in ***Chapter 8***.

Table ES-4 – Recommended Unique Stream Segments

Stream Segment	County
Armand Bayou	Harris
Austin Bayou	Brazoria
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Creek Lake	Brazoria
Menard Creek	Liberty and Polk
Oyster Bayou	Chambers

ES.8.2 Unique Reservoir Sites

The Texas Water Code offers an opportunity to designate sites of unique value for use as surface water supply reservoirs. Designation by the Legislature as a unique reservoir site prevents the State from constructing major infrastructure (such as major highways) within the project limits. Through use of a decision-based water management strategy analysis and selection process, the RHWPG selected two reservoir projects for meeting needs in the 2016 RWP: Allens Creek Reservoir and the Dow Expansion to Harris Reservoir. Region H chose to select Allens Creek Reservoir as a recommendation for any future reaffirmation of Unique Reservoir Sites. In addition, the Little River Off-Channel site was selected due to its application as an alternative management strategy in the 2011 RWP. These sites are described below in *Table ES-5*. Additional information is contained in ***Chapter 8***.

Table ES-5 – Recommended Unique Reservoir Sites

Name	County	General Location
Allens Creek	Austin	1 mile north of the City of Wallis
Little River Off-Channel	Milam	Beaver Creek, approximately 5 miles northeast of City of Milano

ES.8.3 Regulatory, Administrative, and Legislative Recommendations

Guidance for regional water planning requires that a regional water plan include recommendations for regulatory, administrative, and legislative changes. These recommendations are addressed to each governmental agency that has the appropriate jurisdiction over each subject. It is generally assumed that regulatory recommendations are directed toward the TCEQ, that administrative recommendations are directed toward the TWDB, and that legislative recommendations are directed toward the State of Texas Legislature.

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

<u>Regulatory and Administrative Recommendations</u>

- The Region H Water Planning Group recommends that the TWDB determines, in conjunction with the TCEQ and the Texas Parks and Wildlife Department (TPWD), which specific environmental studies and analysis are required for each category of management strategy (i.e., new water right, new reservoir, etc.). Furthermore, the guidance should be added to the Planning Guidelines, so that RWPGs can reflect the cost of those requirements in their budgets and scopes of work. Adding environmental guidelines will also make water plans consistent across the State.
- The Region H Water Planning Group recommends that the TCEQ clarify the TPDES rules for wastewater permitting so that the environmental impacts of reuse and reclamation facility discharges are assessed in conjunction with appurtenant reductions in discharges for their source water facilities. This will eliminate double-counting of waste loads and remove a potential obstacle for some wastewater reuse projects in the State.
- The Region H Water planning Group recommends that TCEQ rules be amended to include a reasonable timeline for the update of WAMs associated with significant changes to water rights conditions in each basin and also on a routine basis as the historical period of record grows over time. Furthermore, these rules should require that the most recent model for each basin be made available through the TCEQ website for use by both the RWPGs and the public.

<u>Legislative Recommendations</u>

- Allow RWPGs to work with local regulatory bodies to develop appropriate, dry-year groundwater supplies for use in regional water planning that are consistent with local conditions and regulation.
- The Region H Water Planning Group recommends that the legislature revise the current law on interbasin transfers and remove the unnecessary and counterproductive barriers to such transfers that now exist.

- The Region H Water Planning Group recommends establishment of additional and dedicated funding to pursue necessary future efforts of the Galveston Bay Estuary program.
- The Region H Water Planning Group supports continued usage of the Rule-of-Capture as the basis of groundwater law throughout the State of Texas except as modified through creation of certified groundwater conservation districts.
- The Region H Water Planning Group supports creation of GCDs, as necessary, by local subarea water interests. The RHWPG supports development of truly regional GCDs as opposed to single county districts to recognize the regional expansiveness of underground aquifers and to provide the greatest degree of regional water supply protections.
- The Region H Water Planning Group wishes to recognize the Legislature's efforts in implementing the SWIFT program and also supports ongoing and expanded support for financing methods by the State of Texas for development of water supply projects recommended within adopted RWPs.
- The Region H Water Planning Group supports continued funding for the GAMs effort and recommends comprehensive analysis of all groundwater resources within the state.
- The Region H Water Planning Group supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices.
- Region H Water Planning Group supports water conservation and recommends that the legislature continue to address and improve water conservation activities in the state.
- The Region H Water Planning Group recommends that the State fund research into advanced conservation technologies.
- Consider State legislation clarifying the liability exposure of reservoir operators for passing storm flows through water supply reservoirs.
- The Region H Water Planning Group recommends that the State direct the State Demographer's office to explore the potential changes in population distribution made possible by rapid advancements in information technology.
- The Region H Water Planning Group recommends that the TWDB request additional and adequate funding and the adoption of the appropriate administrative procedures from the legislature to facilitate ongoing activities of the RWPGs. Funding should be made available throughout the entirety of the planning cycle without funding "gaps" that make it difficult for planning groups to accomplish their ongoing efforts.

<u>Infrastructure Financing Recommendations</u>

- Increase funding of the Board Participation Program as needed to allow development of these water supply projects.
- Increase the funding of the State Revolving Funds Program in future decades, and expand the program to include coverage for system capacity increases to meet projected growth for communities.
- Increase funding of the State Loan Program to meet near-term infrastructure cost projections.
- Provide a mechanism to leverage Federal grant programs for agriculture by providing the local matching share. Increase funding of associated loan programs and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators. Provide opportunities for joint cooperation between growers and land owners to facilitate the use of funding programs for property under long-term lease agreements.

- Continue State and Federal support of the Texas Community Development Program, and increase the allocation of funds for the Small Town Environment Program.
- Increase funding of the Regional Water Supply and Wastewater Facilities Planning Program in anticipation of upcoming development throughout the state, and expand the program to include the preliminary engineering design costs for recommended facilities.
- Support continued and increased funding of Water and Waste Disposal Loans and Grants from USDA Rural Utilities Service at the Federal level, and fund the State Rural Water Assistance Fund.
- Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities to develop a customer base, and pursue Federal funding for desalination programs. Focus particular attention to "near-term" efforts such as brackish groundwater desalination as a way of bridging current and long-term seawater desalination alternatives.
- Provide increased research grants to study and better develop drought-resistant crop species and efficient irrigation practices.
- Region H supports the forming of regional partnerships and encourages the State to allow them the greatest possible latitude for financing in their governing regulations. Additionally, the State Participation Program should be made available to these public/private partnerships and to private nonprofit water supply corporations.

Additional information is contained in ***Chapter 8***.

ES.9 REPORTING OF FINANCING MECHANISMS FOR WATER MANAGEMENT STRATEGIES

Approximately $11.0 billion in capital costs were identified for meeting needs throughout the planning period. These capital costs primarily represent infrastructure (wells, pump stations, treatment facilities, transmission mains, etc.) required to implement water management strategies at the WWP and WUG levels. These costs do not include annual costs and debt service associated with the new projects. Additionally, these costs do not represent improvements that will be required within individual WUGs for providing adequate water supply.

With the assistance of the RHWPG, the TWDB will conduct a survey of water utilities related to the anticipated cost of infrastructure and approaches to fund these projects. Anticipated costs developed as part of the RWP will be submitted to WUGs in order to determine their interest in pursuing one or more of the financial assistance programs offered by TWDB. Please see ***Chapter 9*** for an overview of this methodology. Results of the survey will be contained in the final, adopted 2016 RWP.

ES.10 ADOPTION OF PLAN AND PUBLIC PARTICIPATION

During the course of developing the 2016 RWP, the RHWPG conducted numerous public meetings corresponding with various phases of plan development. In addition, the group provided notice for a public hearing corresponding to the initiation of the planning cycle.

After the submittal of the IPP to TWDB by May 1, 2015, the RHWPG will also conduct three public hearings to receive comment from the public. Details of these meetings and comments from the public and interested agencies are provided in ***Chapter 10*** of the RWP.

ES.11 IMPLEMENTATION AND COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

A new requirement for the 2016 round of RWP development is the inclusion of a comparison to the previous plan including the implementation of projects and the development of water demands, supplies, and strategies associated with each RWP. A detailed comparison of the 2011 and 2016 RWPs is provided in ***Chapter 11***.

Nearly 50 projects in the 2011 RWP were identified as implemented, partially implemented, or in-progress at the time of development of the 2016 RWP. Many of these are GRP projects that provide for new water supply beginning in the 2010 decade. In addition, numerous projects, such as the San Jacinto River Authority (SJRA) Water Resources Assessment Plan (WRAP), now known as the GRP, received funding from TWDB to facilitate their completion.

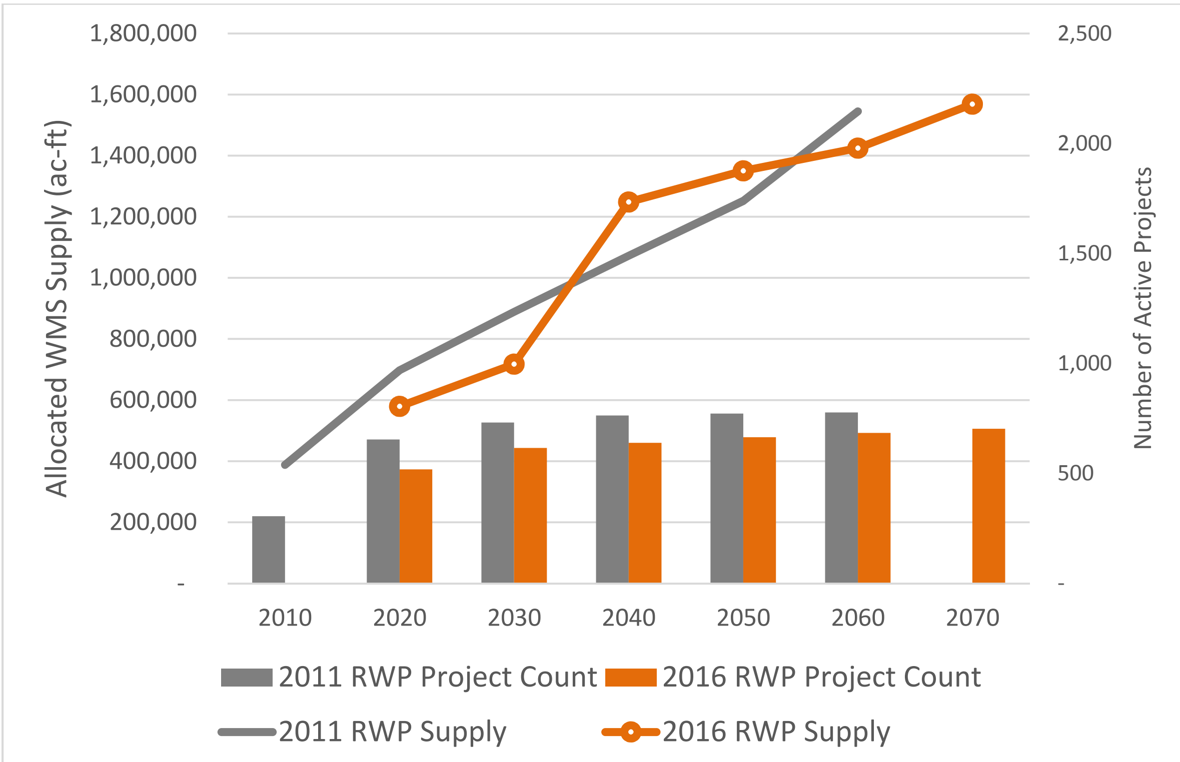
Overall, the two plans differed slightly in relation to water demands. Municipal demands in Region H have remained relatively similar between the two RWPs but the distribution of this population has changed considerably in the 2016 RWP with higher levels of growth in the suburban counties in the near-term. Although all non-population demands varied somewhat from the 2011 RWP, the greatest change was found in Irrigation, where demands were reduced dramatically due to the reduction in crop acreage in the region over time.

A change to the assumptions used in developing current water supplies in Region H caused somewhat of a reduction in availability from the reservoir and run-of-the-river supplies although this is a small deviation in the overall scale of Region H surface water supplies. Estimates of the MAG for each aquifer layer and county are required for use in development of 2016 RWPs. Early in the process, Region H identified issues related to the use of these numbers that may cause unintentional inflation of the true water needs for the region. As a result, Region H adapted its methodology to deal with needs brought about by this Rule-Based Groundwater Disparity. The end result is a revision to groundwater needs in response to the artificial reduction of available groundwater supply in the 2016 RWP when compared to the 2011 RWP.

The identified WUG needs in the 2016 RWP were reduced due to the development of regional infrastructure recommended in the 2011 RWP for the 2010 decade. Needs for each decade in the 2016 RWP were consistently lower than the identified needs in the 2011 RWP and the final, 2070 need in the 2016 RWP was found to be nearly 75,000 acre-feet per year less than the identified 2060 needs at the end of the 2011 RWP planning horizon.

In total, the RHWPG recommended 70 WMSs and 705 projects for the 2016 RWP. This compares to 468 WMSs and 870 projects identified in the 2011 RWP. Much of the variation in WMS count is related to the way in which WMS are defined in the two RWPs. In the 2016 RWP, more strategy connections could be detailed through the use of WMSs and projects rather than the 2011 RWP structure that was built around WMSs and then, later, projects were developed from this list of WUGs and WMSs. Allocations of WMS supplies in the 2016 RWP differ from those in the 2011 RWP for a number of reasons, including differences in projected WUG demands, establishment of new existing contracts between water providers and WUG customers, implementation of 2011 WMSs as existing supplies, changes in recommended WMS, and changes to associated project schedules. A comparison of allocated WMS volume and active project count for the two Plans is presented in *Figure ES-6* below.

Figure ES-6 – Identified Water Needs by WUG Category by Decade



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Chapter 1 – Description of Region

1.1 REGIONAL WATER PLANNING IN TEXAS

In 1997 the State Legislature, through Senate Bill 1, determined that a Texas State Water Plan for the 2000 - 2050 timeframe would be developed through a regional water planning approach. To accomplish this task, the Texas Water Development Board (TWDB) divided the state into 16 regional water planning areas and appointed representational Regional Water Planning Groups (RWPG) that have guided the development of each region's plan. In 2001, a new set of rules and guidelines were enacted through Senate Bill 2. With the help of the Senate Bill 2, the 2002 State Water Plan received enormous public involvement compared to previous plans. The planning process is cyclic, with updated Regional and State Water Plans produced every five years. The 2011 Region H Water Plan and the 2012 State Water Plan were created during the last planning cycle.

1.2 DESCRIPTION OF REGION H

Region H, located along the upper Texas coast, consists of all or part of 15 counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Leon, Liberty, Madison, Montgomery, Polk, San Jacinto, Trinity, Walker and Waller. The eastern portions of Trinity and Polk counties are included in the Region I planning area. The Region spans three river and four coastal basins in southeast Texas. Region H encompasses the San Jacinto River basin, the lower portions of the Trinity and Brazos River Basins, and includes part or all of the Brazos-Colorado, the San Jacinto-Brazos, the Trinity-San Jacinto and the Neches-Trinity coastal basins. This area includes the Galveston and Trinity Bay estuaries, the urbanized, rapidly growing Houston-Galveston Metropolitan Area encompassing Brazoria-Harris-Galveston-Ft. Bend and Montgomery counties, the coastal port communities of Galveston and Freeport, and agricultural areas in Austin, Chambers, Leon, Liberty, Madison, Polk, San Jacinto, Trinity, Walker and Waller counties. *Figure 1-1* is a map of the Region H area. The Region H Water Planning Group (RHWPG) is a 26 member committee representing the diverse interests of the Region. *Table 1-1* lists the RHWPG membership.

Figure 1-1 – Region H Water Planning Area

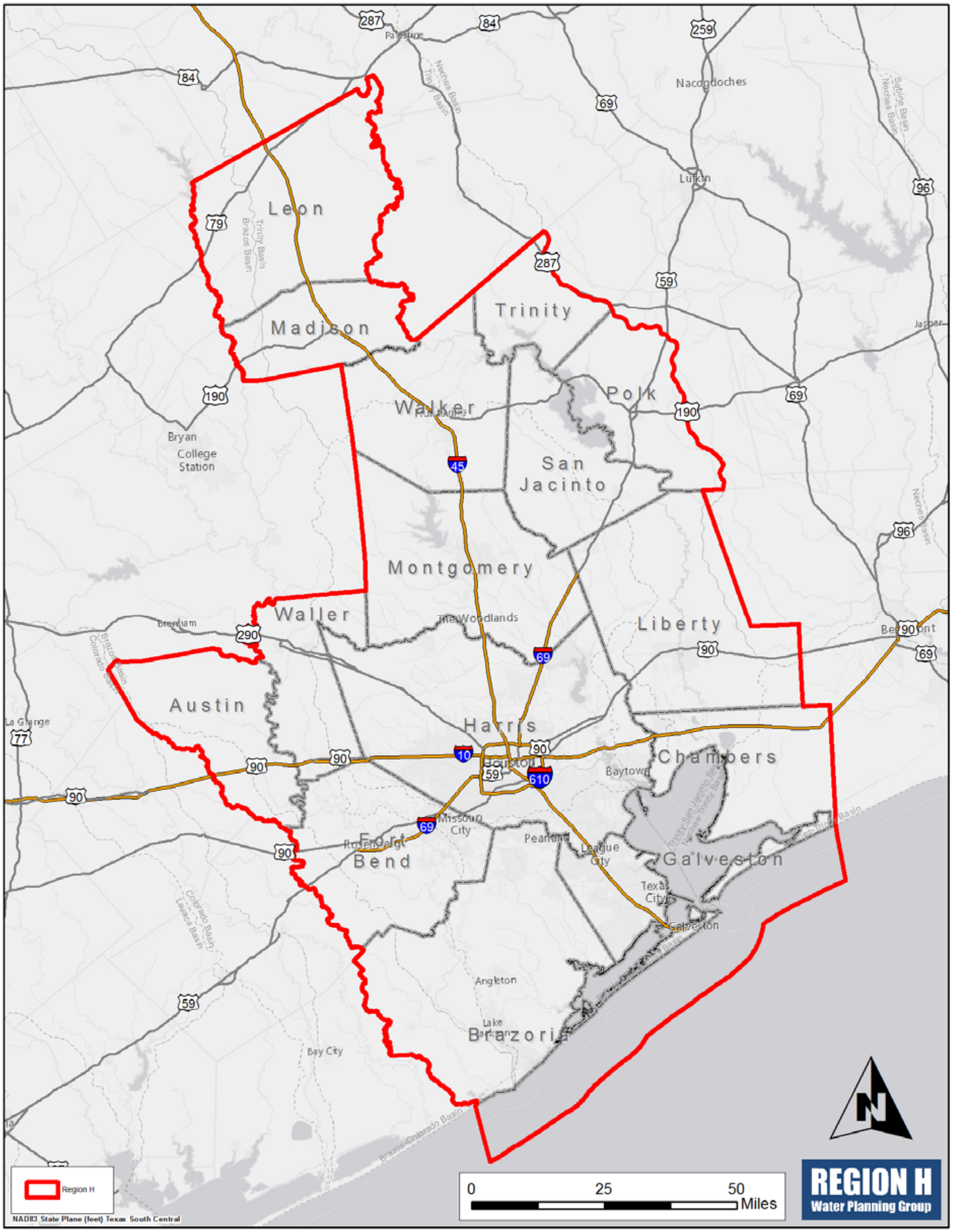


Table 1-1 – Member Information for the Region H Water Planning Group

Executive Committee	
Office	**Incumbent**
Chair	Mark Evans
Vice-Chair	Ron J. Neighbors
Secretary	Jace Houston
At-Large	John R. Bartos
At-Large	Jun Chang
Offices	
Office	**Organization**
Administrative	San Jacinto River Authority P.O. Box 329 Conroe, Texas 77305-0329 Phone: (936) 588-1111 Fax: (936) 588-1114
Political Subdivision	San Jacinto River Authority P.O. Box 329 Conroe, Texas 77305-0329 Phone: (936) 588-1111 Fax: (936) 588-1114

Notes:
Administrative Office manages records.
Political Subdivision is the entity eligible to apply for State grant funds.

Voting Membership			
Category	**Member**	**Organization**	**County (Location of Interest)**
Agriculture	Robert Bruner 03/1998-Present	Rancher	Walker
	Pudge Willcox 02/2007-Present	CLCND	Chambers
Counties	John Blount, P.E. 09/2004-Present	Harris County	Harris
	Mark Evans 03/1998-Present	Trinity County	Trinity
	Art Henson 11/2009-Present	Madison County	Madison
Electric Generation Utilities	Gene Fisseler 11/2013-Present	NRG	Harris
	Ted Long 08/2008-11/2013		
Environmental	John R. Bartos 03/1998-Present	Galveston Bay Foundation	Harris
GMA 12	David Bailey 12/2011-Present	Mid-East Texas GCD	GMA 12 Counties
GMA 14	Kathy Jones 12/2011-Present	Lone Star GCD	GMA 14 Counties
Industries	Gená Leathers 09/2009-11/2014	Dow Chemical Company	Brazoria
	Glenn Lord 11/2014-Present		

Voting Membership			
Industries (cont.)	James Comin 08/2014-Present	ExxonMobil	Chambers/Harris
	Glynna Leiper 08/2008-08/2014		
Municipalities	Robert Istre 07/2003-Present		Galveston
	Jun Chang 11/2008-Present	City of Houston	Harris, Fort Bend, Montgomery
Public	Carl Masteron 12/2011-Present	General Public	Harris
River Authorities	David Collinsworth 08/2014-Present	Brazos River Authority	McLennan (service in west and southwest portion of region)
	John Hofmann 02/2009-08/2014		
	Reed Eichelberger 11/2006-09/2011	San Jacinto River Authority	Montgomery (service in central portion of region)
	Jace Houston 09/2011-Present		
	J. Kevin Ward 06/2012-Present	Trinity River Authority	Tarrant (service in east and southeast portion of region)
	Danny Vance 03/1998-06/2012		
Small Business	Bob Hebert 05/2007-Present	Robert Hebert and Associates	Fort Bend
	John Howard 05/2007-Present	Howard Farms	Austin
	Steve Tyler 03/1998-10/2014	Steve Tyler Creative Solutions	Trinity
Water Districts	Marvin Marcell 07/1998-Present	Fort Bend Subsidence District	Fort Bend
	Ron J. Neighbors 03/1998-Present	Neighbors & Associates	Harris, Galveston
	Jimmie Schindewolf 11/2005-Present	North Harris County Regional Water Authority	Harris
Water Utilities	C. Harold Wallace 03/1998-02/2014	West Harris County WSC	Harris
	James Morrison 03/1998-Present	Walker County Rural WSC	Walker
	William Teer, P.E. 03/1998-Present	Southeast WSC	Leon

Non-Voting Membership	
Member	**Organization**
David Alders	East Texas Water Planning Group
Wayne Ahrens	West Harris County Regional Water Authority
Jennifer Bailey	Texas Dept of Agriculture
Bill Balboa	Texas Parks & Wildlife Dept.
Vacant	Lower Colorado Regional Water Planning Group
Scott Hall	Lower Neches Valley Authority
Larry Jacobs	Montgomery County Soil and Water Cons Dist.
Lann Bookout	Texas Water Development Board
Dave Scholler	North Fort Bend Water Authority
Wayne Wilson	Brazos G Water Planning Group

1.2.1 Governmental Authorities in Region H

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

In addition to these regional councils there are several other entities with regulatory or management authority of importance to long range water planning for the region. The State exercises certain responsibilities over water planning, supply and quality through the TWDB, the Texas Commission on Environmental Quality (TCEQ), and Texas Parks and Wildlife Department (TPWD). Points of contact for these state agencies are listed in *Table 1-2*. Three river authorities manage surface water supply in the region's three river basins: the Brazos River Authority, the San Jacinto River Authority and the Trinity River Authority. There are eleven soil and water conservation districts within Region H. Five groundwater conservation districts (GCD) in Region H have the authority to regulate groundwater withdrawals. The Harris-Galveston Subsidence District and the Fort Bend Subsidence District have existed for some time. Three groundwater conservation districts were formed in 2001: the Lone Star GCD in Montgomery County, the Bluebonnet GCD, which includes Austin, Grimes and Walker Counties, and the Mid-East Texas GCD which includes Leon, Madison and Freestone Counties. In November 2005, the Brazoria County Groundwater Conservation District was confirmed by voters in Brazoria County. The Lower Trinity Groundwater Conservation District was confirmed by vote in November 2006. Region H also includes five Regional Water Authorities that provide for regional water infrastructure pursuant to conversion to surface water sources: Central Harris County Regional Water Authority, North Harris County Regional Water Authority, West Harris County Regional Water Authority, North Channel Water Authority, and North Fort Bend Water Authority.

Table 1-2 – State Agencies with Oversight of Water Planning

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

1.2.2 General Economic Conditions

Two thirds of all U.S. petrochemical production and almost a third of the nation's petroleum industries are located in Region H. The Port of Houston handles over 200 million tons of cargo annually, contributing approximately $178.5 billion to the state economy. In 2014, the Houston area employed 3.1 million people. Region H is generally characterized with urbanized land uses and broad-based economic development. In areas outside of the urban core, agriculture dominates economic activities. The region supports six primary economic sectors: services, manufacturing, transportation, government, agriculture, and fishing.

The service sector employs the greatest number of people in Region H. The most common service industries include: accounting, law, banking, computer software, engineering, healthcare, and telecommunications. Medical specialties are concentrated at the Texas Medical Center in Houston and the University of Texas Medical Branch in Galveston. Tourism is also a major industry for both Galveston and Houston. Galveston alone drew more than 5.7 million tourists a year generating approximately $900 million dollars in 2012.

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

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

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

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

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

1.3 POPULATION AND WATER DEMAND IN REGION H

Based on data from the 2000 Census, the first Regional Water Plan reflected a regional population of approximately 4,898,948. Based on the 2010 census, the population for Region H had grown to approximately 6,093,967 in the year 2010. Approximately 59 percent (3,592,506) of this population resides in 125 cities and towns with populations of over 500 persons; additionally, Regional Water Authorities and water utilities of over 500 persons include approximately 1,792,152 people, or 29 percent of the Region H population. The balance of the population resides in smaller communities or the unincorporated portions of the 15 counties of the region. Seventeen of the cities in the Region have populations in excess of 25,000. *Table 1-3* lists the Water User Groups (WUGs) with over 25,000 persons and their 2010 census population and associated reported municipal use.

Table 1-3 – WUGs with Populations Over 25,000

WUG	2010 Population	2010 Reported Municipal Use (ac-ft/yr)
Baytown	71,802	9,751
Conroe	56,207	9,027
Deer Park	32,010	4,498
Friendswood	35,805	4,473
Galveston	47,743	15,538
Houston	2,100,263	321,436
Huntsville	38,548	7,296
La Porte	33,800	3,801
League City	83,560	10,434
Missouri City	67,358	8,184
Pasadena	149,043	18,859
Pearland	91,252	10,157
Sugar Land	78,817	17,821
Texas City	45,099	6,127
The Woodlands	92,659	17,690

Source: Texas Water Development Board

The 2010 total county populations and reported 2010 water use is listed in *Table 1-4*. Detailed information on local, county, and regional population estimates and projections for the 50-year planning period are included in the ***Chapter 2*** of this plan. In 2010, municipal uses accounted for 52 percent of the region's total reported water use, an increase from 41 percent in 2000. In addition to municipal water use, year 2000 estimates of other water use types were prepared by the TWDB for use in the planning process.

Table 1-4 – County Population and Municipal Water Demand

County	2010 Population	2010 Reported Municipal Use (ac-ft/yr)
Austin	28,417	4,351
Brazoria	313,166	44,286
Chambers	35,096	5,927
Fort Bend	585,375	95,331
Galveston	291,309	47,646
Harris	4,092,459	623,341
Leon	16,801	2,818
Liberty	75,643	10,794
Madison	13,664	3,316
Montgomery	455,746	76,708
Polk[1]	37,569	7,302
San Jacinto	26,384	2,963
Trinity[1]	11,272	2,108
Walker	67,861	12,222
Waller	43,205	5,577
Region H Total	**6,093,967**	**944,690**

Source: Texas Water Development Board
[1]*Includes portion of the county in the Region H area and adjacent Region I.*

Manufacturing uses accounted for 29 percent of the region's total use in 2010, compared to 30 percent in 2000. Irrigation uses represented 14 percent of the region's total 2010 reported use, a decline from the 22 percent reported in 2000. *Figure 1-2* illustrates the distribution of 2010 water demand by use type. Total water demands for each county are listed in *Table 1-5*.

Figure 1-2 – Percentage of 2010 Total Water Demand by Use

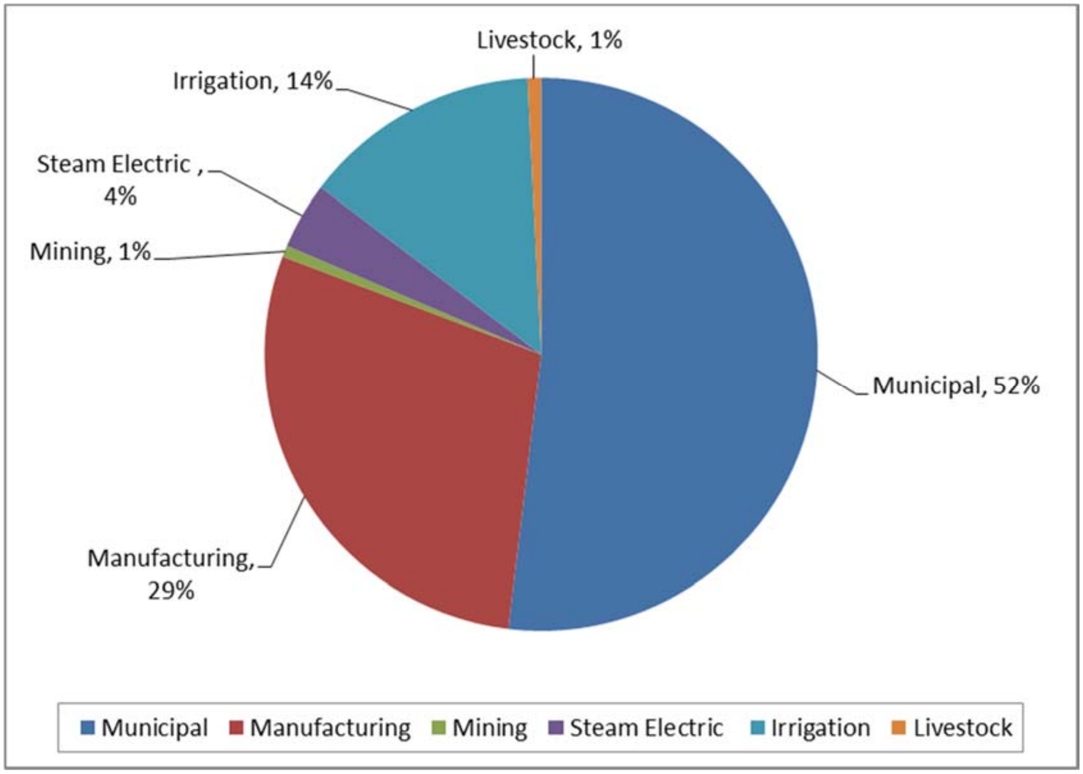


Table 1-5 – Reported 2010 Non-Municipal Water Use (acre-feet per year)

County	MFR	MIN	POW	IRR	STK	Total
Austin	106	14	0	3,986	1,153	5,259
Brazoria	183,733	760	0	77,889	1,501	263,883
Chambers	19,074	10	607	60,300	528	80,519
Fort Bend	3,811	781	59,057	26,940	1,036	91,625
Galveston	20,571	524	33	2,291	332	23,751
Harris	260,334	5,099	4,652	2,874	1,594	274,553
Leon	544	744	0	31	1,729	3,048
Liberty	160	288	0	43,200	1,056	44,704
Madison	0	13	0	10	973	996
Montgomery	1,609	811	3,258	1,050	635	7,363
Polk[1]	238	18	0	595	441	1,292
San Jacinto	5	10	0	148	566	729
Trinity[1]	0	11	0	0	467	478
Walker	246	13	0	570	735	1,564
Waller	56	8	0	22,044	1,463	23,571
Region H Total	**490,487**	**9,104**	**67,607**	**241,928**	**14,209**	**823,335**

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

1.3.1 Major Demand Centers

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

Houston has the greatest overall water demand in the region, as shown in *Table 1-6*, followed closely by remaining demands in Harris County. The next highest demands are Fort Bend, Montgomery, Galveston, and Brazoria Counties. Harris County and the City of Houston dominate municipal water use in Region H. The City of Houston used 321,463 acre-feet in the year 2010 or approximately 34 percent of the total regional municipal use. As shown in *Table 1-6*, Brazoria, Fort Bend, Galveston, and Montgomery Counties are major demand centers with reported use in excess of 25,000 acre-feet in both 2000 and 2006. In addition to the City of Houston, municipalities identified as major demand centers (reported municipal demands in excess of 10,000 acre-feet) include the cities of Pasadena, Galveston, Baytown, and Sugar Land.

Table 1-6 – Major Municipal Demand Centers

County/City	2000 Municipal Use (acre-feet)	2010 Municipal Use (acre-feet)
City of Houston	347,947	321,463
Harris County (excluding Houston)	250,649	301,878
Fort Bend County	67,566	95,331
Montgomery County	51,193	76,708
Galveston County	44,544	47,646
Brazoria County	40,127	44,286
Pasadena	18,567	18,859
Sugar Land	5,959	17,821
The Woodlands	*	17,690
Galveston	16,288	15,538
League City	6,617	10,434
Pearland	5,650	10,157

Source: Texas Water Development Board

** The Woodlands was not reported as a WUG in 2000 survey.*

The largest manufacturing demand center is Harris County, which used 260,334 acre-feet of water in 2010 (53 percent of the regional total). Two other major demand centers are identified: Brazoria County, with reported 2010 manufacturing use of 183,733 acre-feet, and Galveston County with a reported 2010 manufacturing use of 20,571 acre-feet. The principal water using industries in the region are petroleum refining, chemical products and pulp and paper mills. The three largest manufacturing demand centers are shown in *Table 1-7*.

Table 1-7 – Major Manufacturing Demand Centers

County	2000 Manufacturing Use (acre-feet per year)	2010 Manufacturing Use (acre-feet per year)
Brazoria	221,930	183,733
Galveston	35,381	20,571
Harris	349,420	260,334

Source: Texas Water Development Board

The four largest irrigation demand centers are Brazoria, Chambers, Liberty, and Fort Bend counties. *Table 1-8* highlights each county's reported 2000 and 2010 irrigation use. The major irrigated crops in the region are rice, soybeans, vegetables and cotton.

Table 1-8 – Major Irrigation Demand Centers

County	2000 Irrigation Use (acre-feet per year)	2010 Irrigation Use (acre-feet per year)
Brazoria	149,188	77,889
Chambers	117,777	60,300
Fort Bend	53,455	26,940
Liberty	82,901	43,200

Source: Texas Water Development Board

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

1.3.2 Water User Group WUG Updates

The 2016 Region H Water Plan was updated to include additional WUGs based on changes in population estimates. WUGs are added when their population increases to 500 or more residents. Forty-three new entities were added to the WUG list based on population estimates for the year 2010, representation of regional systems, or other reasons. These new WUGs are listed below in *Table 1-9*.

Table 1-9 – New WUGs in 2016 Region H Water Plan

County	WUG Name
Brazoria	Brazoria County MUD #21
Brazoria	Brazoria County MUD #6
Chambers	Cove
Fort Bend	Fort Bend County MUD #116
Fort Bend	Fort Bend County MUD #121
Fort Bend	Fort Bend County MUD #129
Fort Bend	Greatwood
Fort Bend	Sienna Plantation
Fort Bend	Weston Lakes
Harris	Greenwood UD
Harris	Harris County MUD #106
Harris	Harris County MUD #119
Harris	Harris County MUD #148 - Kingslake
Harris	Harris County MUD #221
Harris	Harris County MUD #278
Harris	Harris County MUD #290
Harris	Harris County MUD #400 - West
Harris	Harris County MUD #49
Harris	Harris County MUD #96
Harris	Harris County WCID #74
Harris	Harris County WCID #96
Harris	Kings Manor MUD
Harris	Kirkmont MUD
Harris	Mount Houston Road MUD
Harris	Newport MUD
Harris	North Channel Water Authority
Harris	Sagemeadow UD
Harris	The Commons Water Supply Inc
Leon	Concord-Robbins WSC
Leon	Oakwood
Liberty	Tarkington SUD
Liberty	Woodland Hills Water Company
Montgomery	Benders Landing Water System
Montgomery	Dobbin-Plantersville WSC
Montgomery	Indigo Lake Water System
Montgomery	Kings Manor MUD
Montgomery	Lake Windcrest Water System
Montgomery	Montgomery County MUD #15
Montgomery	Montgomery County MUD #83

County	WUG Name
Montgomery	Montgomery County MUD #89
Montgomery	Montgomery County MUD #94
Montgomery	Westwood North WSC
Waller	G & W WSC

1.4 REGION H WATER SUPPLY SOURCES AND PROVIDERS

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

Traditionally, water supplies in Region H have originated from groundwater sources. As development has occurred in the area, communities developed with their own groundwater wells and wastewater services, making them self-contained in meeting their needs from a water resources perspective. This characteristic makes Region H unique among many other urbanized regions who have relied upon regional infrastructure to develop, transmit, and deliver water supplies from regional sources.

This perspective has changed over time as the greater-Houston area has coped with groundwater reduction due to the risks of subsidence. In many area, Region H has retroactively developed regional infrastructure for the use of surface and other water supplies in lieu of groundwater to offset this threat. Therefore, the water supply systems within the region face challenges due to, not only the organic growth of demands over time, but also the sudden conversion from groundwater to alternative supplies.

In addition, these regional infrastructure projects are typically layered in their development. Water users rarely rely upon one project to develop and deliver their water supplies. Instead, users more than likely rely upon one project that provides for development of raw water, one or more raw water transmission project, a treatment project, and one or more treated water transmission projects to finally deliver water to the demand center. In addition, there are also costs associated with distribution of this water to retail customers which is outside of the scope of the Regional Water Plan (RWP). This is an important factor to consider when reviewing the way in which projects are presented in the RWP. Regional projects are most often inter-related and require numerous other components in order to provide a comprehensive water supply solution.

1.4.1 Groundwater Sources

Two major aquifers supply groundwater within the Region H area. The aquifer that furnishes the most groundwater within the area is the Gulf Coast aquifer. This aquifer is composed of the Evangeline, Chicot and Jasper formations and extends from near the Gulf Coast shoreline to approximately 100 to 120 miles inland, to Walker and Trinity counties. The other major aquifer in the study area is the Carrizo-Wilcox, which begins 115 to 125 miles inland and extends beyond the northern boundary of the region. There are also four minor aquifers in this part of the state: the Sparta and Queen City aquifers occur in Leon County, the southern part of Madison County and northern parts of Walker and Trinity Counties. In Leon and Madison Counties, they lie above the Carrizo-Wilcox Aquifer. The

Yegua Formation and the Jackson Group comprise the Yegua-Jackson aquifer, located in parts of Madison, Walker, Trinity, and Polk Counties. The Brazos River alluvium occurs along the main stem of the Brazos as it passes through the region, except in Brazoria County. *Figure 1-3* and *Figure 1-4* illustrate these groundwater sources. Groundwater withdrawals accounted for approximately 34 percent of the total regional water supply in 2000 and approximately 37 percent in 2010.

Groundwater use is regulated in Harris, Galveston, and Fort Bend, and Montgomery Counties due to the potential for over-drafting of the Gulf Coast Aquifer and related subsidence and water level impacts. For these areas, the availability of groundwater is determined by the regulatory plans developed for each county or area in accordance with the goals of each regulating entity; the Harris-Galveston Subsidence District, the Fort Bend Subsidence District, and the Lone Star GCD. In addition, Groundwater Management Plans have been published for Austin, Brazoria, Leon, Madison, Polk, Trinity, Walker, and Waller Counties by the Bluebonnet, Brazoria County, Mid-East Texas and Lower Trinity GCDs. The active GCDs and Subsidence Districts within Region H are shown on *Figure 1-5*.

Region H is divided into Groundwater Management Areas (GMAs) 11, 12, and 14. Trinity County lies within GMA 11. GMA 12 encompasses the areas of Leon and Madison Counties with all other Region H Counties falling within GMA 14. All three GMAs are currently in the process of updating their Desired Future Conditions (DFCs) for their relevant aquifers which will be used to determine the Modeled Available Groundwater (MAG) for incorporation into planning documents for the GCDs within each GMA.

1.4.2 Surface Water Sources

Surface water sources in Region H are reservoir storage and run-of-river supply for the three rivers in the area: the Trinity, the San Jacinto, and the Brazos. There are no major springs located within Region H, although small springs and seeps supply base flows for some streams. Historically there were numerous small seeps identified throughout the region. Many of these have ceased flowing due to land use changes and groundwater pumping.

Figure 1-6 illustrates the region's surface water sources. A selected bibliography of related references is included in ***Appendix 1-A.***

Figure 1-3 – Region H Major Groundwater Sources

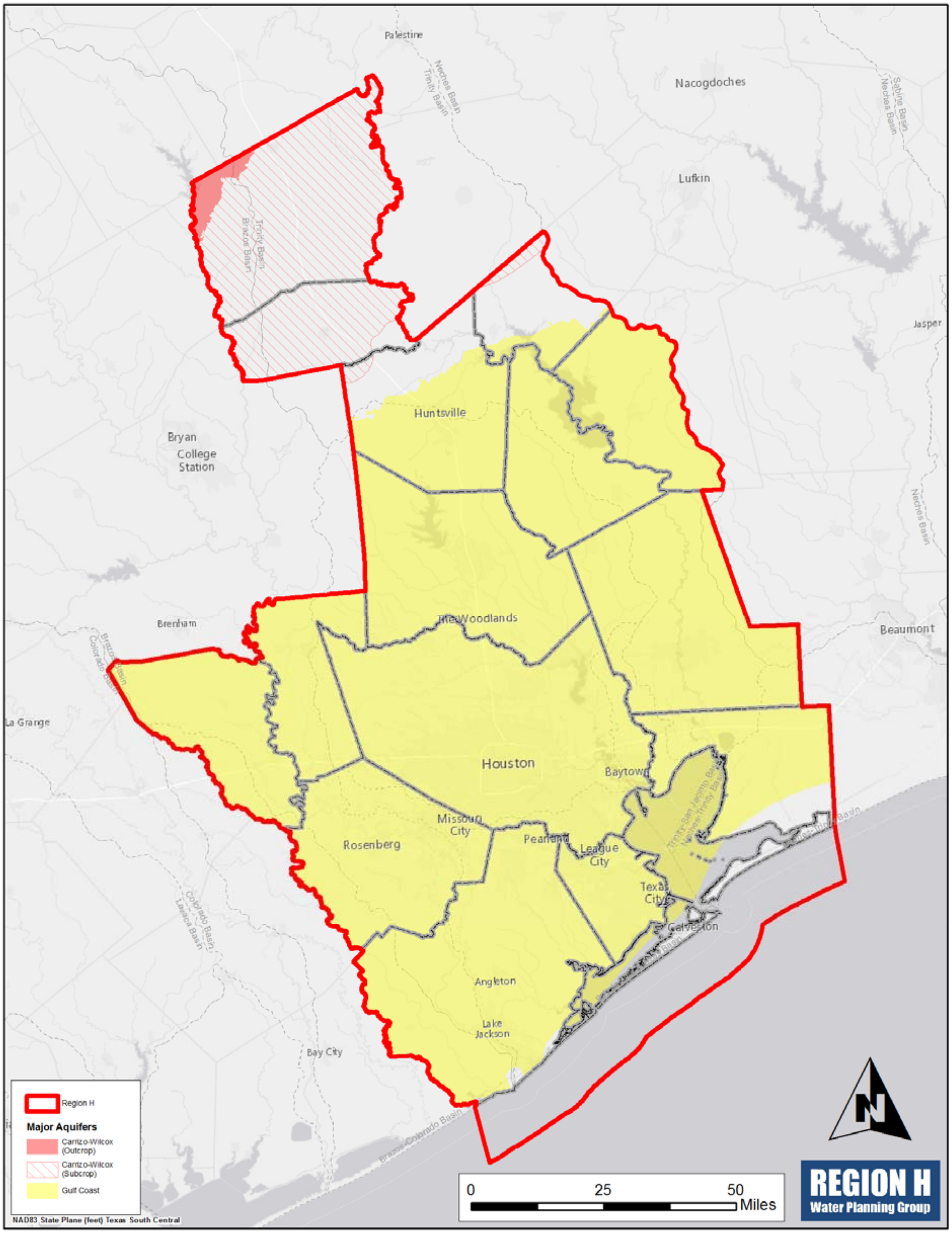


Figure 1-4 – Region H Minor Groundwater Sources

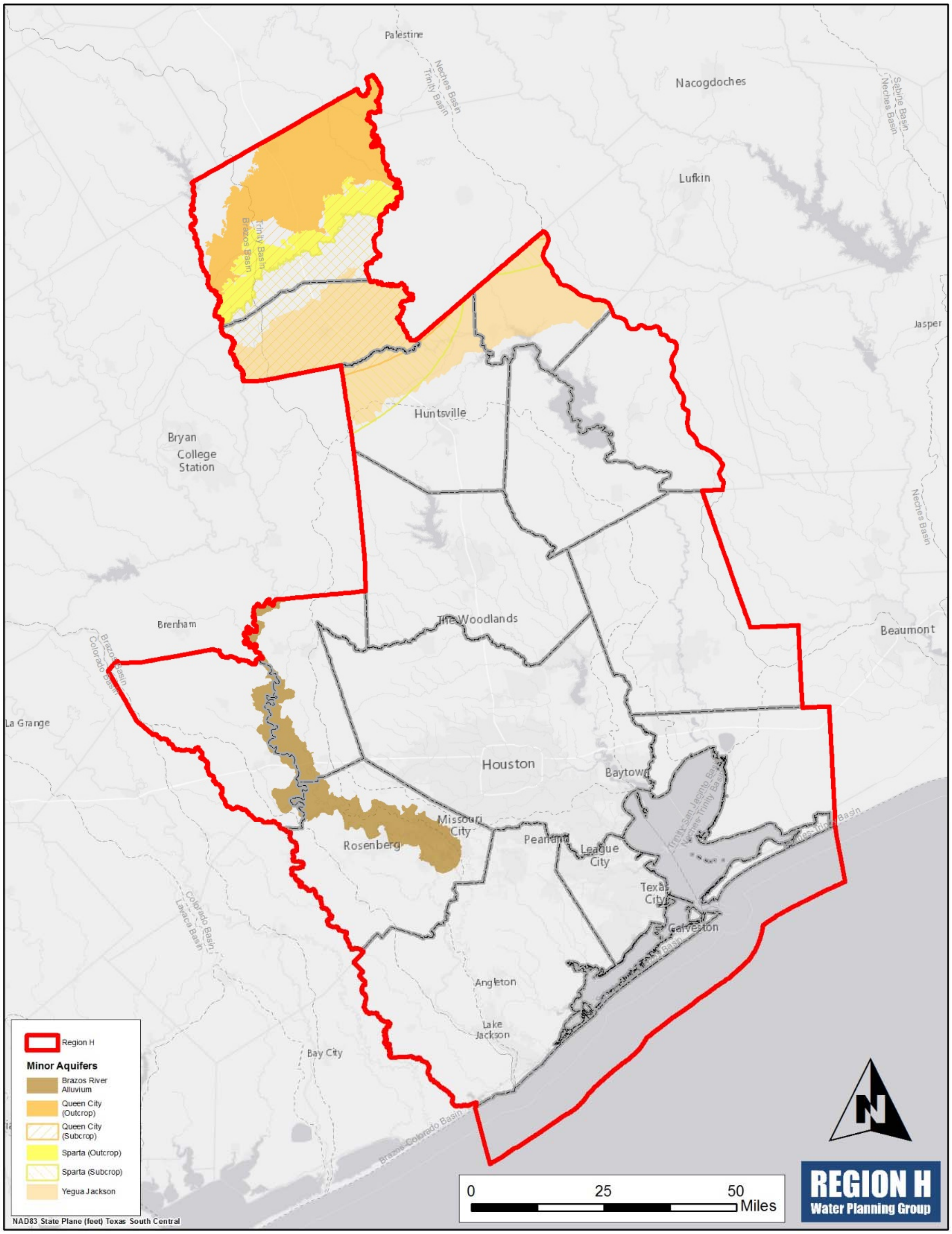


Figure 1-5 – Region H Groundwater Conservation and Subsidence Districts

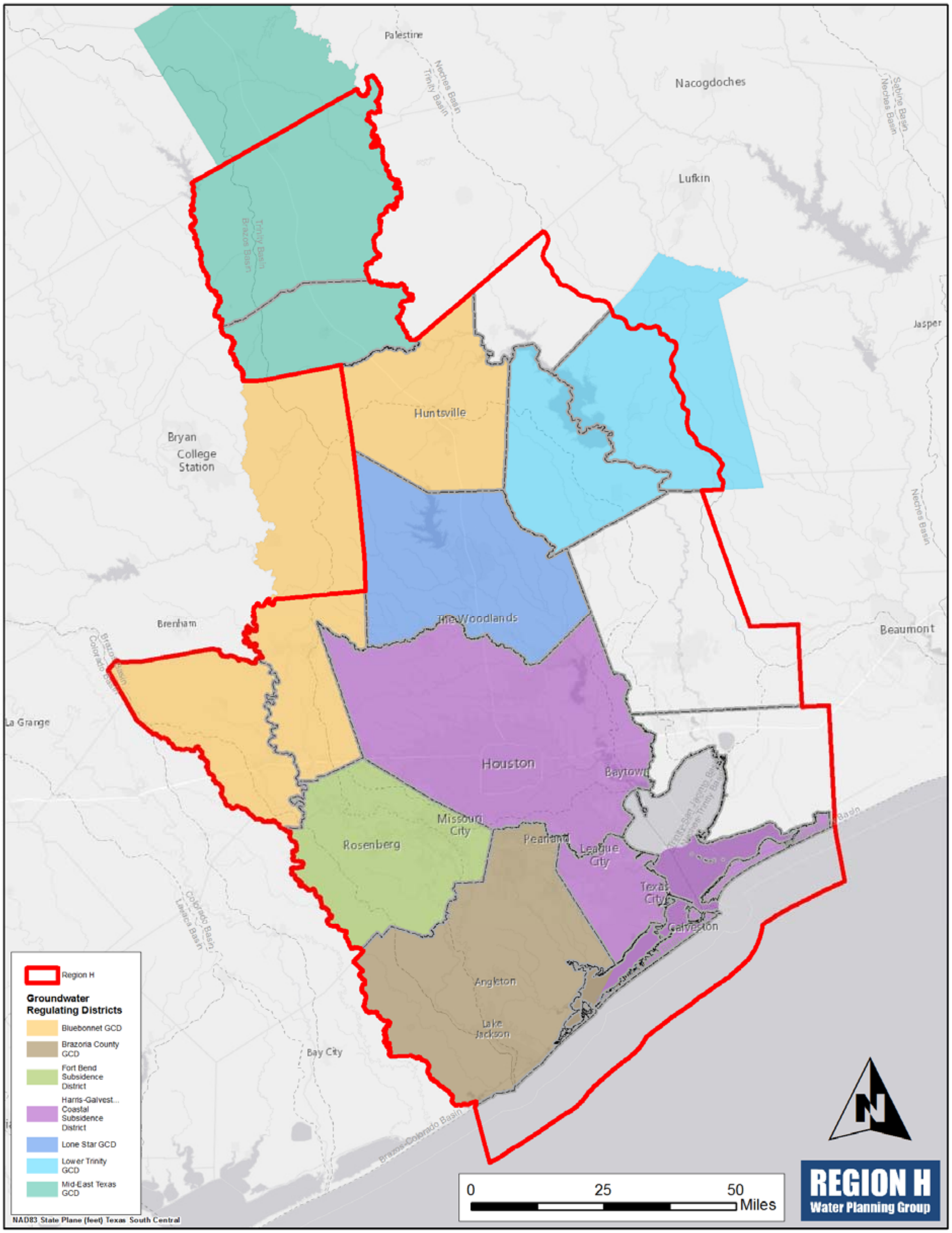
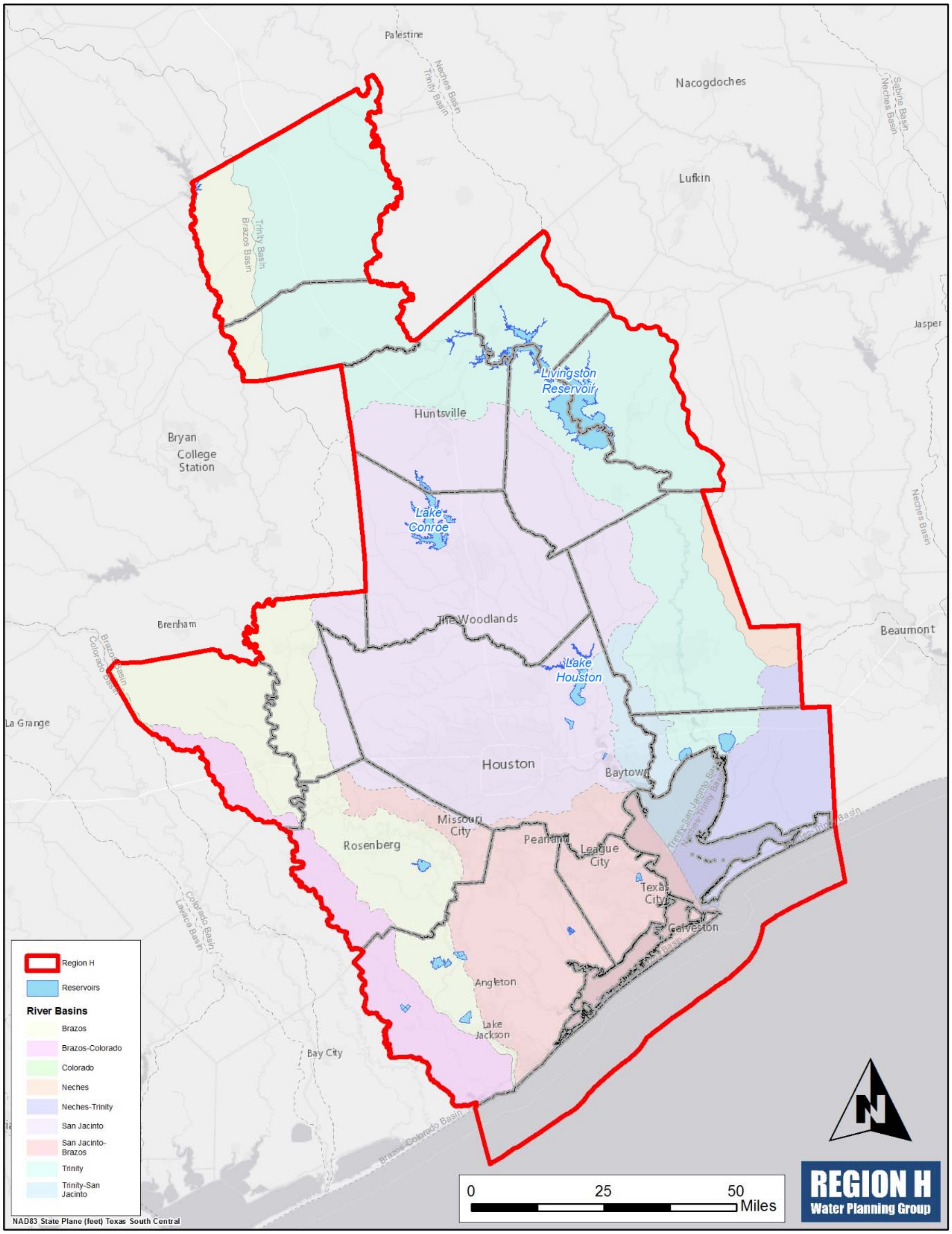


Figure 1-6 – Region H Surface Water Sources



1.4.3 Trinity River Basin

The Trinity River basin contains two water projects in Region H: Lake Livingston and the Wallisville Salt Water Barrier. The City of Houston (COH) and the Trinity River Authority (TRA) sponsored Lake Livingston's construction. It is operated by the TRA to meet the service demands of the COH and other local users in the Trinity Basin and in the Neches-Trinity Coastal Basin. These two projects are operated as a system, using Livingston primarily to store water and Wallisville to control the migration of salt water from Trinity Bay. The combined permitted yield of the Livingston-Wallisville system is 1,344,000 acre-feet per year. Additional permitted run-of-the-river water supplies downstream of Lake Livingston total 220,230 acre-feet per year. These supplies are associated with the water rights agreements established at the time of Lake Livingston permitting.

1.4.4 San Jacinto River Basin

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

1.4.5 Brazos River Basin

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

The total Brazos Basin supply, including firm supplies from BRA's reservoirs and reliable yield from run-of-river permits in both Region G and H, is estimated at over 1,200,000 acre-feet per year. Approximately 160,495 acre-feet per year of firm supply from the BRA system is contracted for use in the Region H area. The reliable yield of run-of-river permits granted in Region H is estimated at approximately 415,608 acre-feet per year. Suppliers in the Brazos Basin include Dow Chemical with permitted diversions of 305,656 acre-feet per year. Dow diverts surface water from the Brazos River and enhances the reliability of their supplies through off-channel surface reservoirs as well as contracts with BRA for upstream supplies.

1.4.6 San Jacinto – Brazos Coastal Basin

There are several significant water users within the San Jacinto-Brazos Coastal Basin supported by the run-of-river water supplies from the Brazos Basin. Suppliers include the Gulf Coast Water Authority

(GCWA) which has historically owned water rights on the Brazos River with permitted diversions of 391,932 acre-feet per year. The GCWA also enhances the reliability of their surface water supplies through the use of off-channel surface reservoirs as well as contracts with BRA for upstream supplies.

1.4.7 Use by Source

TWDB reports that Region H used 1,835,200 acre-feet of water in 2000. Of that, 619,549 acre-feet (34 percent) came from groundwater wells, and 1,215,651 acre-feet (66 percent) came from rivers and other surface sources. Similarly, the most recent water use estimates of groundwater and surface water use available from the TWDB show that in 2010, groundwater use equaled 650,988 acre-feet, approximately 37 percent of the water used in Region H. Surface water use was approximately 1,117,034 acre-feet, approximately 63 percent of the total Region H water use. Galveston and Harris Counties some of the most significant reductions in groundwater use over this period.

Table 1-10 summarizes the groundwater and surface water usage for each county. *Table 1-11* lists the estimated year 2070 reliable yields available from existing sources to Region H. Further information regarding the yield of major surface water rights in Region H is available in ***Chapter 3***.

Table 1-10 – County Water Use by Source

County	2000 Groundwater (acre-feet)	2000 Surface Water (acre-feet)	2000 Total Use (acre-feet)	2010 Groundwater (acre-feet)	2010 Surface Water (acre-feet)	2010 Total Use (acre-feet)
Austin	12,651	3,000	15,651	8,797	813	9,610
Brazoria	34,641	236,163	270,804	52,036	256,134	308,170
Chambers	4,219	56,577	60,796	10,289	76,156	86,445
Fort Bend	97,339	62,506	159,845	116,140	70,816	186,956
Galveston	8,631	80,215	88,846	3,687	67,711	71,398
Harris	343,397	731,891	1,075,288	316,456	581,435	897,891
Leon	4,671	924	5,595	4,196	1,670	5,866
Liberty	13,517	25,159	38,676	11,079	44,419	55,498
Madison	2,814	522	3,336	3,430	882	4,312
Montgomery	54,624	4,581	59,205	79,731	4,340	84,071
Polk [1]	5,188	2,188	7,376	6,029	2,565	8,594
San Jacinto	3,372	922	4,294	2,998	694	3,692
Trinity [1]	1,265	1,368	2,633	1,486	1,099	2,585
Walker	4,770	9,259	14,029	6,328	7,458	13,786
Waller	28,450	376	28,826	28,306	842	29,148
Total	619,549	1,215,651	1,835,200	650,988	1,117,034	1,768,022

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

Table 1-11 – Projected 2070 Supplies Available for Use in Region H

Groundwater	Projected Yield (acre-feet/year)
Gulf Coast Aquifer[1]	613,253
Gulf Coast Aquifer (Additional Availability)[2]	156,369
Carrizo-Wilcox Aquifer	20,938
Queen City Aquifer	1,203
Sparta Aquifer	5,986
Yegua-Jackson Aquifer	7,487
Brazos River Alluvium	19,971
San Bernard River Alluvium	520
San Jacinto River Alluvium	1,450
Trinity River Alluvium	3,913
Subtotal	**831,090**
Reuse	
Direct Reuse	9,897
Indirect Reuse	17,327
Subtotal	**27,224**
Basin/Reservoir/Run-of-River	
Neches Basin	
Sam Rayburn Contract[3]	70,518
Neches-Trinity Coastal Basin	
Run-of-River	37,700
Trinity Basin	
Lake Livingston/Wallisville	1,344,000
Run-of-River, Lower Basin	139,186
Trinity-San Jacinto Coastal Basin	
Run-of-River	35,316
San Jacinto Basin	
Lake Houston	169,300
Lake Conroe	75,500
Run-of-River	12,652
San Jacinto – Brazos Coastal Basin	
Run-of-River	38,826
Brazos River Basin	
Brazos River Authority System[4]	160,495
Run-of-River, Lower Basin	437,954
Brazos-Colorado Coastal Basin	
Run-of-River	3,211
Subtotal	**2,524,658**
Total	**3,382,972**

[1]Value includes use from the Catahoula Aquifer
[2]Additional availability based on groundwater regulation (not included in DB17)
[2]Values based on input from LNVA and Region I
[3] Values based on long-term contracts from BRA to Region H customers

1.4.8 Wholesale Water Providers

A wholesale water provider (WWP) is an entity with contracts to sell more than 1,000 ac-ft/yr of water wholesale in any one year prior to the published regional water plan. Based on the known sales of water within Region H, the entities in *Table 1-12* have been identified as WWPs for the purpose of the 2016 Region H RWP.

Table 1-12 – Region H Wholesale Water Providers

WWP Name	WWP RWPG
Baytown Area Water Authority	H
Brazos River Authority	G
Brazosport Water Authority	H
Central Harris County Regional Water Authority	H
Chambers-Liberty Counties Navigation District	H
Clear Lake City Water Authority	H
Dow Chemical USA	H
Fort Bend County WCID #2	H
Galveston	H
Galveston County WCID #1	H
Gulf Coast Water Authority	H
Houston	H
Huntsville	H
La Porte Area Water Authority	H
Lower Neches Valley Authority	I
Missouri City	H
North Channel Water Authority	H
North Fort Bend Water Authority	H
North Harris County Regional Water Authority	H
NRG	H
Pasadena	H
San Jacinto River Authority	H
Sugar Land	H
Trinity River Authority	C
West Harris County Regional Water Authority	H

1.5 WATER QUALITY AND NATURAL RESOURCES

1.5.1 Water Quality

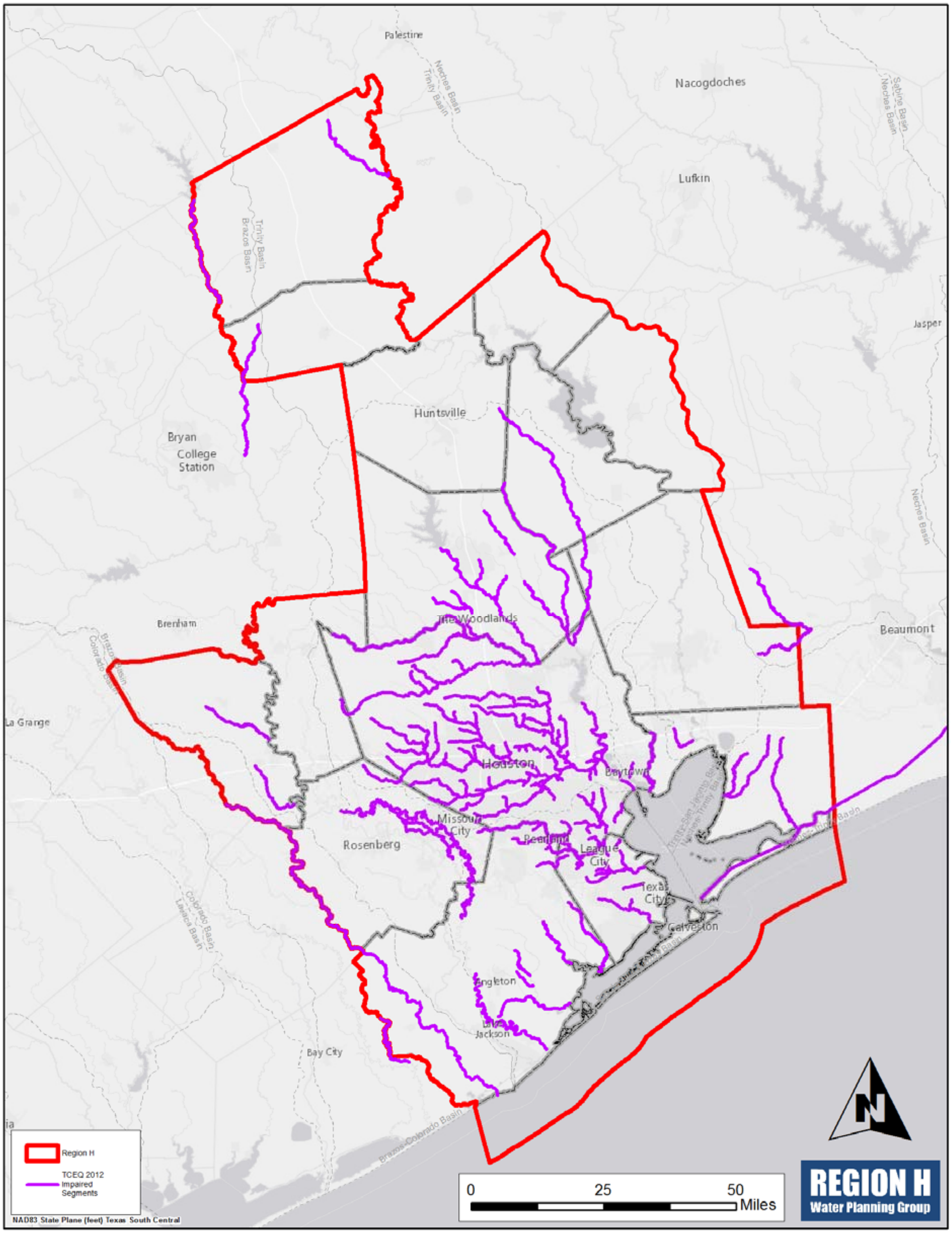
The TCEQ 2012 Water Quality Inventory was prepared in compliance with Sections 305(b) and 303(d) of the Federal Clean Water Act. *Figure 1-7* illustrates the impaired stream segments within Region H identified by TCEQ in 2012. The figure was prepared using the 2012 list of impaired segments and GIS data available on the TCEQ website. In addition to water quality data collected by TCEQ, agencies participating in the Texas Clean Rivers Program (CRP) annually compile and publish Regional Water Quality Assessments. In Region H, the Brazos, San Jacinto and Trinity River Authorities participate in the Texas Clean Rivers Program and have each published reports on the water quality conditions within their respective basins. These reports established the condition of each river and stream segment and identified those segments with water quality concerns for a number of parameters.

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

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

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

Figure 1-7 – Region H Surface Water Quality



1.5.2 Topography

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

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

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

1.5.3 Public Lands

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

Table 1-13 – Public Lands

Resource Area	Acreage	County
State and National Forests		
W. Goodrich Jones State Forest	1,725	Montgomery
Davey Crockett National Forest	162,012[1]	Total
	67,329	Trinity
Sam Houston National Forest	161,657	Total
	47,777	Montgomery
	60,247	San Jacinto
	53,633	Walker
State and National Preserve		
Big Thicket National Preserve	86,000	Total
National Wildlife Refuges		
Anahuac NWR	30,000	Chambers
Brazoria NWR	42,337	Brazoria
San Bernard NWR	28,000	Brazoria
Trinity River NWR	6,800	Liberty
Texas Wildlife Management Areas		
Candy Cain Abshier WMA	207	Chambers
Atkinson Island WMA	151	Harris
Keechi Creek	1,500	Leon
Peach Point	10,312	Brazoria

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

1.5.4 Navigation

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

1.5.5 Agricultural and Natural Resources

Agricultural interests in Region H are impacted by threats to water supply during drought of record conditions. As in other parts of the state, agricultural interests in water resources are often the first ones limited in times of shortage. Traditionally, Region H has been immune to these pressures due to its relatively plentiful supply of water. However, in recent years of drought and with the increased utilization of water for other purposes, water supply has become a critical driver in agricultural operations. Most surface water is provided through annual contracts that do not provide certainty in planning long-term water supplies. Additionally, water rights that are held by agricultural interests are often not reliable without storage to provide backup during drought. Because of these issues, many farmers have turned to use of groundwater, where allowable through local regulation, to augment the unpredictable surface water supplies. However, the prospect of developing wells is only a viable alternative for growers who farm land that they own. Growers who lease land are not able to make long-term commitments to developing groundwater resources or other fixed assets on the property they farm.

The Galveston Bay estuary is the single most significant natural resource in Region H. The estuary is dependent upon freshwater inflows to maintain seasonal salinity ranges for wildlife habitat and fisheries productivity. In addition, the development of wastewater return flows over the years from the growing urban development has provided an important baseflow for preserving the system. The estuary is capable of withstanding natural flood and drought cycles, but the amplified effects of water diversions during a drought may pose a threat to this resource.

Senate Bill 3, passed in 2007 by the 80th Texas Legislature developed a framework for evaluation and determination of future environmental flows throughout the state including Region H. Region H is home to two separate SB3 process: the Trinity-San Jacinto Basin working groups in the eastern basins of the region and the Brazos Basin working groups in the western basins. The Trinity-San Jacinto Basin and Bay Expert Science Team (BBEST) submitted their report in November, 2009 and the Trinity-San Jacinto Basin and Bay Area Stakeholder Committee (BBASC) concluded its findings in two series of recommendations transmitted in May, 2010. TCEQ adopted standards in April 2011 based on these recommendations. In the Brazos River Basin, evaluations were completed by the BBEST and BBASC in March and September 2012, respectively. In turn, final rules for the Trinity-San Jacinto and Brazos systems were formerly adopted on May 15, 2011 and March 6, 2014, respectively

The number of additional threatened and endangered species added to each county by the Texas Department of Parks and Wildlife is presented in *Table 1-14*. Threatened and endangered species are further discussed in ***Chapter 6***.

Table 1-14 – Threatened and Endangered Species

County	Current County Total
Austin County	19
Brazoria County	26
Chambers County	23
Fort Bend County	19
Galveston County	23
Harris County	24
Leon County	20
Liberty County	25
Madison County	19
Montgomery County	20
Polk County	23
San Jacinto County	21
Trinity County	24
Walker County	22
Waller County	19

1.6 EXISTING WATER PLANNING

1.6.1 Existing Regional and Local Water Management Plans

The first Region H Water Plan was published in 2001 and was incorporated into the State Water Plan in 2002. Another series of plans was developed five years later in 2006 and 2007. The last update to the Region H Water Plan was performed in 2011. The 2011 Region H Water Plan recommended several water management strategies to ensure that all water demands in the Region were met. First, water conservation was recommended for all municipalities with projected shortages. Next, supplies that were identified as surplus in one area were recommended for contract or sale to water users in other areas. These transfers included moving TRA water supply from Lake Livingston to Harris County, moving SJRA supplies from the Trinity Basin to Montgomery County, additional yield from system operation of the BRA system and future reservoir projects.

The 2011 Region H Plan proposed a series of projects in the eastern basins (Trinity and San Jacinto Basins) to maximize the use of existing supplies through transfer (TRA to COH and Lake Livingston to SJRA transfers, Luce Bayou, etc.) and by maximizing the efficiency of water use (conservation, COH reuse permit, NHCRWA reuse permit, etc.). The western portion of Region H (Brazos Basin) relied upon a series of raw water projects intended to maximize storage and create firm yield from interruptible flow conditions in the river. In all, five off-channel projects were recommended in the plan for storage enhancement.

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

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

Other previously completed regional water supply plans include the City of Houston Master Plan, Brazos Valley Long-Range Resource Plan, the San Jacinto River Authority Water Resources Development Plan, and the Trinity River Basin Master Plan. Within Region H, the BRA plan also recommended development of the Allens Creek Reservoir. The TRA recommended the development of thirteen potential reservoirs, six of which are located in Region H. The largest, Bedias Reservoir, could provide a formerly estimated 109,000 acre-feet per year, and is located to allow use in the Trinity, San Jacinto or Brazos River Basins.

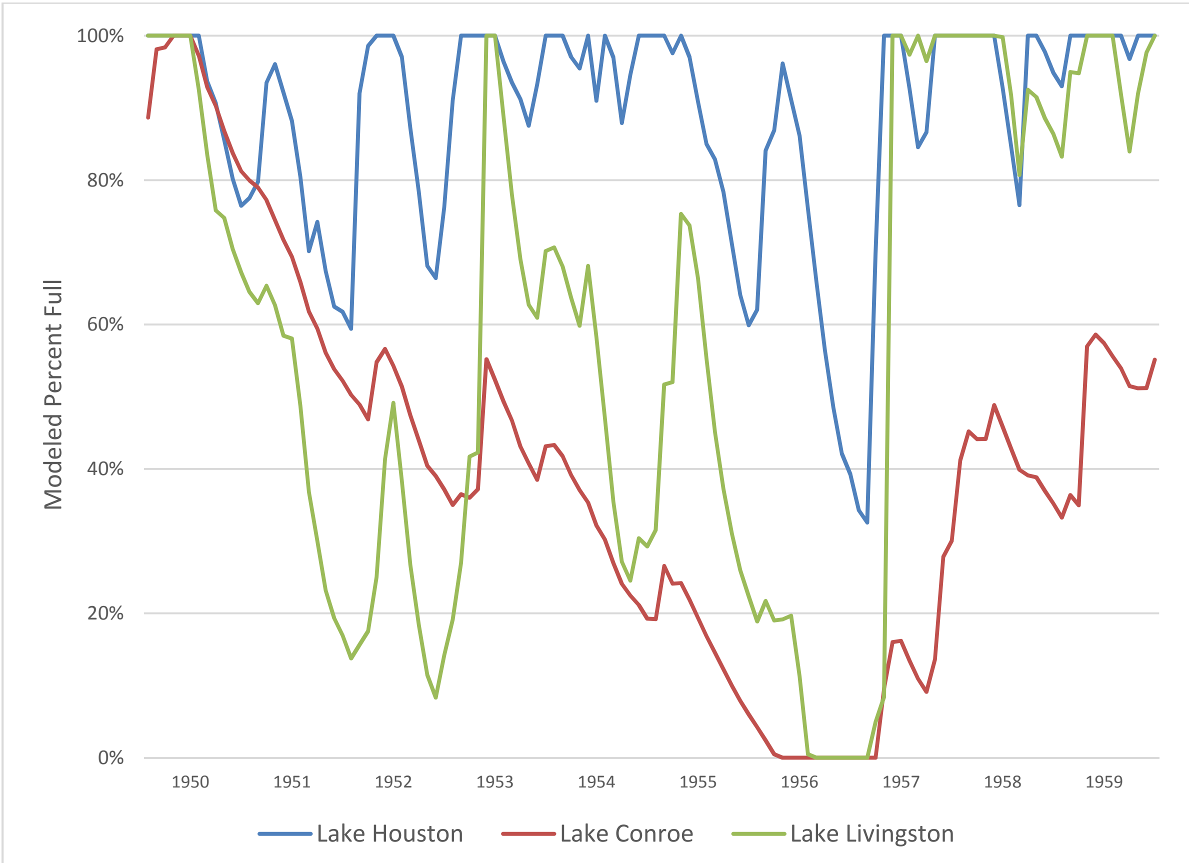
The Harris-Galveston Subsidence District and Fort Bend Subsidence District developed Groundwater Management Plans to address subsidence through reduced groundwater extraction within their respective regulatory areas. These districts adopted their most recent regulatory plans in 2013 and 2003, respectively, setting limits on groundwater use as a percentage of total water demand. The Long Star GCD has developed a regulatory plan that similarly includes a plan for groundwater reduction in order to maintain pumpage within sustainable limits. In addition, the Bluebonnet, Brazoria County, Lower Trinity, and Mid-East Texas GCDs, have published regulatory plans although these districts have not proposed limitations on groundwater withdrawals in order to maintain groundwater resources.

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

1.6.2 Drought of Record

Water supplies included in the 2016 Region H Water Plan are based on drought of record conditions. Specifically, the drought of record condition used in Region H is the drought of the 1950s as recreated in simulation by the Water Resources Analysis Package (WRAP) for the Trinity, San Jacinto, and Brazos River Basin Water Availability Models (WAMs). *Figure 1-8* below represents the percentage full for the three major reservoirs in Region H during the drought of record. Note that this analysis does not include any revisions to yield in order to maintain firm yield and assumes no return flows as modeled in the Run 3 WAM for each basin.

Figure 1-8 – Drought of Record Effects on Region H Reservoirs



1.6.3 Current Preparations for Drought

The amended Title 30, Texas Administrative Code, Chapter 288 became effective on December 6, 2012. The next revision of the drought contingency plans for retail public water suppliers serving 3,300 or more connections, wholesale public water suppliers, and irrigation districts must be submitted no later than May 1, 2014, and every five years thereafter to coincide with the regional water planning group process. Any new or revised plans must be submitted to the TCEQ within 90 days of adoption by the governing body of the entity. For entities serving fewer than 3,300 connections, the plans must be developed and made available upon request by TCEQ.

In the completed drought plans, the predominant response activities are first a public information effort to alert the public to drought conditions and encourage water conservation. If drought conditions persist, many plans impose mandatory water conservation measures, including restrictions on landscape watering and car washing. Water Conservation and Drought Response are discussed in ***Chapter 5*** and ***Chapter 7*** of this report.

1.6.4 Water Loss Audits

An important part of a municipal conservation plan is minimizing the amount of water loss in their distribution system. Retail entities that have an active financial obligation with TWDB or have more than 3,300 connections are required to submit water loss audits annually. All retail public water suppliers are required to submit a water loss audit every five years. The next upcoming audits for the five-year cycle will be submitted by May 1, 2016.

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

Apparent Losses represent water that was used but not paid for, resulting in lost revenue. Apparent losses include:

- Unauthorized Consumption
- Customer Meter Under-registering
- Billing Adjustment and Waivers

Real Losses represent water that is physically lost from the water system prior to use, resulting in lost revenue. Real Losses include:

- Main Breaks and Leaks
- Storage Overflows
- Customer Service Line Breaks and Leaks

The results of the 2010 Water Loss Audit Study found a high level of inaccuracy suggesting that utilities in the regions should refine their water accounting procedures. Within Region H, the study utilized information provided by 665 utilities. As illustrated in *Table 1-15,* an aggregate of the region showed overall real losses of 15.5 percent or the second highest of any region. This data represents a real potential for the reduction of water demand through leak detection and other practices aimed at increasing accountability.

Table 1-15 – Water Loss by Type (acre-feet per year)

<table>
<tr><td rowspan="8">Region H
665 Audits Submitted</td><td rowspan="8">System Input Volume
702,498,747,696</td><td rowspan="4">Authorized Consumption
570,527,434,739
81.2%</td><td rowspan="2">Billed Consumption
555,838,304,896
79.1%</td><td>Billed Metered
555,609,659,853
79.1%</td><td rowspan="2">Revenue Water
555,838,304,896
79.1%</td></tr>
<tr><td>Billed Unmetered
228,645,043
0.0%</td></tr>
<tr><td rowspan="2">Unbilled Consumption
14,689,129,843
2.1%</td><td>Unbilled Metered
7,758,976,293
1.1%</td><td rowspan="6">Non-revenue Water
146,904,342,195
20.9%</td></tr>
<tr><td>Unbilled Unmetered
6,930,153,550
1.0%</td></tr>
<tr><td rowspan="4">Water Loss
132,372,265,647
18.8%</td><td rowspan="3">Apparent Loss
23,989,517,923
3.4%</td><td>Unauthorized Consumption
1,679,121,648
0.2%</td></tr>
<tr><td>Customer Meter Accuracy Loss
22,006,209,101
3.1%</td></tr>
<tr><td>Systematic Data Handling Discrepency
304,187,174
0.0%</td></tr>
<tr><td>Real Loss
109,059,675,934
15.5%</td><td>Reported Breaks and Leaks
11,712,207,418
1.7%
Unreported Loss
99,795,102,209
14.2%</td></tr>
</table>

APPENDIX 1-A

SELECTED BIBLIOGRAPHY BY TOPIC

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Contents

Appendix 1-A – Selected Bibliography by Topic

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1-A.8.1 Self-Financing Information

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

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

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

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

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

1-A.8.2 Government Loan and Grant Programs

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

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

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

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

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

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

EDAP Status Report, TWDB, December 31, 2001

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

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

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

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

1-A.8.3 Additional Reports

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

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

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

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

Water Infrastructure Now, Water Infrastructure Network, February 2001

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

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Chapter 2 – Projected Population and Water Demands

2.1 INTRODUCTION

Statewide estimates indicate that the population of Texas will almost double from 2010 to 2070, growing from almost 26.5-million people to over 51-million. Region H is anticipated to make up approximately 23 percent of this population or roughly 11.7-million. With this growth in population comes a corresponding growth in demands for the Manufacturing and Steam Electric sectors. Additionally, irrigated agriculture, which has reduced considerably over the past several decades, continues to be a center for substantial demands within the Region, particularly in Brazoria, Chambers, Fort Bend, and Liberty Counties.

This chapter summarizes the long-term projections for Region H as well as the methodology employed to generate these estimates for development of the 2016 Regional Water Plan (RWP). In this effort, the Region H Water Planning Group (RHWPG) was assisted by the members of the Region H Population and Non-Population Water Demand Committees. Members of these committees are listed below in *Table 2-1*. The results of the analyses described below can be found in detail within the Texas Water Development Board's (TWDB's) DB17 and attached to this document in ***Appendix 2-DB***.

Table 2-1 – Region H Committee Members

Non-Population Demands Committee	
Member	**Organization**
Gená Leathers (Chair) Glenn Lord	Dow Chemical Company
Gene Fisseler Ted Long	NRG
John Howard	Howard Farms
Robert Istre	
James Comin Glynna Leiper	ExxonMobil
Pudge Willcox	Chambers-Liberty Counties Navigation District
Population Demands Committee	
Member	**Organization**
Marvin Marcell (Chair)	Fort Bend Subsidence District
John Blount	Harris County
Art Henson	Madison County
Jace Houston	River Authorities
Robert Istre	
Carl Masterson	General Public
Ron Neighbors	Neighbors and Associates
Steve Tyler	Steve Tyler Creative Solutions
Harold Wallace	West Harris County WSC

2.2 NON-POPULATION WATER DEMANDS

Non-population water demands include water use for Water User Groups (WUGs) that are not associated with domestic purposes. These include Irrigation, Livestock, Manufacturing, Mining, and Steam Electric use and are distributed throughout the Regional Water Planning Areas (RWPAs) by county and river basin.

2.2.1 Methodology

Information regarding non-population water use was compiled from a number of sources based on the type of demand considered. In each category, projections were initially presented by TWDB and reviewed and amended by the RHWPG as required. The demands, as prepared by TWDB and revised by the RHWPG were formally adopted by TWDB on October 17, 2013.

2.2.1.1 Irrigation

TWDB developed draft Irrigation demand projections by applying an evapotranspiration-based estimated crop water need to Farm Service Agency (FSA) acreage to generate water need estimates by county, crop, and year. The RHWPG conducted an assessment of available information and concluded that the maximum level of irrigation identified within recent years for crop acreage be used to develop the long-term projections in order to achieve a worst-case demand scenario. Demands were held constant out to 2070 in absence of any additional data representing long-term trends in agricultural production.

2.2.1.2 Livestock

Draft Livestock water demands were developed by TWDB by applying per-head water use estimates by species or category to livestock count estimates from the Texas Agricultural Statistics Service (TASS). Upon review, the RHWPG recognized that the projections were within reasonable levels based on available information and the projections were retained for use in the RWP.

2.2.1.3 Manufacturing

TWDB developed draft Manufacturing water demand projections using data from the 2004-2008 Water Use Survey. Results were adjusted for response rate and reported employment, which significantly impacted estimates for some counties. Decadal rates of change from the 2011 RWP (the slope of projected trends) were then applied to these revised baseline demands.

Following review, the RHWPG recommended retaining the TWDB projections for all counties with the exception of Brazoria, Galveston, and Walker Counties. Brazoria County projections have historically been difficult to address based on experience in previous RWP development. Water use survey data from 2001 to 2009 were used to project future growth which results in a slighter shallower rate of increase to 2070. Galveston County projections were developed with the assistance of data and input from the Gulf Coast Water Authority (GCWA) which provides raw water to the county for industrial purposes. In Walker County, the RHWPG corresponded with an industrial entity and identified a potential error in the water use survey data used to generate the projections. The resulting projection demonstrated a reduced level of demand for the county.

2.2.1.4 Mining

TWDB draft Mining water demand projections were derived through a 2011 TWDB-contracted study performed by the Bureau of Economic Geology (BEG), which examined a number of factors and mining industry sectors in development of water demand projections. This study was embarked upon due to the heightened level of oil and gas activity in the state due to shale gas exploration. Although this phenomenon is less relevant to mining demands in Region H than other regions, some Region H counties are anticipated to be impacted by this activity. Upon review, the RHWPG elected to retain the projections as presented by TWDB from the BEG study with the exception of Chambers County where more recent estimates of Mining water use were found to be well below the estimates of earlier years. Rather than retain the maximum level of demand demonstrated by these use estimates, the RHWPG chose to use an average value for Chambers County, reducing the projected demand to a level commensurate to the recent level of use.

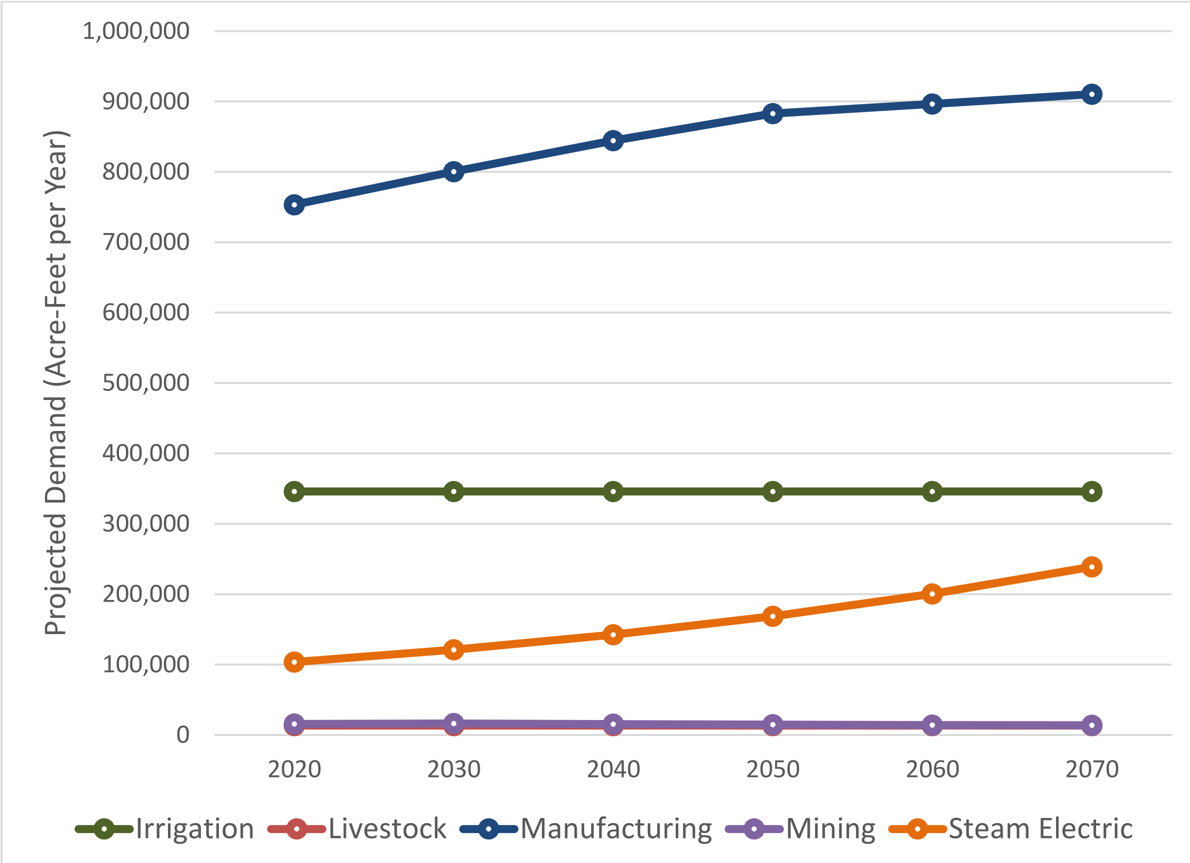
2.2.1.5 Steam Electric

Water demands for Steam Electric use were developed in the course of creating the 2011 RWP by TWDB through contract with BEG. This study was completed in 2008 and serves as the most recent review on the subject. Projections from this study were compared with past projections alongside local representatives for steam electric power generation facilities. The RHWPG proposed the use of the TWDB projections with the exception of Brazoria, Galveston, and Liberty Counties where the demands were understood to be associated with industrial cogeneration, retired, or air-cooled facilities that do not have associated water demands that should be represented in this demand sector.

2.2.2 Demand Projections

The resulting projections demonstrate growth of non-population demands from approximately 1.23-million acre-feet per year in 2020 to 1.52-million acre-feet of demand in 2070. Manufacturing and Municipal represent the significant growth in demand sectors over that time, although higher levels of efficiency are anticipated over that period that help to attenuate those demands in the long-term. These patterns are demonstrated below in *Figure 2-1*. Detailed non-population demand information can be found in ***Appendix 2-DB***.

Figure 2-1 – Projected Non-Population Demand Growth



2.3 POPULATION WATER DEMANDS

Population water demands are associated with domestic use and other demands that may be served from a Public Water Supply (PWS). Unlike non-population demands that are allocated at the county and basin levels only, population demands may be divided into WUGs if the following criteria apply:

- A city with a population of 500 or more, per the Texas State Demographer's July 2005 population estimate,
- Individual utilities providing more than 280 AFY of water for municipal use in 2005 (for counties having four or less of these utilities), or
- Collective Reporting Units (CRUs) consisting of grouped utilities having a common association.

All smaller communities and rural/incorporated areas of municipal water use, aggregated at the county level, are considered a WUG and are referred to as "County Other" for each county.

2.3.1 Methodology

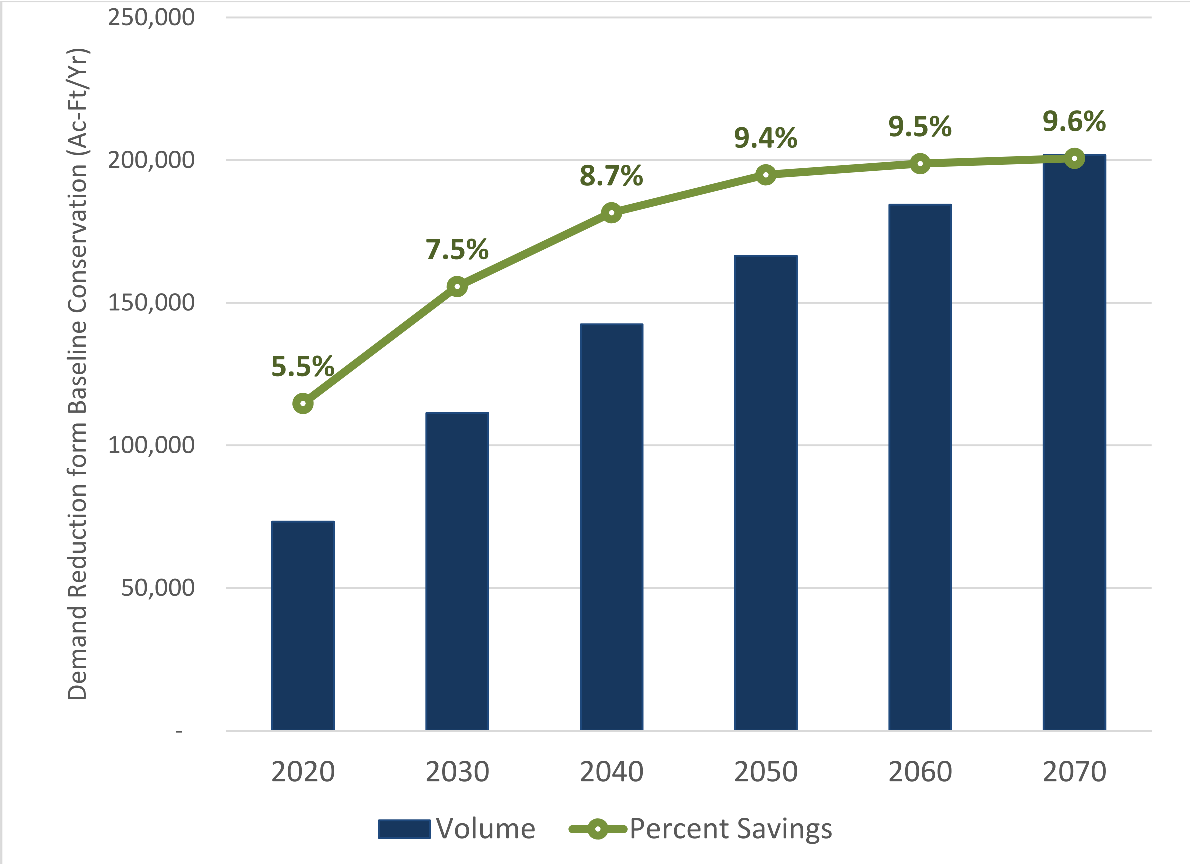
For the fourth round of regional water planning, 2010 U.S. Census data was made available for use in assessing current population and forecasting long-term trends. This information was used by the Texas State Data Center (SDC) and TWDB to generate WUG-level projections for all Regional Water Planning Groups (RWPGs).

The RHWPG opted to request an exception from these state-generated projections and, instead, utilize information developed for a parallel project to evaluate groundwater use within the region for the Harris-Galveston Subsidence District (HGSD), Fort Bend Subsidence District (FBSD), and Lone Star Groundwater Conservation District (LSGCD). This study was designed to fit with the regional planning process and coordination with TWDB was performed in order to ensure uniformity between the groundwater study and the projection development conducted by TWDB. The result was a detailed depiction of population growth in Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties for use in both the groundwater study and Region H planning.

Short-term projections were provided by Metrostudy through a methodology that examines development trends and housing starts throughout the study area. These estimates were interwoven with long-term projections from the University of Houston Center for Public Policy (UHCPP) that uses the Small Area Model Houston (SAM-Houston) to predict how population and employment will be allocated throughout the region and incorporates a land use model to consider the extent of area favorable for development. The projections developed from this combined methodology were compared against county total projections from the SDC and it was found that they compared favorably. Populations were then allocated to WUGs geographically to develop the final Region H population projections.

Water demands were calculated for the WUG populations by TWDB using data from the water use survey. Per capita demands from 2011 were applied for WUGs within Region H in order to provide a dry-year representation of demand. The effective per capita for each decade was adjusted from this baseline according to anticipated conservation savings due to plumbing code enforcement and the proliferation of water-efficient appliances. This reduction on overall demands resulted in a reduction of year 2070 water demands of 201,807 acre-feet annually, or approximately 9.6 percent. The increase in baseline conservation savings factored into the demand projections are shown below in *Figure 2-2*.

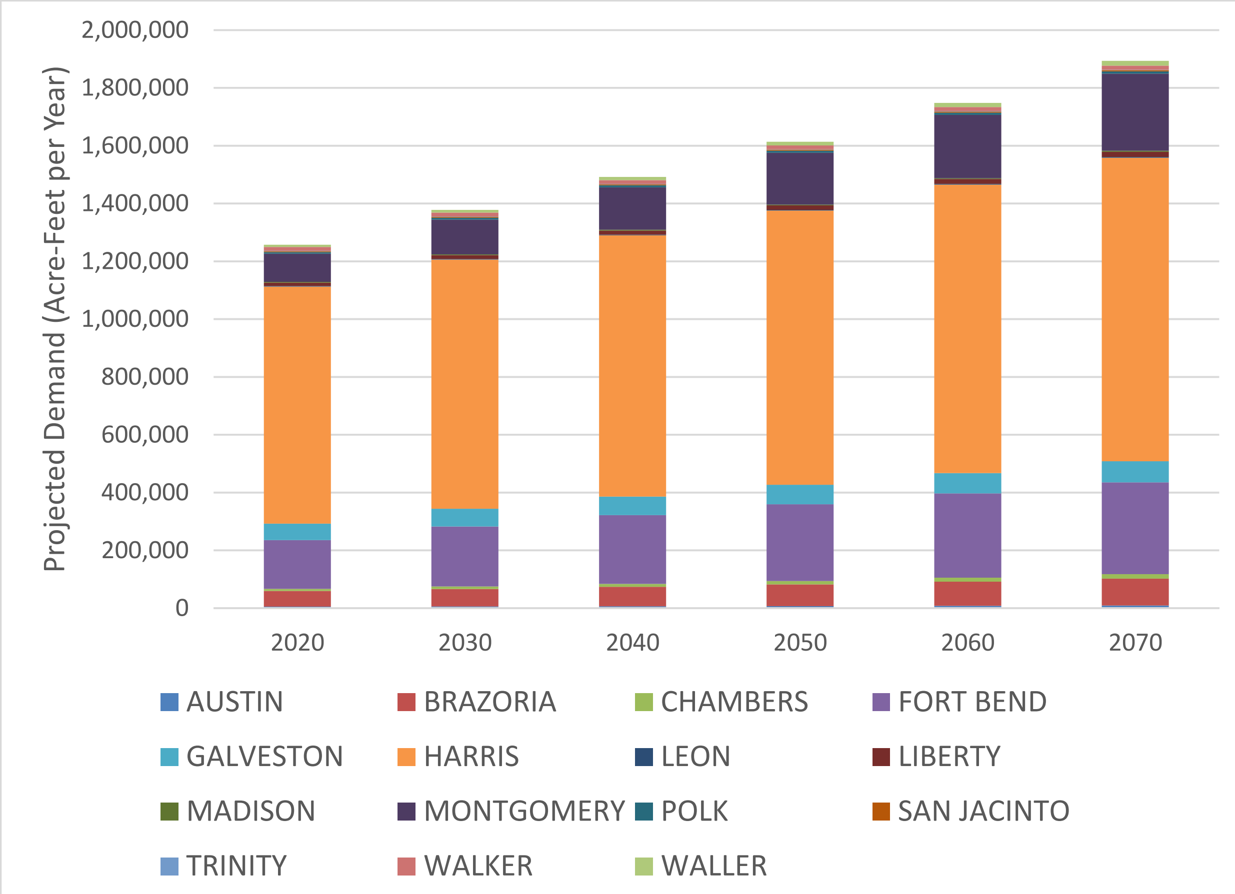
Figure 2-2 – Demand Reduction through Baseline Conservation



2.3.2 Demand Projections

The resulting projections demonstrate growth of population demands from approximately 1.25-million acre-feet per year in 2020 to 1.89-million acre-feet of demand in 2070. Over this time, Montgomery County demonstrates the single largest level of growth of 175 percent during the planning period. These patterns are demonstrated below in *Figure 2-3*. Detailed population demand information can be found in ***Appendix 2-DB***.

Figure 2-3 – Projected Population Demand Growth



2.4 WHOLESALE WATER PROVIDER DEMANDS AND CONTRACTUAL OBLIGATIONS

TWDB rules require the determination of demands associated with each of the Wholesale Water Providers (WWPs) designated by the RHWPG. Region H defines wholesale water providers as any persons or entities (including river authorities and irrigation districts) that have contracts to sell more than 1,000 acre-feet of wholesale water in any one year during the five years immediately preceding the adoption of the last RWP. The RHWPG will also include other persons and entities that enter or that the Planning Group expects or recommends to enter into contracts to sell more than 1,000 acre-feet of wholesale water during the period covered by the plan. Region H recognizes the WWPs identified in *Table 2-2* as active within the region. Note that several WWPs sell water to entities within Region H but are located outside of the region.

Table 2-2 – Wholesale Water Providers in Region H

WWP Name	WWP RWPG
Baytown Area Water Authority	H
Brazos River Authority	G
Brazosport Water Authority	H
Central Harris County Regional Water Authority	H
Chambers-Liberty Counties Navigation District	H
Clear Lake City Water Authority	H
Dow Chemical USA	H
Fort Bend County WCID #2	H
Galveston	H
Galveston County WCID #1	H
Gulf Coast Water Authority	H
Houston	H
Huntsville	H
La Porte Area Water Authority	H
Lower Neches Valley Authority	I
Missouri City	H
North Channel Water Authority	H
North Fort Bend Water Authority	H
North Harris County Regional Water Authority	H
NRG	H
Pasadena	H
San Jacinto River Authority	H
Sugar Land	H
Trinity River Authority	C
West Harris County Regional Water Authority	H

APPENDIX 2-DB

DB17 REPORTS

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WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
AUSTIN COUNTY						
BRAZOS BASIN						
BELLVILLE	4,386	4,716	5,070	5,485	5,940	6,445
SAN FELIPE	868	1,006	1,154	1,328	1,518	1,729
SEALY	6,740	7,577	8,475	9,527	10,682	11,963
COUNTY-OTHER	15,670	18,759	22,075	25,962	30,227	34,963
BRAZOS BASIN TOTAL POPULATION	**27,664**	**32,058**	**36,774**	**42,302**	**48,367**	**55,100**
BRAZOS-COLORADO BASIN						
SEALY	14	15	17	19	21	24
WALLIS	1,329	1,416	1,510	1,620	1,740	1,874
COUNTY-OTHER	3,684	4,394	5,156	6,048	7,028	8,115
BRAZOS-COLORADO BASIN TOTAL POPULATION	**5,027**	**5,825**	**6,683**	**7,687**	**8,789**	**10,013**
COLORADO BASIN						
COUNTY-OTHER	323	374	429	494	565	643
COLORADO BASIN TOTAL POPULATION	**323**	**374**	**429**	**494**	**565**	**643**
AUSTIN COUNTY TOTAL POPULATION	**33,014**	**38,257**	**43,886**	**50,483**	**57,721**	**65,756**
BRAZORIA COUNTY						
BRAZOS BASIN						
BAILEY'S PRAIRIE	217	228	237	247	256	265
BRAZORIA	677	682	686	691	696	701
FREEPORT	1,297	1,480	1,659	1,836	2,001	2,137
LAKE JACKSON	181	221	297	383	479	588
VARNER CREEK UD	1,529	1,532	1,534	1,536	1,537	1,539
WEST COLUMBIA	3,321	3,329	3,340	3,353	3,367	3,383
COUNTY-OTHER	6,189	7,213	8,741	10,262	11,820	13,460
BRAZOS BASIN TOTAL POPULATION	**13,411**	**14,685**	**16,494**	**18,308**	**20,156**	**22,073**
BRAZOS-COLORADO BASIN						
BRAZORIA	2,444	2,530	2,599	2,656	2,704	2,747
FREEPORT	6	9	12	14	16	17
JONES CREEK	2,042	2,068	2,088	2,102	2,113	2,121
SWEENY	3,704	3,716	3,731	3,747	3,765	3,785
WEST COLUMBIA	602	610	619	630	642	656
COUNTY-OTHER	22,659	27,824	32,579	37,153	41,725	46,445
BRAZOS-COLORADO BASIN TOTAL POPULATION	**31,457**	**36,757**	**41,628**	**46,302**	**50,965**	**55,771**
SAN JACINTO-BRAZOS BASIN						
ALVIN	26,830	28,832	31,157	34,065	37,803	42,709
ANGLETON	19,064	19,208	19,342	19,482	19,629	19,785
BAILEY'S PRAIRIE	531	558	567	577	586	596
BRAZORIA COUNTY MUD #2	5,348	5,348	5,351	5,355	5,359	5,363
BRAZORIA COUNTY MUD #21	3,707	3,867	4,168	4,469	4,770	4,968
BRAZORIA COUNTY MUD #3	3,653	3,659	3,717	3,775	3,833	3,911

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
BRAZORIA COUNTY						
SAN JACINTO-BRAZOS BASIN						
BRAZORIA COUNTY MUD #6	3,158	3,158	3,169	3,180	3,192	3,207
BROOKSIDE VILLAGE	1,691	1,849	2,373	3,006	3,769	4,689
CLUTE	11,440	11,830	12,255	12,706	13,189	13,705
DANBURY	1,722	1,722	1,722	1,723	1,723	1,724
FREEPORT	11,560	12,156	12,685	13,169	13,644	14,145
HILLCREST	730	731	733	734	736	737
HOLIDAY LAKES	1,109	1,110	1,112	1,115	1,117	1,119
IOWA COLONY	2,312	2,635	3,115	3,546	3,941	4,187
LAKE JACKSON	27,127	27,875	28,636	29,460	30,354	31,326
MANVEL	11,619	18,954	25,612	33,127	41,930	52,829
OYSTER CREEK	1,131	1,154	1,182	1,217	1,259	1,310
PEARLAND	97,542	104,025	112,321	121,290	131,111	140,420
RICHWOOD	3,647	3,797	3,948	4,109	4,282	4,467
COUNTY-OTHER	81,146	107,477	132,599	158,981	188,020	219,527
SAN JACINTO-BRAZOS BASIN TOTAL POPULATION	**315,067**	**359,945**	**405,764**	**455,086**	**510,247**	**570,724**
BRAZORIA COUNTY TOTAL POPULATION	**359,935**	**411,387**	**463,886**	**519,696**	**581,368**	**648,568**
CHAMBERS COUNTY						
NECHES-TRINITY BASIN						
ANAHUAC	1,840	1,865	1,891	1,919	1,949	1,980
TRINITY BAY CONSERVATION DISTRICT	10,227	12,260	14,362	16,625	19,046	21,588
COUNTY-OTHER	298	699	1,112	1,557	2,033	2,534
NECHES-TRINITY BASIN TOTAL POPULATION	**12,365**	**14,824**	**17,365**	**20,101**	**23,028**	**26,102**
TRINITY BASIN						
ANAHUAC	429	435	441	447	454	462
BEACH CITY	284	339	396	458	524	593
COVE	656	829	1,008	1,201	1,407	1,624
MONT BELVIEU	3,855	4,929	6,040	7,237	8,517	9,860
OLD RIVER-WINFREE	1,327	1,590	1,863	2,157	2,470	2,800
TRINITY BAY CONSERVATION DISTRICT	2,670	3,200	3,749	4,340	4,972	5,635
COUNTY-OTHER	7,693	8,954	10,256	11,657	13,156	14,730
TRINITY BASIN TOTAL POPULATION	**16,914**	**20,276**	**23,753**	**27,497**	**31,500**	**35,704**
TRINITY-SAN JACINTO BASIN						
BAYTOWN	4,866	5,756	6,676	7,667	8,726	9,839
BEACH CITY	2,346	2,803	3,275	3,783	4,326	4,897
MONT BELVIEU	1,158	1,481	1,815	2,174	2,558	2,962
COUNTY-OTHER	4,513	5,403	6,326	7,319	8,381	9,495
TRINITY-SAN JACINTO BASIN TOTAL POPULATION	**12,883**	**15,443**	**18,092**	**20,943**	**23,991**	**27,193**
CHAMBERS COUNTY TOTAL POPULATION	**42,162**	**50,543**	**59,210**	**68,541**	**78,519**	**88,999**

WUG POPULATION

REGION H	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
FORT BEND COUNTY						
BRAZOS BASIN						
BEASLEY	49	72	113	171	250	357
FAIRCHILDS	783	915	1,026	1,186	1,422	1,778
FORT BEND COUNTY MUD #116	2,505	2,843	3,340	3,729	4,118	4,506
FORT BEND COUNTY MUD #121	3,188	3,461	4,094	4,741	5,389	6,037
FORT BEND COUNTY MUD #129	2,680	3,848	4,933	5,838	6,471	6,475
FORT BEND COUNTY MUD #25	1,180	1,186	1,190	1,194	1,199	1,203
FULSHEAR	813	1,513	2,014	2,450	2,838	3,191
GREATWOOD	12,140	12,601	12,669	12,736	12,803	12,870
MISSOURI CITY	7,198	9,893	12,538	14,701	16,076	16,740
NEEDVILLE	1,285	1,297	1,314	1,340	1,379	1,437
NORTH FORT BEND WATER AUTHORITY	10,233	16,610	79,520	112,328	125,240	127,302
PECAN GROVE MUD #1	11,421	11,446	11,491	11,530	11,563	11,593
PLANTATION MUD	3,948	3,948	3,948	3,948	3,948	3,948
PLEAK	1,350	1,580	1,691	1,797	1,907	2,034
RICHMOND	12,400	12,890	13,510	14,375	15,236	16,093
ROSENBERG	40,381	42,520	44,831	47,204	49,946	53,226
SIENNA PLANTATION	4,966	6,376	7,822	9,268	10,714	12,318
SIMONTON	884	1,047	1,369	1,623	1,826	1,992
SUGAR LAND	57,295	61,865	67,971	74,302	79,824	83,448
WESTON LAKES	2,621	2,791	3,019	3,247	3,475	3,704
COUNTY-OTHER	119,460	181,679	185,585	220,787	277,825	351,619
BRAZOS BASIN TOTAL POPULATION	**296,780**	**380,381**	**463,988**	**548,495**	**633,449**	**721,871**
BRAZOS-COLORADO BASIN						
BEASLEY	617	655	734	842	990	1,194
NEEDVILLE	1,551	1,577	1,608	1,655	1,725	1,830
ROSENBERG	3	40	97	174	281	428
COUNTY-OTHER	10,685	17,788	30,317	48,632	75,429	114,670
BRAZOS-COLORADO BASIN TOTAL POPULATION	**12,856**	**20,060**	**32,756**	**51,303**	**78,425**	**118,122**
SAN JACINTO BASIN						
HOUSTON	25,294	27,280	28,259	29,151	29,866	30,305
KATY	6,908	16,048	16,136	16,205	16,259	16,302
MEADOWS PLACE	4,288	4,380	4,475	4,571	4,668	4,768
MISSOURI CITY	10,014	11,747	13,444	14,174	14,632	15,298
NORTH FORT BEND WATER AUTHORITY	148,140	176,426	180,480	182,392	184,084	186,051
STAFFORD	5,207	5,467	5,759	6,097	6,487	6,939
SUGAR LAND	4,199	4,201	4,202	4,204	4,205	4,207
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	11,255	11,534	11,591	11,656	11,750	11,850
COUNTY-OTHER	942	1,176	1,384	1,495	1,557	1,615
SAN JACINTO BASIN TOTAL POPULATION	**216,247**	**258,259**	**265,730**	**269,945**	**273,508**	**277,335**
SAN JACINTO-BRAZOS BASIN						
ARCOLA	1,874	2,848	3,748	4,605	5,302	5,999

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
FORT BEND COUNTY						
SAN JACINTO-BRAZOS BASIN						
FORT BEND COUNTY MUD #23	11,693	12,464	12,884	13,305	13,725	14,145
FORT BEND COUNTY MUD #25	8,232	8,316	8,459	8,628	8,801	8,978
FULSHEAR	11,293	12,242	12,918	13,475	13,946	14,352
HOUSTON	16,295	16,804	17,836	18,725	19,463	20,127
MEADOWS PLACE	381	381	381	382	384	385
MISSOURI CITY	58,637	71,707	84,738	97,048	104,776	109,256
NORTH FORT BEND WATER AUTHORITY	120,824	193,777	211,003	225,108	236,529	245,782
PEARLAND	3,495	3,766	4,691	5,615	6,543	7,621
PECAN GROVE MUD #1	89	89	90	90	90	90
SIENNA PLANTATION	13,481	17,217	24,291	31,365	38,440	44,698
STAFFORD	12,554	12,774	13,086	13,421	13,784	14,176
SUGAR LAND	44,016	48,842	49,999	50,769	51,195	51,657
COUNTY-OTHER	53,219	35,196	52,709	69,654	85,422	100,570
SAN JACINTO-BRAZOS BASIN TOTAL POPULATION	**356,083**	**436,423**	**496,833**	**552,190**	**598,400**	**637,836**
FORT BEND COUNTY TOTAL POPULATION	**881,966**	**1,095,123**	**1,259,307**	**1,421,933**	**1,583,782**	**1,755,164**
GALVESTON COUNTY						
NECHES-TRINITY BASIN						
BOLIVAR PENINSULA SUD	2,943	3,480	4,118	4,875	5,771	6,835
COUNTY-OTHER	38	50	66	86	110	138
NECHES-TRINITY BASIN TOTAL POPULATION	**2,981**	**3,530**	**4,184**	**4,961**	**5,881**	**6,973**
SAN JACINTO-BRAZOS BASIN						
BACLIFF MUD	7,310	7,416	7,524	7,633	7,742	7,850
BAYOU VISTA	1,538	1,541	1,544	1,546	1,548	1,549
CLEAR LAKE SHORES	1,525	1,579	1,579	1,579	1,579	1,579
DICKINSON	19,103	20,048	21,121	22,176	23,223	24,269
FRIENDSWOOD	27,724	29,656	31,856	34,254	36,885	39,790
GALVESTON	51,260	54,643	57,846	60,955	63,941	67,085
HITCHCOCK	8,604	10,217	11,248	12,053	12,692	13,205
JAMAICA BEACH	989	998	1,007	1,017	1,030	1,044
KEMAH	4,685	6,166	6,392	6,572	6,719	6,842
LA MARQUE	20,111	21,970	22,429	22,810	23,133	23,414
LEAGUE CITY	106,764	120,273	130,742	139,323	144,257	147,634
SAN LEON MUD	5,547	6,066	6,466	6,866	7,266	7,667
SANTA FE	12,524	12,895	13,356	13,825	14,300	14,783
TEXAS CITY	51,369	56,474	60,714	64,373	67,607	70,539
TIKI ISLAND	972	979	987	994	998	1,002
COUNTY-OTHER	20,564	22,922	24,825	26,610	28,325	29,968
SAN JACINTO-BRAZOS BASIN TOTAL POPULATION	**340,589**	**373,843**	**399,636**	**422,586**	**441,245**	**458,220**
GALVESTON COUNTY TOTAL POPULATION	**343,570**	**377,373**	**403,820**	**427,547**	**447,126**	**465,193**

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY						
SAN JACINTO BASIN						
BAYTOWN	3,131	3,181	3,246	3,313	3,380	3,447
BELLAIRE	17,135	18,622	20,250	22,020	23,952	26,059
BLUE BELL MANOR UTILITY COMPANY	2,879	2,982	3,152	3,336	3,525	3,689
BUNKER HILL VILLAGE	3,803	4,105	4,431	4,784	5,164	5,575
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	50,418	55,097	58,372	61,420	64,232	67,191
CHIMNEY HILL MUD	5,504	5,589	5,665	5,750	5,843	5,946
CROSBY MUD	2,603	2,768	2,823	2,877	2,932	2,988
DEER PARK	10,775	11,128	11,302	11,480	11,662	11,849
EL DORADO UD	2,807	2,930	3,057	3,184	3,233	3,233
FOUNTAINVIEW SUBDIVISION	1,929	1,941	1,953	1,966	1,980	1,995
GALENA PARK	10,887	11,092	11,303	11,520	11,742	11,969
GREEN TRAILS MUD	1,820	1,828	1,846	1,860	1,870	1,877
GREENWOOD UD	4,741	5,452	5,518	5,586	5,654	5,725
HARRIS COUNTY MUD #106	4,655	4,725	4,912	5,046	5,145	5,219
HARRIS COUNTY MUD #11	3,203	3,293	3,411	3,537	3,673	3,819
HARRIS COUNTY MUD #119	5,927	6,119	6,346	6,590	6,758	6,908
HARRIS COUNTY MUD #132	5,006	5,079	5,122	5,154	5,177	5,195
HARRIS COUNTY MUD #148 - KINGSLAKE	3,615	3,809	3,842	3,877	3,913	3,950
HARRIS COUNTY MUD #151	5,990	6,051	6,101	6,138	6,165	6,185
HARRIS COUNTY MUD #152	8,154	8,360	8,658	8,890	9,063	9,191
HARRIS COUNTY MUD #153	7,027	7,031	7,053	7,069	7,081	7,090
HARRIS COUNTY MUD #154	5,851	5,917	6,072	6,238	6,416	6,607
HARRIS COUNTY MUD #158	4,992	4,992	4,992	4,992	4,992	4,992
HARRIS COUNTY MUD #180	5,788	6,279	6,651	6,715	6,715	6,715
HARRIS COUNTY MUD #189	3,982	4,224	4,383	4,552	4,729	4,916
HARRIS COUNTY MUD #221	4,043	4,398	4,563	4,720	4,873	5,025
HARRIS COUNTY MUD #278	9,718	12,958	12,958	12,958	12,958	12,958
HARRIS COUNTY MUD #290	4,944	5,166	5,403	5,579	5,709	5,806
HARRIS COUNTY MUD #345	3,476	3,504	3,535	3,559	3,576	3,589
HARRIS COUNTY MUD #400 - WEST	4,817	5,183	5,476	5,729	5,868	5,931
HARRIS COUNTY MUD #46	4,017	4,025	4,028	4,030	4,031	4,032
HARRIS COUNTY MUD #49	4,676	4,866	5,008	5,118	5,205	5,275
HARRIS COUNTY MUD #5	6,280	6,599	7,023	7,477	7,965	8,489
HARRIS COUNTY MUD #50	2,177	2,199	2,245	2,277	2,284	2,292
HARRIS COUNTY MUD #8	4,595	4,596	4,597	4,598	4,598	4,600
HARRIS COUNTY MUD #96	6,782	7,032	7,495	8,043	8,568	8,957
HARRIS COUNTY UD #14	3,025	3,311	3,603	3,944	4,364	5,005
HARRIS COUNTY UD #15	3,603	3,926	4,364	4,797	5,258	5,612
HARRIS COUNTY WCID #1	5,696	5,884	6,120	6,356	6,593	6,829
HARRIS COUNTY WCID #133	5,324	5,375	5,614	6,056	6,533	7,047
HARRIS COUNTY WCID #74	5,045	5,264	5,518	5,721	5,887	6,065
HARRIS COUNTY WCID #96	10,500	11,550	11,550	11,550	11,550	11,550

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY						
SAN JACINTO BASIN						
HEDWIG VILLAGE	2,580	2,771	2,975	3,194	3,429	3,683
HILSHIRE VILLAGE	749	791	857	951	1,051	1,160
HOUSTON	2,064,279	2,220,602	2,374,857	2,528,947	2,686,749	2,851,123
HUMBLE	17,243	20,928	23,603	25,590	27,068	28,170
HUNTERS CREEK VILLAGE	4,461	4,817	5,202	5,619	6,068	6,553
JACINTO CITY	10,603	10,908	11,224	11,546	11,879	12,222
JERSEY VILLAGE	7,723	7,790	7,936	8,096	8,272	8,465
KATY	13,337	14,032	14,556	15,018	15,438	15,830
KINGS MANOR MUD	895	906	926	940	951	959
LA PORTE	2,225	2,289	2,350	2,411	2,474	2,538
LONGHORN TOWN UD	1,273	1,292	1,302	1,309	1,315	1,319
MASON CREEK UD	6,610	6,610	6,610	6,610	6,610	6,610
MISSOURI CITY	5,650	6,439	7,082	7,773	8,529	9,352
MOUNT HOUSTON ROAD MUD	5,017	6,179	7,015	7,637	8,101	8,442
NEWPORT MUD	8,780	9,074	9,302	9,531	9,759	9,988
NORTH BELT UD	1,788	1,799	1,846	1,897	1,952	2,011
NORTH CHANNEL WATER AUTHORITY	82,326	84,755	86,983	89,193	91,387	93,192
NORTH FORT BEND WATER AUTHORITY	8,697	8,748	8,790	8,831	8,873	8,914
NORTH GREEN MUD	4,072	4,127	4,181	4,241	4,300	4,355
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	731,265	780,933	821,599	856,170	886,651	914,489
NORTHWEST PARK MUD	16,782	17,493	18,300	19,114	19,950	20,824
PARKWAY UD	5,970	6,282	6,328	6,375	6,421	6,468
PASADENA	118,765	122,380	125,922	129,514	133,172	136,947
PINEY POINT VILLAGE	3,178	3,495	3,847	4,234	4,659	5,127
SOUTH HOUSTON	16,983	17,562	18,161	18,782	19,425	20,088
SOUTHSIDE PLACE	1,734	1,865	2,007	2,159	2,323	2,500
SPRING VALLEY	3,870	4,202	4,541	4,885	5,258	5,660
STAFFORD	310	333	342	351	361	372
SUNBELT FWSD	16,510	17,366	18,196	19,148	20,247	21,453
THE COMMONS WATER SUPPLY INC	2,981	3,143	3,273	3,370	3,442	3,494
THE WOODLANDS	16,144	17,484	19,174	20,436	21,378	22,083
TOMBALL	12,742	13,457	14,110	14,677	15,182	15,644
TRAIL OF THE LAKES MUD	9,058	9,453	9,578	9,671	9,740	9,791
WALLER	478	492	513	540	574	617
WEST HARRIS COUNTY MUD #6	2,428	2,628	2,750	2,841	2,909	2,959
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	555,456	583,011	623,082	663,886	678,007	690,322
WEST UNIVERSITY PLACE	14,972	16,123	17,377	18,728	20,185	21,758
WINDFERN FOREST UD	4,288	4,302	4,311	4,317	4,321	4,324
WOODCREEK MUD	2,340	2,354	2,375	2,396	2,420	2,445
COUNTY-OTHER	203,802	242,564	256,997	263,780	291,987	318,695
SAN JACINTO BASIN TOTAL POPULATION	**4,259,704**	**4,570,209**	**4,849,941**	**5,115,114**	**5,373,633**	**5,632,338**

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY						
SAN JACINTO-BRAZOS BASIN						
CLEAR BROOK CITY MUD	17,670	18,631	20,075	21,345	22,532	23,648
DEER PARK	23,480	24,846	26,180	27,373	28,469	29,506
EL LAGO	2,733	2,750	2,762	2,773	2,785	2,797
FRIENDSWOOD	11,925	14,393	16,073	17,783	19,431	21,257
HARRIS COUNTY MUD #55	14,071	14,923	15,664	16,582	18,055	19,802
HOUSTON	137,465	156,807	175,590	195,004	215,556	238,661
KIRKMONT MUD	2,323	2,548	2,759	2,982	3,223	3,483
LA PORTE	32,120	32,485	32,942	33,374	33,787	34,191
LEAGUE CITY	2,919	3,304	3,542	3,720	3,849	3,944
NASSAU BAY	4,091	4,149	4,202	4,256	4,310	4,366
PASADENA	35,676	36,461	37,199	37,936	38,705	39,501
PEARLAND	14,127	17,440	20,943	23,539	25,464	26,892
SAGEMEADOW UD	6,352	6,801	7,367	7,921	8,476	9,043
SEABROOK	12,797	13,005	13,238	13,476	13,717	13,963
SHOREACRES	1,493	1,505	1,527	1,550	1,573	1,596
TAYLOR LAKE VILLAGE	3,557	3,618	3,654	3,690	3,727	3,765
WEBSTER	15,071	16,187	17,079	17,776	18,329	18,773
COUNTY-OTHER	14,178	17,176	19,454	21,465	23,564	25,669
SAN JACINTO-BRAZOS BASIN TOTAL POPULATION	**352,048**	**387,029**	**420,250**	**452,545**	**485,552**	**520,857**
TRINITY-SAN JACINTO BASIN						
BAYTOWN	67,692	68,729	69,892	71,071	72,267	73,479
HARRIS COUNTY WCID #1	220	226	239	253	266	279
HOUSTON	242	253	260	265	269	272
COUNTY-OTHER	27,964	31,698	35,517	38,994	42,081	45,121
TRINITY-SAN JACINTO BASIN TOTAL POPULATION	**96,118**	**100,906**	**105,908**	**110,583**	**114,883**	**119,151**
HARRIS COUNTY TOTAL POPULATION	**4,707,870**	**5,058,144**	**5,376,099**	**5,678,242**	**5,974,068**	**6,272,346**
LEON COUNTY						
BRAZOS BASIN						
CONCORD-ROBBINS WSC	2,219	2,370	2,492	2,660	2,805	2,946
JEWETT	388	462	521	603	673	742
NORMANGEE	165	177	186	199	211	222
COUNTY-OTHER	1,929	2,035	2,120	2,236	2,337	2,436
BRAZOS BASIN TOTAL POPULATION	**4,701**	**5,044**	**5,319**	**5,698**	**6,026**	**6,346**
TRINITY BASIN						
BUFFALO	1,907	1,954	1,992	2,045	2,091	2,136
CENTERVILLE	967	1,038	1,094	1,172	1,240	1,306
CONCORD-ROBBINS WSC	613	655	689	735	775	815
FLO COMMUNITY WSC	3,916	3,978	4,028	4,097	4,156	4,214
JEWETT	1,074	1,277	1,441	1,666	1,861	2,052
NORMANGEE	496	532	561	602	636	670

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
LEON COUNTY						
TRINITY BASIN						
OAKWOOD	475	477	479	482	484	486
COUNTY-OTHER	4,062	4,581	5,000	5,574	6,071	6,557
TRINITY BASIN TOTAL POPULATION	**13,510**	**14,492**	**15,284**	**16,373**	**17,314**	**18,236**
LEON COUNTY TOTAL POPULATION	**18,211**	**19,536**	**20,603**	**22,071**	**23,340**	**24,582**
LIBERTY COUNTY						
NECHES BASIN						
DAISETTA	396	446	494	541	587	631
HARDIN WSC	297	380	458	537	612	684
WEST HARDIN WSC	357	395	431	468	503	536
COUNTY-OTHER	860	931	999	1,067	1,131	1,193
NECHES BASIN TOTAL POPULATION	**1,910**	**2,152**	**2,382**	**2,613**	**2,833**	**3,044**
NECHES-TRINITY BASIN						
COUNTY-OTHER	110	124	137	150	165	176
NECHES-TRINITY BASIN TOTAL POPULATION	**110**	**124**	**137**	**150**	**165**	**176**
SAN JACINTO BASIN						
CLEVELAND	7,785	7,907	8,023	8,139	8,250	8,356
PLUM GROVE	685	772	854	937	1,016	1,092
TARKINGTON SUD	3,011	3,536	4,037	4,539	5,019	5,478
COUNTY-OTHER	13,488	15,915	18,222	20,539	22,756	24,873
SAN JACINTO BASIN TOTAL POPULATION	**24,969**	**28,130**	**31,136**	**34,154**	**37,041**	**39,799**
TRINITY BASIN						
AMES	1,145	1,290	1,427	1,566	1,698	1,824
DAISETTA	707	796	881	967	1,048	1,126
DAYTON	10,189	13,231	16,125	19,030	21,809	24,464
HARDIN	944	1,072	1,194	1,316	1,433	1,545
HARDIN WSC	4,110	5,249	6,334	7,422	8,464	9,459
KENEFICK	643	724	801	879	953	1,024
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	2,883	3,833	4,736	5,643	6,511	7,340
LIBERTY	9,104	9,829	10,519	11,211	11,873	12,506
OLD RIVER-WINFREE	161	182	201	221	239	257
TARKINGTON SUD	899	1,057	1,206	1,356	1,500	1,637
WOODLAND HILLS WATER COMPANY	6,507	8,957	11,288	13,628	15,867	18,005
COUNTY-OTHER	18,899	17,083	15,357	13,621	11,962	10,377
TRINITY BASIN TOTAL POPULATION	**56,191**	**63,303**	**70,069**	**76,860**	**83,357**	**89,564**
TRINITY-SAN JACINTO BASIN						
DAYTON	31	40	49	57	66	74
COUNTY-OTHER	3,092	3,478	3,845	4,214	4,566	4,903

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
LIBERTY COUNTY						
TRINITY-SAN JACINTO BASIN TOTAL POPULATION	**3,123**	**3,518**	**3,894**	**4,271**	**4,632**	**4,977**
LIBERTY COUNTY TOTAL POPULATION	**86,303**	**97,227**	**107,618**	**118,048**	**128,028**	**137,560**
MADISON COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	1,133	1,215	1,290	1,373	1,451	1,527
BRAZOS BASIN TOTAL POPULATION	**1,133**	**1,215**	**1,290**	**1,373**	**1,451**	**1,527**
TRINITY BASIN						
MADISONVILLE	4,747	5,089	5,401	5,750	6,077	6,395
NORMANGEE	83	88	94	100	106	111
COUNTY-OTHER	8,790	9,425	10,001	10,649	11,252	11,844
TRINITY BASIN TOTAL POPULATION	**13,620**	**14,602**	**15,496**	**16,499**	**17,435**	**18,350**
MADISON COUNTY TOTAL POPULATION	**14,753**	**15,817**	**16,786**	**17,872**	**18,886**	**19,877**
MONTGOMERY COUNTY						
SAN JACINTO BASIN						
BENDERS LANDING WATER SYSTEM	5,094	8,091	11,167	14,243	17,304	17,304
CLEVELAND	30	36	51	69	92	120
CONROE	77,926	93,516	107,457	120,314	134,086	148,830
CUT AND SHOOT	1,311	1,421	1,666	1,990	2,419	2,986
DOBBIN-PLANTERSVILLE WSC	8,335	11,255	15,183	20,335	27,097	35,974
EAST PLANTATION UD	1,074	1,105	1,300	1,495	1,723	1,783
HOUSTON	4,839	6,934	9,275	11,538	13,736	14,375
INDIGO LAKE WATER SYSTEM	2,934	4,050	5,820	8,319	11,846	17,602
KINGS MANOR MUD	1,909	1,963	2,061	2,133	2,187	2,227
LAKE WINDCREST WATER SYSTEM	2,544	2,868	3,645	4,731	6,250	8,377
MAGNOLIA	3,105	3,729	4,545	5,740	7,492	10,211
MONTGOMERY	2,676	4,985	6,185	7,393	8,625	10,565
MONTGOMERY COUNTY MUD #15	3,792	4,082	4,708	5,534	6,747	8,466
MONTGOMERY COUNTY MUD #18	4,676	6,041	6,868	7,695	8,522	10,527
MONTGOMERY COUNTY MUD #19	1,996	2,009	2,023	2,039	2,057	2,076
MONTGOMERY COUNTY MUD #8	2,963	3,173	3,560	3,947	4,334	5,205
MONTGOMERY COUNTY MUD #83	1,494	1,544	1,595	1,646	1,698	1,734
MONTGOMERY COUNTY MUD #89	4,254	4,346	4,413	4,761	5,261	5,429
MONTGOMERY COUNTY MUD #9	3,240	3,377	3,849	4,320	4,792	5,744
MONTGOMERY COUNTY MUD #94	3,441	3,480	3,857	4,234	4,609	4,609
MONTGOMERY COUNTY UD #2	1,391	1,423	1,498	1,598	1,732	1,910
MONTGOMERY COUNTY UD #3	1,825	2,134	2,154	2,459	3,114	3,967
MONTGOMERY COUNTY UD #4	3,069	4,004	4,037	4,634	5,924	7,607
MONTGOMERY COUNTY WCID #1	2,989	3,279	3,602	3,960	4,360	4,805
NEW CANEY MUD	8,923	9,867	10,884	12,099	13,563	15,342
OAK RIDGE NORTH	3,121	3,265	3,485	3,610	3,655	3,670
PANORAMA VILLAGE	2,557	2,601	2,773	3,002	3,309	3,718

WUG POPULATION

REGION H	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
MONTGOMERY COUNTY						
SAN JACINTO BASIN						
PATTON VILLAGE	2,175	2,363	2,624	2,955	3,375	3,908
POINT AQUARIUS MUD	1,655	1,663	1,779	1,935	2,143	2,420
PORTER SUD	25,185	31,483	37,835	44,073	50,332	55,511
RAYFORD ROAD MUD	7,878	8,217	8,878	9,615	10,395	10,672
RIVER PLANTATION MUD	2,107	2,244	2,742	3,239	3,786	3,994
ROMAN FOREST	1,553	1,571	1,755	1,991	2,291	2,674
SHENANDOAH	2,959	3,854	4,226	4,476	4,764	5,130
SOUTHERN MONTGOMERY COUNTY MUD	7,488	7,767	7,960	8,115	8,239	8,369
SPLENDORA	1,821	1,989	2,381	2,878	3,506	4,300
SPRING CREEK UD	7,307	8,058	8,502	9,295	10,279	10,600
STAGECOACH	541	645	1,049	1,632	2,553	4,142
STANLEY LAKE MUD	2,586	2,906	3,766	4,910	6,413	8,295
THE WOODLANDS	100,003	105,894	111,674	118,464	128,339	140,330
WESTWOOD NORTH WSC	1,967	2,083	2,322	2,561	2,801	3,143
WILLIS	6,533	6,768	7,296	8,025	9,036	10,442
WOODBRANCH	1,369	1,487	1,801	2,199	2,704	3,345
COUNTY-OTHER	293,282	427,682	585,027	777,715	1,018,645	1,313,625
SAN JACINTO BASIN TOTAL POPULATION	**627,917**	**811,252**	**1,019,278**	**1,267,916**	**1,576,135**	**1,946,063**
MONTGOMERY COUNTY TOTAL POPULATION	**627,917**	**811,252**	**1,019,278**	**1,267,916**	**1,576,135**	**1,946,063**
POLK COUNTY						
TRINITY BASIN						
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	15,677	17,513	18,957	20,188	21,192	22,002
LIVINGSTON	6,093	6,807	7,368	7,847	8,237	8,552
ONALASKA	2,468	3,130	3,651	4,095	4,457	4,749
COUNTY-OTHER	18,673	20,485	21,912	23,129	24,122	24,922
TRINITY BASIN TOTAL POPULATION	**42,911**	**47,935**	**51,888**	**55,259**	**58,008**	**60,225**
POLK COUNTY TOTAL POPULATION	**42,911**	**47,935**	**51,888**	**55,259**	**58,008**	**60,225**
SAN JACINTO COUNTY						
SAN JACINTO BASIN						
COLDSPRING	320	352	378	407	430	451
SAN JACINTO SUD	734	808	867	932	986	1,033
COUNTY-OTHER	11,525	12,700	13,622	14,640	15,487	16,237
SAN JACINTO BASIN TOTAL POPULATION	**12,579**	**13,860**	**14,867**	**15,979**	**16,903**	**17,721**
TRINITY BASIN						
COLDSPRING	638	703	754	810	857	898
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	3,973	4,378	4,696	5,047	5,339	5,597
POINT BLANK	773	851	913	981	1,038	1,088
RIVERSIDE WSC	567	625	670	720	762	799
SAN JACINTO SUD	1,854	2,044	2,192	2,356	2,492	2,613

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
SAN JACINTO COUNTY						
TRINITY BASIN						
SHEPHERD	2,603	2,868	3,076	3,307	3,498	3,667
COUNTY-OTHER	6,623	7,298	7,828	8,414	8,900	9,331
TRINITY BASIN TOTAL POPULATION	**17,031**	**18,767**	**20,129**	**21,635**	**22,886**	**23,993**
SAN JACINTO COUNTY TOTAL POPULATION	**29,610**	**32,627**	**34,996**	**37,614**	**39,789**	**41,714**
TRINITY COUNTY						
TRINITY BASIN						
GROVETON	655	708	713	693	725	759
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	1,615	1,747	1,760	1,710	1,790	1,873
TRINITY	3,051	3,300	3,325	3,231	3,380	3,537
TRINITY RURAL WSC	4,459	4,822	4,858	4,721	4,940	5,169
COUNTY-OTHER	2,974	3,216	3,241	3,149	3,295	3,447
TRINITY BASIN TOTAL POPULATION	**12,754**	**13,793**	**13,897**	**13,504**	**14,130**	**14,785**
TRINITY COUNTY TOTAL POPULATION	**12,754**	**13,793**	**13,897**	**13,504**	**14,130**	**14,785**
WALKER COUNTY						
SAN JACINTO BASIN						
HUNTSVILLE	33,854	35,479	36,650	37,748	38,602	39,294
NEW WAVERLY	1,085	1,132	1,166	1,198	1,223	1,243
WALKER COUNTY SUD	3,372	3,585	3,739	3,883	3,995	4,086
COUNTY-OTHER	8,238	8,585	8,834	9,068	9,250	9,397
SAN JACINTO BASIN TOTAL POPULATION	**46,549**	**48,781**	**50,389**	**51,897**	**53,070**	**54,020**
TRINITY BASIN						
HUNTSVILLE	6,934	7,267	7,507	7,732	7,907	8,048
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	391	410	423	436	446	454
RIVERSIDE	565	613	648	681	707	728
RIVERSIDE WSC	5,206	5,738	6,121	6,481	6,761	6,988
THE CONSOLIDATED WSC	142	161	175	188	198	206
TRINITY RURAL WSC	339	376	403	428	447	463
WALKER COUNTY SUD	4,500	4,785	4,990	5,183	5,333	5,454
COUNTY-OTHER	7,174	7,112	7,068	7,024	6,990	6,963
TRINITY BASIN TOTAL POPULATION	**25,251**	**26,462**	**27,335**	**28,153**	**28,789**	**29,304**
WALKER COUNTY TOTAL POPULATION	**71,800**	**75,243**	**77,724**	**80,050**	**81,859**	**83,324**
WALLER COUNTY						
BRAZOS BASIN						
BROOKSHIRE	5,811	7,107	8,544	10,112	11,844	13,722
G & W WSC	953	1,293	1,669	2,081	2,535	3,028
HEMPSTEAD	6,726	7,843	9,081	10,433	11,926	13,544
PINE ISLAND	1,112	1,256	1,416	1,591	1,784	1,993
PRAIRIE VIEW	6,060	7,167	8,394	9,734	11,213	12,817

WUG POPULATION

REGION H	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
WALLER COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	12,019	14,798	17,882	21,246	24,963	28,994
BRAZOS BASIN TOTAL POPULATION	**32,681**	**39,464**	**46,986**	**55,197**	**64,265**	**74,098**
SAN JACINTO BASIN						
G & W WSC	2,925	3,969	5,127	6,390	7,785	9,297
KATY	1,468	1,833	2,237	2,678	3,165	3,693
PRAIRIE VIEW	549	649	760	881	1,015	1,160
WALLER	2,036	2,219	2,421	2,642	2,886	3,150
COUNTY-OTHER	12,879	15,309	18,004	20,948	24,198	27,724
SAN JACINTO BASIN TOTAL POPULATION	**19,857**	**23,979**	**28,549**	**33,539**	**39,049**	**45,024**
WALLER COUNTY TOTAL POPULATION	**52,538**	**63,443**	**75,535**	**88,736**	**103,314**	**119,122**
REGION H TOTAL POPULATION	**7,325,314**	**8,207,700**	**9,024,533**	**9,867,512**	**10,766,073**	**11,743,278**

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
AUSTIN COUNTY						
BRAZOS BASIN						
BELLVILLE	1,217	1,286	1,366	1,468	1,588	1,722
SAN FELIPE	231	263	298	341	389	443
SEALY	1,377	1,514	1,667	1,859	2,081	2,329
COUNTY-OTHER	1,856	2,148	2,475	2,883	3,348	3,869
MANUFACTURING	89	96	103	109	119	130
MINING	97	243	195	147	100	68
LIVESTOCK	1,171	1,171	1,171	1,171	1,171	1,171
IRRIGATION	2,398	2,398	2,398	2,398	2,398	2,398
BRAZOS BASIN TOTAL DEMAND	**8,436**	**9,119**	**9,673**	**10,376**	**11,194**	**12,130**
BRAZOS-COLORADO BASIN						
SEALY	3	3	4	4	5	5
WALLIS	161	165	171	180	193	207
COUNTY-OTHER	437	504	579	672	779	898
MANUFACTURING	19	21	23	24	26	28
MINING	28	70	57	43	29	20
LIVESTOCK	329	329	329	329	329	329
IRRIGATION	4,080	4,080	4,080	4,080	4,080	4,080
BRAZOS-COLORADO BASIN TOTAL DEMAND	**5,057**	**5,172**	**5,243**	**5,332**	**5,441**	**5,567**
COLORADO BASIN						
COUNTY-OTHER	39	43	49	55	63	72
MINING	2	7	5	4	3	2
LIVESTOCK	23	23	23	23	23	23
COLORADO BASIN TOTAL DEMAND	**64**	**73**	**77**	**82**	**89**	**97**
AUSTIN COUNTY TOTAL DEMAND	**13,557**	**14,364**	**14,993**	**15,790**	**16,724**	**17,794**
BRAZORIA COUNTY						
BRAZOS BASIN						
BAILEY'S PRAIRIE	26	26	26	27	28	29
BRAZORIA	69	67	65	64	64	65
FREEPORT	145	158	171	185	201	215
LAKE JACKSON	36	43	56	71	89	109
VARNER CREEK UD	213	207	201	201	201	201
WEST COLUMBIA	369	354	340	341	341	343
COUNTY-OTHER	942	1,067	1,273	1,484	1,706	1,942
MANUFACTURING	9,174	9,900	10,626	11,353	12,079	12,805
MINING	135	167	195	226	258	297
LIVESTOCK	118	118	118	118	118	118
IRRIGATION	4,855	4,855	4,855	4,855	4,855	4,855
BRAZOS BASIN TOTAL DEMAND	**16,082**	**16,962**	**17,926**	**18,925**	**19,940**	**20,979**
BRAZOS-COLORADO BASIN						
BRAZORIA	249	246	244	244	248	251
FREEPORT	1	1	2	2	2	2
JONES CREEK	207	200	193	192	192	193
SWEENY	540	525	513	508	509	511
WEST COLUMBIA	68	65	64	64	65	66
COUNTY-OTHER	3,448	4,112	4,743	5,372	6,023	6,700
MANUFACTURING	44,381	47,894	51,408	54,921	58,435	61,948

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
BRAZORIA COUNTY						
BRAZOS-COLORADO BASIN						
MINING	252	309	361	418	479	553
LIVESTOCK	443	443	443	443	443	443
IRRIGATION	5,071	5,071	5,071	5,071	5,071	5,071
BRAZOS-COLORADO BASIN TOTAL DEMAND	**54,660**	**58,866**	**63,042**	**67,235**	**71,467**	**75,738**
SAN JACINTO-BRAZOS BASIN						
ALVIN	4,644	4,866	5,161	5,587	6,186	6,983
ANGLETON	1,964	1,893	1,835	1,810	1,816	1,830
BAILEY'S PRAIRIE	63	64	63	63	64	65
BRAZORIA COUNTY MUD #2	2,199	2,190	2,185	2,183	2,183	2,184
BRAZORIA COUNTY MUD #21	549	568	610	653	695	724
BRAZORIA COUNTY MUD #3	566	558	560	565	572	584
BRAZORIA COUNTY MUD #6	681	676	676	676	677	680
BROOKSIDE VILLAGE	198	207	258	325	406	504
CLUTE	1,476	1,475	1,486	1,518	1,570	1,631
DANBURY	176	169	163	160	159	159
FREEPORT	1,283	1,290	1,299	1,325	1,368	1,417
HILLCREST	118	115	112	111	111	111
HOLIDAY LAKES	75	75	75	75	76	76
IOWA COLONY	292	326	381	431	479	508
LAKE JACKSON	5,284	5,303	5,345	5,443	5,596	5,774
MANVEL	1,658	2,645	3,548	4,575	5,786	7,286
OYSTER CREEK	250	250	251	256	265	275
PEARLAND	14,000	14,710	15,750	16,925	18,254	19,539
RICHWOOD	377	377	380	388	403	420
COUNTY-OTHER	12,344	15,885	19,303	22,985	27,137	31,664
MANUFACTURING	194,383	209,773	225,161	240,550	255,938	271,328
MINING	581	713	833	965	1,105	1,276
LIVESTOCK	1,089	1,089	1,089	1,089	1,089	1,089
IRRIGATION	99,877	99,877	99,877	99,877	99,877	99,877
SAN JACINTO-BRAZOS BASIN TOTAL DEMAND	**344,127**	**365,094**	**386,401**	**408,535**	**431,812**	**455,984**
BRAZORIA COUNTY TOTAL DEMAND	**414,869**	**440,922**	**467,369**	**494,695**	**523,219**	**552,701**
CHAMBERS COUNTY						
NECHES-TRINITY BASIN						
ANAHUAC	216	210	206	206	208	211
TRINITY BAY CONSERVATION DISTRICT	1,793	2,091	2,408	2,766	3,162	3,582
COUNTY-OTHER	34	78	121	168	219	273
MINING	3,316	3,316	3,316	3,316	3,316	3,316
LIVESTOCK	312	312	312	312	312	312
IRRIGATION	67,413	67,413	67,413	67,413	67,413	67,413
NECHES-TRINITY BASIN TOTAL DEMAND	**73,084**	**73,420**	**73,776**	**74,181**	**74,630**	**75,107**
TRINITY BASIN						
ANAHUAC	51	50	49	48	49	50
BEACH CITY	34	40	46	52	60	67
COVE	79	96	114	134	157	181
MONT BELVIEU	1,680	2,134	2,606	3,116	3,665	4,243
OLD RIVER-WINFREE	130	147	166	190	217	246

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CHAMBERS COUNTY						
TRINITY BASIN						
TRINITY BAY CONSERVATION DISTRICT	469	546	629	722	826	936
COUNTY-OTHER	874	989	1,116	1,258	1,417	1,584
MANUFACTURING	1,988	2,145	2,303	2,444	2,626	2,823
MINING	956	956	956	956	956	956
LIVESTOCK	83	83	83	83	83	83
IRRIGATION	12,640	12,640	12,640	12,640	12,640	12,640
TRINITY BASIN TOTAL DEMAND	**18,984**	**19,826**	**20,708**	**21,643**	**22,696**	**23,809**
TRINITY-SAN JACINTO BASIN						
BAYTOWN	653	747	844	955	1,083	1,221
BEACH CITY	281	325	374	429	489	554
MONT BELVIEU	505	641	783	937	1,102	1,275
COUNTY-OTHER	514	598	689	791	903	1,022
MANUFACTURING	9,055	9,774	10,489	11,133	11,965	12,858
MINING	1,349	1,349	1,349	1,349	1,349	1,349
STEAM ELECTRIC POWER	3,536	4,134	4,863	5,751	6,834	7,573
LIVESTOCK	159	159	159	159	159	159
IRRIGATION	4,213	4,213	4,213	4,213	4,213	4,213
TRINITY-SAN JACINTO BASIN TOTAL DEMAND	**20,265**	**21,940**	**23,763**	**25,717**	**28,097**	**30,224**
CHAMBERS COUNTY TOTAL DEMAND	**112,333**	**115,186**	**118,247**	**121,541**	**125,423**	**129,140**
FORT BEND COUNTY						
BRAZOS BASIN						
BEASLEY	6	9	13	19	27	38
FAIRCHILDS	94	106	116	132	157	196
FORT BEND COUNTY MUD #116	580	654	767	854	942	1,031
FORT BEND COUNTY MUD #121	394	423	498	575	652	730
FORT BEND COUNTY MUD #129	664	947	1,211	1,432	1,586	1,587
FORT BEND COUNTY MUD #25	152	150	148	148	148	148
FULSHEAR	93	171	227	276	319	358
GREATWOOD	1,469	1,491	1,477	1,471	1,475	1,482
MISSOURI CITY	1,126	1,505	1,878	2,185	2,385	2,484
NEEDVILLE	136	132	129	129	133	138
NORTH FORT BEND WATER AUTHORITY	2,284	3,674	17,538	24,737	27,563	28,009
PECAN GROVE MUD #1	2,000	1,947	1,907	1,907	1,908	1,913
PLANTATION MUD	417	399	385	377	376	376
PLEAK	158	179	187	197	208	222
RICHMOND	2,023	2,046	2,098	2,207	2,333	2,463
ROSENBERG	4,706	4,818	4,978	5,185	5,472	5,826
SIENNA PLANTATION	1,183	1,510	1,847	2,185	2,524	2,900
SIMONTON	105	119	151	176	198	216
SUGAR LAND	15,298	16,338	17,828	19,415	20,833	21,774
WESTON LAKES	1,657	1,758	1,899	2,039	2,181	2,325
COUNTY-OTHER	16,748	25,045	25,415	30,125	37,864	47,881
MANUFACTURING	2,332	2,420	2,490	2,536	2,401	2,272
MINING	41	43	32	24	16	11
STEAM ELECTRIC POWER	67,762	79,220	93,191	110,219	130,977	156,964
LIVESTOCK	580	580	580	580	580	580
IRRIGATION	22,308	22,308	22,308	22,308	22,308	22,308

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
FORT BEND COUNTY						
BRAZOS BASIN TOTAL DEMAND	**144,316**	**167,992**	**199,298**	**231,438**	**265,566**	**304,232**
BRAZOS-COLORADO BASIN						
BEASLEY	72	73	80	90	106	128
NEEDVILLE	164	160	158	160	165	175
ROSENBERG	1	5	11	20	31	47
COUNTY-OTHER	1,499	2,453	4,152	6,636	10,281	15,616
MINING	16	17	13	9	6	4
LIVESTOCK	205	205	205	205	205	205
IRRIGATION	19,344	19,344	19,344	19,344	19,344	19,344
BRAZOS-COLORADO BASIN TOTAL DEMAND	**21,301**	**22,257**	**23,963**	**26,464**	**30,138**	**35,519**
SAN JACINTO BASIN						
HOUSTON	5,124	5,408	5,513	5,642	5,770	5,852
KATY	1,664	3,798	3,796	3,800	3,810	3,819
MEADOWS PLACE	709	703	701	707	720	736
MISSOURI CITY	1,566	1,787	2,013	2,107	2,172	2,270
NORTH FORT BEND WATER AUTHORITY	33,056	39,018	39,802	40,166	40,511	40,935
STAFFORD	1,243	1,286	1,340	1,410	1,497	1,601
SUGAR LAND	1,122	1,110	1,103	1,099	1,098	1,098
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	1,441	1,449	1,438	1,436	1,445	1,457
COUNTY-OTHER	132	162	190	204	212	220
MANUFACTURING	2,871	2,978	3,064	3,122	2,955	2,797
LIVESTOCK	69	69	69	69	69	69
IRRIGATION	569	569	569	569	569	569
SAN JACINTO BASIN TOTAL DEMAND	**49,566**	**58,337**	**59,598**	**60,331**	**60,828**	**61,423**
SAN JACINTO-BRAZOS BASIN						
ARCOLA	226	330	428	523	601	680
FORT BEND COUNTY MUD #23	1,318	1,387	1,428	1,469	1,511	1,556
FORT BEND COUNTY MUD #25	1,060	1,049	1,052	1,062	1,080	1,102
FULSHEAR	1,285	1,378	1,452	1,512	1,565	1,609
HOUSTON	3,302	3,331	3,481	3,624	3,760	3,887
MEADOWS PLACE	64	62	60	60	60	60
MISSOURI CITY	9,166	10,907	12,686	14,423	15,547	16,205
NORTH FORT BEND WATER AUTHORITY	26,962	42,857	46,533	49,574	52,055	54,077
PEARLAND	502	533	658	784	911	1,061
PECAN GROVE MUD #1	16	16	15	15	15	15
SIENNA PLANTATION	3,212	4,074	5,734	7,393	9,052	10,523
STAFFORD	2,995	3,004	3,043	3,102	3,181	3,271
SUGAR LAND	11,753	12,899	13,114	13,266	13,361	13,480
COUNTY-OTHER	7,463	4,852	7,219	9,504	11,642	13,696
MANUFACTURING	3,768	3,908	4,022	4,097	3,877	3,670
MINING	15	15	12	9	6	4
LIVESTOCK	198	198	198	198	198	198
IRRIGATION	4,579	4,579	4,579	4,579	4,579	4,579
SAN JACINTO-BRAZOS BASIN TOTAL DEMAND	**77,884**	**95,379**	**105,714**	**115,194**	**123,001**	**129,673**
FORT BEND COUNTY TOTAL DEMAND	**293,067**	**343,965**	**388,573**	**433,427**	**479,533**	**530,847**

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
GALVESTON COUNTY						
NECHES-TRINITY BASIN						
BOLIVAR PENINSULA SUD	198	234	277	328	388	460
COUNTY-OTHER	5	8	8	11	13	16
MINING	78	84	92	100	107	114
LIVESTOCK	57	57	57	57	57	57
IRRIGATION	17	17	17	17	17	17
NECHES-TRINITY BASIN TOTAL DEMAND	**355**	**400**	**451**	**513**	**582**	**664**
SAN JACINTO-BRAZOS BASIN						
BACLIFF MUD	539	516	506	514	521	528
BAYOU VISTA	276	270	265	262	262	262
CLEAR LAKE SHORES	562	575	571	571	570	570
DICKINSON	2,435	2,480	2,554	2,649	2,766	2,889
FRIENDSWOOD	4,882	5,104	5,399	5,759	6,189	6,673
GALVESTON	16,623	17,422	18,285	19,244	20,165	21,152
HITCHCOCK	949	1,079	1,157	1,224	1,285	1,337
JAMAICA BEACH	261	259	259	260	263	266
KEMAH	1,181	1,538	1,588	1,629	1,665	1,695
LA MARQUE	3,137	3,339	3,351	3,376	3,419	3,459
LEAGUE CITY	14,194	15,650	16,806	17,792	18,386	18,808
SAN LEON MUD	373	408	435	462	489	516
SANTA FE	1,695	1,696	1,717	1,755	1,810	1,870
TEXAS CITY	7,077	7,522	7,896	8,270	8,665	9,037
TIKI ISLAND	243	241	240	241	241	242
COUNTY-OTHER	2,554	2,754	2,920	3,094	3,285	3,474
MANUFACTURING	56,394	57,522	58,672	59,846	61,042	62,263
MINING	303	324	358	386	413	441
LIVESTOCK	197	197	197	197	197	197
IRRIGATION	6,283	6,283	6,283	6,283	6,283	6,283
SAN JACINTO-BRAZOS BASIN TOTAL DEMAND	**120,158**	**125,179**	**129,459**	**133,814**	**137,916**	**141,962**
GALVESTON COUNTY TOTAL DEMAND	**120,513**	**125,579**	**129,910**	**134,327**	**138,498**	**142,626**
HARRIS COUNTY						
SAN JACINTO BASIN						
BAYTOWN	420	413	410	413	420	428
BELLAIRE	3,804	4,045	4,329	4,669	5,070	5,514
BLUE BELL MANOR UTILITY COMPANY	646	656	681	715	754	788
BUNKER HILL VILLAGE	1,626	1,734	1,856	1,995	2,152	2,323
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	4,789	5,082	5,288	5,507	5,738	5,998
CHIMNEY HILL MUD	583	569	559	557	564	573
CROSBY MUD	313	317	322	327	332	338
DEER PARK	1,349	1,345	1,329	1,331	1,348	1,369
EL DORADO UD	260	257	256	261	264	264
FOUNTAINVIEW SUBDIVISION	176	168	160	160	161	162
GALENA PARK	842	806	779	775	790	805
GREEN TRAILS MUD	555	548	547	550	553	555
GREENWOOD UD	359	398	395	395	399	403
HARRIS COUNTY MUD #106	1,301	1,315	1,364	1,399	1,425	1,445
HARRIS COUNTY MUD #11	332	330	332	339	351	364
HARRIS COUNTY MUD #119	504	491	484	490	500	510

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY						
SAN JACINTO BASIN						
HARRIS COUNTY MUD #132	898	885	873	876	878	881
HARRIS COUNTY MUD #148 - KINGSLAKE	269	276	274	274	276	278
HARRIS COUNTY MUD #151	1,012	1,006	1,003	1,002	1,004	1,007
HARRIS COUNTY MUD #152	1,107	1,114	1,140	1,162	1,182	1,198
HARRIS COUNTY MUD #153	1,200	1,185	1,177	1,174	1,173	1,174
HARRIS COUNTY MUD #154	746	735	737	748	767	790
HARRIS COUNTY MUD #158	534	518	505	498	497	497
HARRIS COUNTY MUD #180	514	536	553	550	548	548
HARRIS COUNTY MUD #189	357	362	375	388	402	417
HARRIS COUNTY MUD #221	399	428	443	456	469	484
HARRIS COUNTY MUD #278	967	1,269	1,265	1,263	1,261	1,260
HARRIS COUNTY MUD #290	609	630	658	677	692	703
HARRIS COUNTY MUD #345	786	781	779	779	781	784
HARRIS COUNTY MUD #400 - WEST	785	839	885	925	946	956
HARRIS COUNTY MUD #46	664	651	640	634	633	633
HARRIS COUNTY MUD #49	456	465	472	479	486	492
HARRIS COUNTY MUD #5	508	509	522	544	577	614
HARRIS COUNTY MUD #50	273	263	265	267	267	268
HARRIS COUNTY MUD #8	485	462	443	442	440	440
HARRIS COUNTY MUD #96	582	592	625	666	707	738
HARRIS COUNTY UD #14	204	223	243	266	294	337
HARRIS COUNTY UD #15	521	552	601	654	715	763
HARRIS COUNTY WCID #1	574	561	564	583	602	624
HARRIS COUNTY WCID #133	658	641	648	687	738	796
HARRIS COUNTY WCID #74	785	792	809	827	849	874
HARRIS COUNTY WCID #96	1,942	2,123	2,122	2,121	2,119	2,118
HEDWIG VILLAGE	1,477	1,572	1,677	1,794	1,925	2,067
HILSHIRE VILLAGE	196	203	217	239	263	291
HOUSTON	418,177	440,169	463,377	489,420	519,026	550,556
HUMBLE	2,687	3,157	3,493	3,753	3,962	4,122
HUNTERS CREEK VILLAGE	2,353	2,516	2,698	2,904	3,134	3,384
JACINTO CITY	774	747	755	776	799	822
JERSEY VILLAGE	1,746	1,733	1,742	1,764	1,799	1,841
KATY	3,212	3,321	3,425	3,522	3,618	3,709
KINGS MANOR MUD	105	104	104	104	105	106
LA PORTE	312	311	311	314	321	330
LONGHORN TOWN UD	287	288	289	290	291	292
MASON CREEK UD	1,268	1,232	1,211	1,208	1,206	1,206
MISSOURI CITY	884	980	1,061	1,156	1,266	1,388
MOUNT HOUSTON ROAD MUD	496	599	676	733	775	807
NEWPORT MUD	945	956	967	983	1,003	1,027
NORTH BELT UD	341	335	337	343	352	363
NORTH CHANNEL WATER AUTHORITY	10,215	10,207	10,237	10,363	10,585	10,791
NORTH FORT BEND WATER AUTHORITY	1,941	1,935	1,939	1,945	1,953	1,962
NORTH GREEN MUD	476	468	462	463	468	474
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	123,598	129,683	134,863	139,655	144,379	148,850
NORTHWEST PARK MUD	3,080	3,154	3,257	3,378	3,518	3,671

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY						
SAN JACINTO BASIN						
PARKWAY UD	520	528	520	516	518	521
PASADENA	17,555	17,564	17,650	17,920	18,378	18,893
PINEY POINT VILLAGE	1,743	1,898	2,073	2,277	2,504	2,754
SOUTH HOUSTON	1,945	1,932	1,933	1,963	2,023	2,091
SOUTHSIDE PLACE	263	274	288	306	329	353
SPRING VALLEY	1,048	1,117	1,191	1,272	1,368	1,472
STAFFORD	74	79	80	82	84	86
SUNBELT FWSD	1,693	1,692	1,701	1,760	1,854	1,963
THE COMMONS WATER SUPPLY INC	359	373	385	394	401	407
THE WOODLANDS	3,873	4,150	4,520	4,800	5,014	5,177
TOMBALL	3,210	3,345	3,474	3,595	3,714	3,826
TRAIL OF THE LAKES MUD	1,043	1,066	1,066	1,068	1,073	1,078
WALLER	84	84	87	90	96	103
WEST HARRIS COUNTY MUD #6	327	344	352	360	368	374
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	71,086	73,202	77,277	81,779	83,359	84,827
WEST UNIVERSITY PLACE	2,885	3,029	3,202	3,416	3,674	3,959
WINDFERN FOREST UD	843	830	819	813	812	812
WOODCREEK MUD	288	282	277	276	278	281
COUNTY-OTHER	28,262	32,569	33,868	34,433	38,021	41,470
MANUFACTURING	246,361	260,546	273,111	282,515	277,795	273,154
MINING	2,913	2,894	2,843	2,812	2,787	2,768
STEAM ELECTRIC POWER	22,378	26,163	30,776	36,400	43,255	51,401
LIVESTOCK	1,517	1,517	1,517	1,517	1,517	1,517
IRRIGATION	6,531	6,531	6,531	6,531	6,531	6,531
SAN JACINTO BASIN TOTAL DEMAND	**1,027,065**	**1,082,551**	**1,136,351**	**1,190,827**	**1,236,625**	**1,285,390**
SAN JACINTO-BRAZOS BASIN						
CLEAR BROOK CITY MUD	1,649	1,683	1,772	1,861	1,957	2,052
DEER PARK	2,939	3,002	3,079	3,172	3,289	3,407
EL LAGO	322	310	301	302	302	303
FRIENDSWOOD	2,100	2,477	2,724	2,990	3,261	3,565
HARRIS COUNTY MUD #55	1,442	1,461	1,480	1,537	1,666	1,825
HOUSTON	27,847	31,082	34,261	37,739	41,642	46,086
KIRKMONT MUD	378	401	425	453	489	528
LA PORTE	4,497	4,404	4,348	4,340	4,381	4,432
LEAGUE CITY	389	430	456	476	491	503
NASSAU BAY	1,065	1,060	1,057	1,065	1,077	1,091
PASADENA	5,274	5,234	5,214	5,249	5,342	5,450
PEARLAND	2,028	2,467	2,937	3,285	3,546	3,742
SAGEMEADOW UD	727	745	780	825	879	937
SEABROOK	1,857	1,842	1,839	1,852	1,880	1,913
SHOREACRES	332	327	327	328	333	337
TAYLOR LAKE VILLAGE	657	651	643	642	647	653
WEBSTER	3,860	4,104	4,305	4,466	4,601	4,711
COUNTY-OTHER	1,966	2,306	2,564	2,803	3,069	3,341
MANUFACTURING	84,953	89,844	94,176	97,418	95,791	94,192
MINING	196	195	192	190	188	187
STEAM ELECTRIC POWER	1,178	1,377	1,620	1,916	2,277	2,705

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY						
SAN JACINTO-BRAZOS BASIN TOTAL DEMAND	**145,656**	**155,402**	**164,500**	**172,909**	**177,108**	**181,960**
TRINITY-SAN JACINTO BASIN						
BAYTOWN	9,077	8,917	8,828	8,845	8,968	9,116
HARRIS COUNTY WCID #1	23	22	23	24	25	26
HOUSTON	50	51	51	52	52	53
COUNTY-OTHER	3,878	4,257	4,681	5,091	5,480	5,872
MANUFACTURING	93,447	98,828	103,594	107,161	105,371	103,610
MINING	164	163	159	157	157	155
LIVESTOCK	150	150	150	150	150	150
IRRIGATION	709	709	709	709	709	709
TRINITY-SAN JACINTO BASIN TOTAL DEMAND	**107,498**	**113,097**	**118,195**	**122,189**	**120,912**	**119,691**
HARRIS COUNTY TOTAL DEMAND	**1,280,219**	**1,351,050**	**1,419,046**	**1,485,925**	**1,534,645**	**1,587,041**
LEON COUNTY						
BRAZOS BASIN						
CONCORD-ROBBINS WSC	167	168	169	179	188	198
JEWETT	63	74	82	94	105	115
NORMANGEE	27	28	29	31	33	34
COUNTY-OTHER	219	221	224	235	246	255
MINING	721	744	623	459	296	190
LIVESTOCK	425	425	425	425	425	425
IRRIGATION	71	71	71	71	71	71
BRAZOS BASIN TOTAL DEMAND	**1,693**	**1,731**	**1,623**	**1,494**	**1,364**	**1,288**
TRINITY BASIN						
BUFFALO	374	375	375	381	389	397
CENTERVILLE	180	189	195	207	218	230
CONCORD-ROBBINS WSC	46	47	47	50	53	55
FLO COMMUNITY WSC	297	286	278	276	280	284
JEWETT	175	202	225	259	288	318
NORMANGEE	81	84	86	91	96	102
OAKWOOD	74	71	70	70	70	70
COUNTY-OTHER	462	495	529	587	637	688
MANUFACTURING	834	958	1,083	1,196	1,301	1,415
MINING	1,681	1,737	1,454	1,071	689	444
LIVESTOCK	1,303	1,303	1,303	1,303	1,303	1,303
IRRIGATION	213	213	213	213	213	213
TRINITY BASIN TOTAL DEMAND	**5,720**	**5,960**	**5,858**	**5,704**	**5,537**	**5,519**
LEON COUNTY TOTAL DEMAND	**7,413**	**7,691**	**7,481**	**7,198**	**6,901**	**6,807**
LIBERTY COUNTY						
NECHES BASIN						
DAISETTA	46	49	53	57	62	67
HARDIN WSC	30	37	44	51	57	63
WEST HARDIN WSC	24	27	29	32	34	37
COUNTY-OTHER	105	109	114	119	126	133
MANUFACTURING	176	203	231	256	278	302
MINING	52	55	54	56	60	65
LIVESTOCK	103	103	103	103	103	103
IRRIGATION	11,153	11,153	11,153	11,153	11,153	11,153

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LIBERTY COUNTY						
NECHES BASIN TOTAL DEMAND	**11,689**	**11,736**	**11,781**	**11,827**	**11,873**	**11,923**
NECHES-TRINITY BASIN						
COUNTY-OTHER	14	15	16	17	19	20
MINING	22	23	22	23	25	27
LIVESTOCK	45	45	45	45	45	45
IRRIGATION	22,063	22,063	22,063	22,063	22,063	22,063
NECHES-TRINITY BASIN TOTAL DEMAND	**22,144**	**22,146**	**22,146**	**22,148**	**22,152**	**22,155**
SAN JACINTO BASIN						
CLEVELAND	1,551	1,539	1,531	1,537	1,555	1,575
PLUM GROVE	81	87	94	102	110	118
TARKINGTON SUD	320	363	406	452	499	543
COUNTY-OTHER	1,641	1,861	2,065	2,287	2,526	2,759
MANUFACTURING	128	148	168	186	202	220
MINING	79	82	80	85	89	97
LIVESTOCK	157	157	157	157	157	157
IRRIGATION	2,517	2,517	2,517	2,517	2,517	2,517
SAN JACINTO BASIN TOTAL DEMAND	**6,474**	**6,754**	**7,018**	**7,323**	**7,655**	**7,986**
TRINITY BASIN						
AMES	100	106	112	121	131	140
DAISETTA	82	89	95	103	111	119
DAYTON	2,266	2,889	3,489	4,100	4,694	5,264
HARDIN	122	134	146	160	173	187
HARDIN WSC	410	504	596	692	788	880
KENEFICK	76	83	89	97	104	112
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	196	258	319	380	438	494
LIBERTY	1,543	1,620	1,698	1,790	1,892	1,992
OLD RIVER-WINFREE	16	17	18	20	21	23
TARKINGTON SUD	96	109	122	135	149	163
WOODLAND HILLS WATER COMPANY	500	661	818	980	1,138	1,290
COUNTY-OTHER	2,300	2,000	1,740	1,517	1,327	1,151
MANUFACTURING	136	157	179	199	216	234
MINING	258	270	263	276	292	318
LIVESTOCK	519	519	519	519	519	519
IRRIGATION	22,884	22,884	22,884	22,884	22,884	22,884
TRINITY BASIN TOTAL DEMAND	**31,504**	**32,300**	**33,087**	**33,973**	**34,877**	**35,770**
TRINITY-SAN JACINTO BASIN						
DAYTON	7	9	11	13	15	16
COUNTY-OTHER	377	408	436	470	507	545
MINING	26	27	27	28	30	32
LIVESTOCK	49	49	49	49	49	49
IRRIGATION	3,268	3,268	3,268	3,268	3,268	3,268
TRINITY-SAN JACINTO BASIN TOTAL DEMAND	**3,727**	**3,761**	**3,791**	**3,828**	**3,869**	**3,910**
LIBERTY COUNTY TOTAL DEMAND	**75,538**	**76,697**	**77,823**	**79,099**	**80,426**	**81,744**
MADISON COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	207	216	226	238	251	264
MINING	119	194	151	108	65	39

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MADISON COUNTY						
BRAZOS BASIN						
LIVESTOCK	152	152	152	152	152	152
IRRIGATION	2	2	2	2	2	2
BRAZOS BASIN TOTAL DEMAND	**480**	**564**	**531**	**500**	**470**	**457**
TRINITY BASIN						
MADISONVILLE	870	909	947	998	1,053	1,107
NORMANGEE	14	14	15	16	17	17
COUNTY-OTHER	1,601	1,676	1,746	1,841	1,942	2,043
MANUFACTURING	226	247	268	287	311	337
MINING	478	778	603	430	258	155
STEAM ELECTRIC POWER	238	278	327	387	459	546
LIVESTOCK	872	872	872	872	872	872
IRRIGATION	14	14	14	14	14	14
TRINITY BASIN TOTAL DEMAND	**4,313**	**4,788**	**4,792**	**4,845**	**4,926**	**5,091**
MADISON COUNTY TOTAL DEMAND	**4,793**	**5,352**	**5,323**	**5,345**	**5,396**	**5,548**
MONTGOMERY COUNTY						
SAN JACINTO BASIN						
BENDERS LANDING WATER SYSTEM	2,188	3,456	4,762	6,070	7,373	7,372
CLEVELAND	6	8	10	14	18	23
CONROE	13,336	15,705	17,863	19,899	22,144	24,564
CUT AND SHOOT	116	120	134	158	190	235
DOBBIN-PLANTERSVILLE WSC	642	840	1,117	1,485	1,972	2,614
EAST PLANTATION UD	212	213	244	278	320	331
HOUSTON	981	1,375	1,810	2,233	2,654	2,776
INDIGO LAKE WATER SYSTEM	1,133	1,548	2,212	3,156	4,491	6,671
KINGS MANOR MUD	224	225	231	236	242	246
LAKE WINDCREST WATER SYSTEM	916	1,026	1,298	1,681	2,219	2,972
MAGNOLIA	694	823	997	1,256	1,637	2,230
MONTGOMERY	631	1,164	1,442	1,722	2,008	2,459
MONTGOMERY COUNTY MUD #15	497	525	598	699	850	1,065
MONTGOMERY COUNTY MUD #18	1,285	1,644	1,861	2,080	2,302	2,842
MONTGOMERY COUNTY MUD #19	261	253	247	245	247	249
MONTGOMERY COUNTY MUD #8	445	462	506	554	607	728
MONTGOMERY COUNTY MUD #83	281	289	298	307	316	323
MONTGOMERY COUNTY MUD #89	335	337	341	366	402	415
MONTGOMERY COUNTY MUD #9	507	520	584	651	720	862
MONTGOMERY COUNTY MUD #94	592	595	657	720	783	782
MONTGOMERY COUNTY UD #2	172	168	172	183	197	217
MONTGOMERY COUNTY UD #3	267	303	305	347	438	557
MONTGOMERY COUNTY UD #4	509	642	637	724	923	1,184
MONTGOMERY COUNTY WCID #1	255	262	274	299	328	361
NEW CANEY MUD	742	774	818	889	992	1,120
OAK RIDGE NORTH	559	569	595	609	616	618
PANORAMA VILLAGE	585	586	617	663	730	819
PATTON VILLAGE	151	159	177	199	227	263
POINT AQUARIUS MUD	339	336	355	383	424	478
PORTER SUD	1,693	2,116	2,543	2,963	3,383	3,731
RAYFORD ROAD MUD	994	1,015	1,080	1,159	1,249	1,282

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MONTGOMERY COUNTY						
SAN JACINTO BASIN						
RIVER PLANTATION MUD	511	534	651	767	895	944
ROMAN FOREST	320	317	348	391	449	524
SHENANDOAH	1,292	1,667	1,820	1,923	2,046	2,203
SOUTHERN MONTGOMERY COUNTY MUD	861	865	865	870	880	894
SPLENDORA	180	190	222	265	322	394
SPRING CREEK UD	645	689	715	773	851	877
STAGECOACH	37	44	71	110	172	279
STANLEY LAKE MUD	569	630	807	1,047	1,365	1,765
THE WOODLANDS	23,987	25,132	26,326	27,820	30,098	32,896
WESTWOOD NORTH WSC	351	369	410	451	492	551
WILLIS	817	826	874	951	1,068	1,232
WOODBRANCH	105	106	122	148	182	225
COUNTY-OTHER	35,816	50,901	68,894	91,167	119,227	153,649
MANUFACTURING	2,135	2,388	2,640	2,863	3,107	3,372
MINING	1,453	1,363	1,077	921	806	728
STEAM ELECTRIC POWER	8,537	9,981	11,741	13,886	16,502	19,611
LIVESTOCK	521	521	521	521	521	521
IRRIGATION	737	737	737	737	737	737
SAN JACINTO BASIN TOTAL DEMAND	**110,422**	**135,318**	**163,626**	**197,839**	**240,722**	**291,791**
MONTGOMERY COUNTY TOTAL DEMAND	**110,422**	**135,318**	**163,626**	**197,839**	**240,722**	**291,791**
POLK COUNTY						
TRINITY BASIN						
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	1,066	1,178	1,275	1,357	1,425	1,479
LIVINGSTON	2,557	2,823	3,032	3,216	3,374	3,502
ONALASKA	316	390	449	501	544	579
COUNTY-OTHER	1,942	2,047	2,131	2,218	2,305	2,381
MINING	124	98	72	46	21	9
LIVESTOCK	144	144	144	144	144	144
TRINITY BASIN TOTAL DEMAND	**6,149**	**6,680**	**7,103**	**7,482**	**7,813**	**8,094**
POLK COUNTY TOTAL DEMAND	**6,149**	**6,680**	**7,103**	**7,482**	**7,813**	**8,094**
SAN JACINTO COUNTY						
SAN JACINTO BASIN						
COLDSPRING	40	42	45	47	50	52
SAN JACINTO SUD	68	70	72	77	81	85
COUNTY-OTHER	1,317	1,413	1,490	1,586	1,672	1,752
MANUFACTURING	11	12	13	14	15	16
MINING	6	6	6	6	6	6
LIVESTOCK	193	193	193	193	193	193
IRRIGATION	130	130	130	130	130	130
SAN JACINTO BASIN TOTAL DEMAND	**1,765**	**1,866**	**1,949**	**2,053**	**2,147**	**2,234**
TRINITY BASIN						
COLDSPRING	78	84	87	94	98	103
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	271	295	316	340	359	377
POINT BLANK	89	95	99	105	111	116
RIVERSIDE WSC	39	43	46	49	52	54

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SAN JACINTO COUNTY						
TRINITY BASIN						
SAN JACINTO SUD	169	177	182	192	203	212
SHEPHERD	314	334	349	370	390	409
COUNTY-OTHER	758	812	856	912	962	1,008
MINING	2	2	3	3	3	3
LIVESTOCK	193	193	193	193	193	193
IRRIGATION	129	129	129	129	129	129
TRINITY BASIN TOTAL DEMAND	**2,042**	**2,164**	**2,260**	**2,387**	**2,500**	**2,604**
SAN JACINTO COUNTY TOTAL DEMAND	**3,807**	**4,030**	**4,209**	**4,440**	**4,647**	**4,838**
TRINITY COUNTY						
TRINITY BASIN						
GROVETON	70	72	70	67	70	73
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	110	118	119	115	121	126
TRINITY	337	349	341	326	340	355
TRINITY RURAL WSC	528	555	550	529	551	577
COUNTY-OTHER	214	217	218	212	222	232
MINING	5	5	5	5	5	5
LIVESTOCK	249	249	249	249	249	249
TRINITY BASIN TOTAL DEMAND	**1,513**	**1,565**	**1,552**	**1,503**	**1,558**	**1,617**
TRINITY COUNTY TOTAL DEMAND	**1,513**	**1,565**	**1,552**	**1,503**	**1,558**	**1,617**
WALKER COUNTY						
SAN JACINTO BASIN						
HUNTSVILLE	6,554	6,715	6,817	6,957	7,101	7,226
NEW WAVERLY	181	184	185	188	192	195
WALKER COUNTY SUD	447	461	470	483	495	506
COUNTY-OTHER	1,727	1,764	1,786	1,818	1,851	1,880
MANUFACTURING	293	293	293	293	293	293
MINING	5	5	5	5	5	5
LIVESTOCK	306	306	306	306	306	306
IRRIGATION	320	320	320	320	320	320
SAN JACINTO BASIN TOTAL DEMAND	**9,833**	**10,048**	**10,182**	**10,370**	**10,563**	**10,731**
TRINITY BASIN						
HUNTSVILLE	1,343	1,376	1,397	1,425	1,455	1,481
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	27	28	29	30	30	31
RIVERSIDE	55	57	58	60	62	63
RIVERSIDE WSC	350	386	412	436	455	470
THE CONSOLIDATED WSC	17	18	19	20	21	22
TRINITY RURAL WSC	41	44	46	48	50	52
WALKER COUNTY SUD	596	615	627	643	661	676
COUNTY-OTHER	1,505	1,462	1,430	1,408	1,399	1,394
MANUFACTURING	19	19	19	19	19	19
MINING	6	6	6	6	6	6
LIVESTOCK	346	346	346	346	346	346
IRRIGATION	355	355	355	355	355	355
TRINITY BASIN TOTAL DEMAND	**4,660**	**4,712**	**4,744**	**4,796**	**4,859**	**4,915**
WALKER COUNTY TOTAL DEMAND	**14,493**	**14,760**	**14,926**	**15,166**	**15,422**	**15,646**

WUG DEMAND

REGION H	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
WALLER COUNTY						
BRAZOS BASIN						
BROOKSHIRE	663	782	921	1,080	1,262	1,460
G & W WSC	111	146	187	231	281	335
HEMPSTEAD	1,304	1,490	1,703	1,944	2,218	2,518
PINE ISLAND	152	167	184	205	230	256
PRAIRIE VIEW	1,436	1,669	1,934	2,232	2,567	2,933
COUNTY-OTHER	1,470	1,756	2,085	2,456	2,879	3,340
MANUFACTURING	115	128	141	152	165	179
MINING	4	4	4	4	4	4
LIVESTOCK	824	824	824	824	824	824
IRRIGATION	7,012	7,012	7,012	7,012	7,012	7,012
BRAZOS BASIN TOTAL DEMAND	**13,091**	**13,978**	**14,995**	**16,140**	**17,442**	**18,861**
SAN JACINTO BASIN						
G & W WSC	339	448	571	709	861	1,028
KATY	354	434	527	628	742	866
PRAIRIE VIEW	131	152	176	202	233	266
WALLER	356	379	407	440	479	523
COUNTY-OTHER	1,575	1,817	2,099	2,422	2,790	3,194
MANUFACTURING	19	21	23	25	27	29
MINING	3	3	3	3	3	3
LIVESTOCK	245	245	245	245	245	245
IRRIGATION	14,084	14,084	14,084	14,084	14,084	14,084
SAN JACINTO BASIN TOTAL DEMAND	**17,106**	**17,583**	**18,135**	**18,758**	**19,464**	**20,238**
WALLER COUNTY TOTAL DEMAND	**30,197**	**31,561**	**33,130**	**34,898**	**36,906**	**39,099**
REGION H TOTAL DEMAND	**2,488,883**	**2,674,720**	**2,853,311**	**3,038,675**	**3,217,833**	**3,415,333**

WUG CATEGORY SUMMARY

REGION H	2020	2030	2040	2050	2060	2070
MUNICIPAL						
POPULATION	6,306,537	6,904,382	7,458,017	7,971,820	8,439,277	8,900,775
DEMANDS (acre-feet per year)	1,121,031	1,208,872	1,292,432	1,374,487	1,455,702	1,537,099
EXISTING SUPPLIES (acre-feet per year)	1,118,301	1,054,696	1,050,212	1,058,097	1,066,018	1,072,857
NEEDS (acre-feet per year)*	(113,391)	(255,993)	(340,214)	(407,637)	(474,125)	(542,432)
COUNTY-OTHER						
POPULATION	1,018,777	1,303,318	1,566,516	1,895,692	2,326,796	2,842,503
DEMANDS (acre-feet per year)	136,245	169,020	199,450	239,079	292,350	356,298
EXISTING SUPPLIES (acre-feet per year)	153,543	152,705	154,357	157,032	160,729	164,350
NEEDS (acre-feet per year)*	(28,516)	(54,613)	(80,652)	(115,966)	(161,740)	(218,524)
MANUFACTURING						
DEMANDS (acre-feet per year)	753,307	800,223	844,300	882,719	896,354	910,294
EXISTING SUPPLIES (acre-feet per year)	707,207	712,138	726,675	727,536	726,445	725,449
NEEDS (acre-feet per year)*	(88,084)	(122,722)	(150,674)	(186,714)	(199,735)	(212,904)
MINING						
DEMANDS (acre-feet per year)	15,486	16,267	15,426	14,646	13,938	13,657
EXISTING SUPPLIES (acre-feet per year)	11,121	11,109	10,795	10,108	9,272	8,698
NEEDS (acre-feet per year)*	(4,817)	(5,619)	(5,114)	(5,160)	(5,388)	(5,746)
STEAM ELECTRIC POWER						
DEMANDS (acre-feet per year)	103,629	121,153	142,518	168,559	200,304	238,800
EXISTING SUPPLIES (acre-feet per year)	197,024	197,628	198,941	199,527	200,207	200,947
NEEDS (acre-feet per year)*	(1,707)	(5,325)	(9,115)	(14,707)	(24,383)	(61,400)
LIVESTOCK						
DEMANDS (acre-feet per year)	13,346	13,346	13,346	13,346	13,346	13,346
EXISTING SUPPLIES (acre-feet per year)	10,949	10,682	10,427	10,281	10,098	9,928
NEEDS (acre-feet per year)*	(2,397)	(2,664)	(2,919)	(3,065)	(3,248)	(3,418)
IRRIGATION						
DEMANDS (acre-feet per year)	345,839	345,839	345,839	345,839	345,839	345,839
EXISTING SUPPLIES (acre-feet per year)	307,825	308,731	307,458	304,714	302,318	300,082
NEEDS (acre-feet per year)*	(108,121)	(107,656)	(110,704)	(113,170)	(115,336)	(117,339)
REGION TOTALS						
POPULATION	7,325,314	8,207,700	9,024,533	9,867,512	10,766,073	11,743,278
DEMANDS (acre-feet per year)	2,488,883	2,674,720	2,853,311	3,038,675	3,217,833	3,415,333
EXISTING SUPPLIES (acre-feet per year)	2,505,970	2,447,689	2,458,865	2,467,295	2,475,087	2,482,311
NEEDS (acre-feet per year)*	(347,033)	(554,592)	(699,392)	(846,419)	(983,955)	(1,161,763)

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Category Summary report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with needs in the decade are included with the Needs totals.

WWP DEMANDS

REGION H	WWP DEMAND					
	2020	2030	2040	2050	2060	2070
WWP NAME						
BAYTOWN AREA WATER AUTHORITY	18,536	18,536	18,536	18,536	18,536	18,536
BRAZOSPORT WATER AUTHORITY	14,991	17,743	19,779	21,567	23,196	24,924
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	5,726	5,084	5,290	5,509	5,739	6,000
CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	40,026	40,026	40,026	40,026	40,026	40,026
CLEAR LAKE CITY WATER AUTHORITY	26,880	26,880	26,880	26,880	26,880	26,880
DOW CHEMICAL USA	186,176	199,793	210,314	222,826	234,686	245,833
FORT BEND COUNTY WCID #2	5,091	5,127	5,164	5,269	5,390	5,472
GALVESTON	21,073	21,271	21,475	21,688	21,899	22,115
GALVESTON COUNTY WCID #1	3,785	3,808	3,832	3,855	3,878	3,902
GULF COAST WATER AUTHORITY	193,253	202,034	206,294	212,680	219,429	227,642
HOUSTON	1,280,628	1,351,139	1,453,851	1,512,102	1,560,921	1,614,662
HUNTSVILLE	29,120	29,120	29,120	29,120	29,120	29,120
LA PORTE AREA WATER AUTHORITY	8,932	8,932	8,932	8,932	8,932	8,932
MISSOURI CITY	21,018	21,112	24,316	27,683	30,365	32,321
NORTH CHANNEL WATER AUTHORITY	12,266	12,264	12,270	12,296	12,340	12,381
NORTH FORT BEND WATER AUTHORITY	65,644	87,984	106,381	117,046	122,751	125,691
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	125,661	133,754	140,706	145,699	150,578	155,164
NRG	178,306	178,504	178,702	178,900	179,652	205,639
PASADENA	52,961	52,957	52,964	52,995	53,050	53,112
SAN JACINTO RIVER AUTHORITY	133,854	153,205	173,930	198,234	222,526	254,193
SUGAR LAND	36,440	38,158	38,881	40,699	42,932	44,203
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	79,434	79,441	85,593	90,114	91,734	93,240
REGION H TOTAL DEMAND	**2,539,801**	**2,686,872**	**2,863,236**	**2,992,656**	**3,104,560**	**3,249,988**

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Chapter 3 – Analysis of Current Water Supplies

3.1 INTRODUCTION

Region H occupies a location on the Texas Gulf Coast which provides a wealth of water resources, with many aquifer formations capable of rapid recharge and with a number of surface water catchments with generally large flows. However, the Region is also home to approximately a quarter of the State's population and is projected to experience significant growth over the next 50 years. This large population, and the Region's status as a major industrial area, generates extremely large water demands.

A key component in addressing these growing demands is understanding the reliability and ownership of existing water supplies. This chapter summarizes the results of Task 3, and describes the resources available to the region and their allocation to Water User Groups (WUGs) throughout Region H. In this effort, the Region H Water Planning Group (RHWPG) was assisted by the members of the Region H Groundwater Supply Committee and Surface Water Supply Committee. Members of these committees are listed below in *Table 3-1*.

Table 3-1 –Region H Committee Members

Groundwater Supply Committee	
Member	**Organization**
Ron Neighbors (Chair)	Neighbors and Associates
David Bailey	Mid-East Texas GCD
Kathy Jones	Lone Star GCD
James Morrison	Walker County Rural WSC
Bill Teer	Southeast WSC
Surface Water Supply Committee	
Member	**Organization**
Jace Houston(Chair)	San Jacinto River Authority
Jun Chang	City of Houston
John Hofmann David Collinsworth	Brazos River Authority
Kevin Ward	Trinity River Authority
Pudge Willcox	Chambers-Liberty Counties Navigation District

Also, to provide consistency and facilitate the compilation of the different regional plans, the Texas Water Development Board (TWDB) required the incorporation of this data into a standardized online database referred to as DB17. The results of the analyses described below can be found in detail within DB17 and attached to this document in ***Appendix 3-DB***. The following sections describe water resources available to the Region, procedures for estimating reliable availability, description of major water providers, and procedures for assigning available water supplies to users in the Plan.

3.2 GROUNDWATER SOURCES

3.2.1 Groundwater Aquifer Overview

Groundwater resources in Region H consist of two major aquifers and four minor aquifers. The two major aquifers are the Gulf Coast aquifer and the Carrizo-Wilcox aquifer (*Figure 3-1*). The four minor aquifers present are the Sparta, Queen City, Yegua-Jackson, and Brazos River alluvium (Figure 3-2). The Carrizo-Wilcox is used primarily in Leon and Madison Counties, the Sparta aquifer system in Madison, Walker, and Trinity Counties, and the Gulf Coast aquifer system in the central and southern sections of the region. Smaller amounts of water are provided by the Queen City, Sparta, Yegua Jackson, and Brazos River alluvium aquifers. Individual aquifers are described in greater detail in the following subsections.

3.2.2 Major Aquifers

3.2.2.1 Carrizo-Wilcox Aquifer

The Carrizo-Wilcox is the main aquifer in the northern part of Region H in Leon County and the northern portion of Madison County. The Carrizo-Wilcox aquifer was deposited in a manner that resulted in a sequence of geologic formations of interbedded sand, silt, clay, and shale having a thickness of about 2,000 feet in the northern part of the region. The Carrizo Sand is one of two principal water-producing units of the Carrizo-Wilcox aquifer and it is about 100 to 200 feet thick. It is a generally uniform, well sorted sand that contains a few very thin beds of clay; the aquifer dips downward to the southeast at about 70 to 100 feet per mile. The Wilcox Group is composed of alternating beds of sand, sandy clay, and clay with locally interbedded gravel, silt, clay, and lignite. The Simsboro Sand is the major water-producing unit in the Wilcox and is about 200 to 400 feet thick. The Carrizo and Wilcox formations are weakly connected hydraulically and are generally described as one major aquifer. Water from the aquifer contains less than 1,000 milligrams per liter (mg/l) of total dissolved solids, but water from the Carrizo Sand can contain elevated levels of iron that require sequestering or treatment for removal for water used for most municipal and industrial purposes.

Figure 3-1 – Region H Major Groundwater Sources

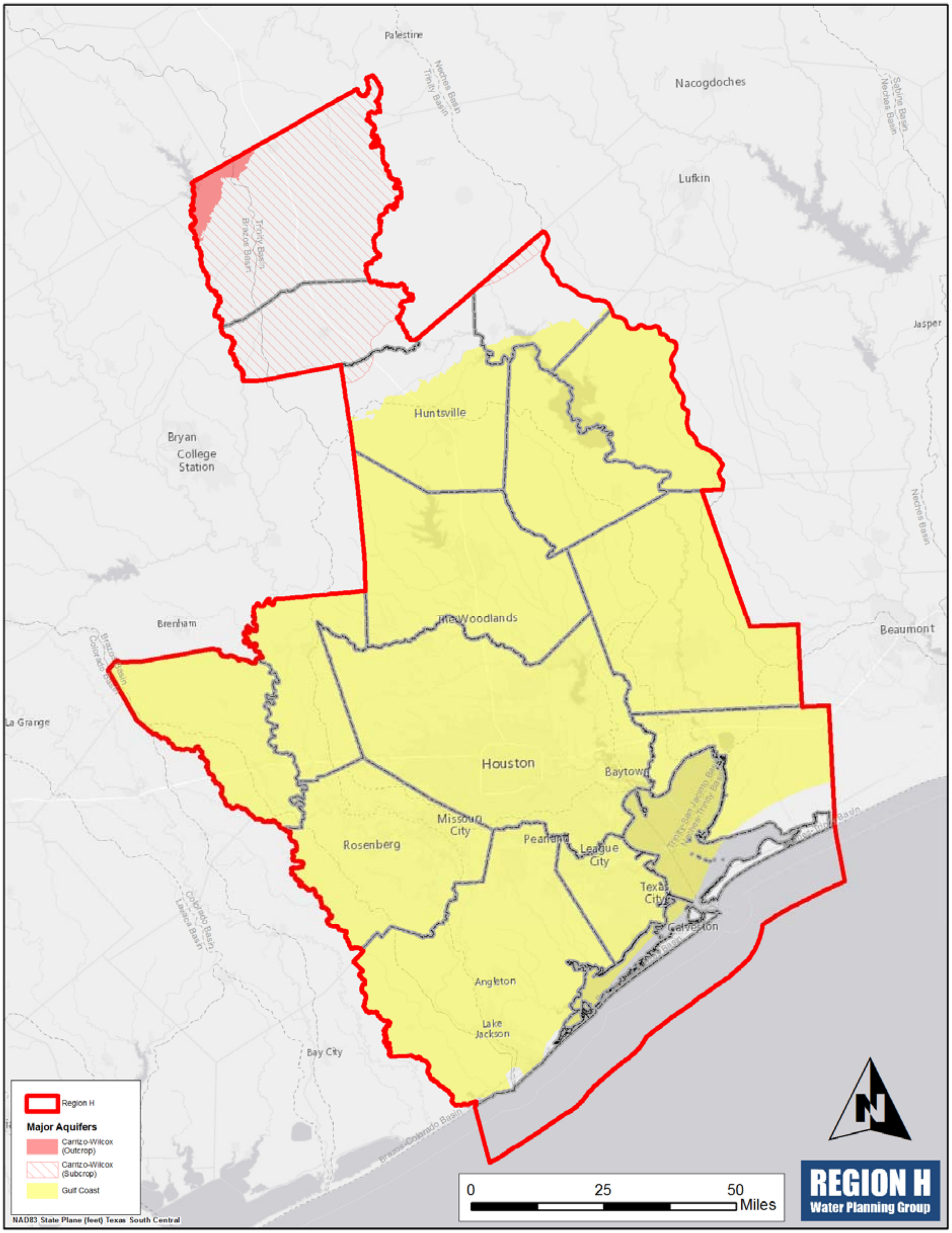
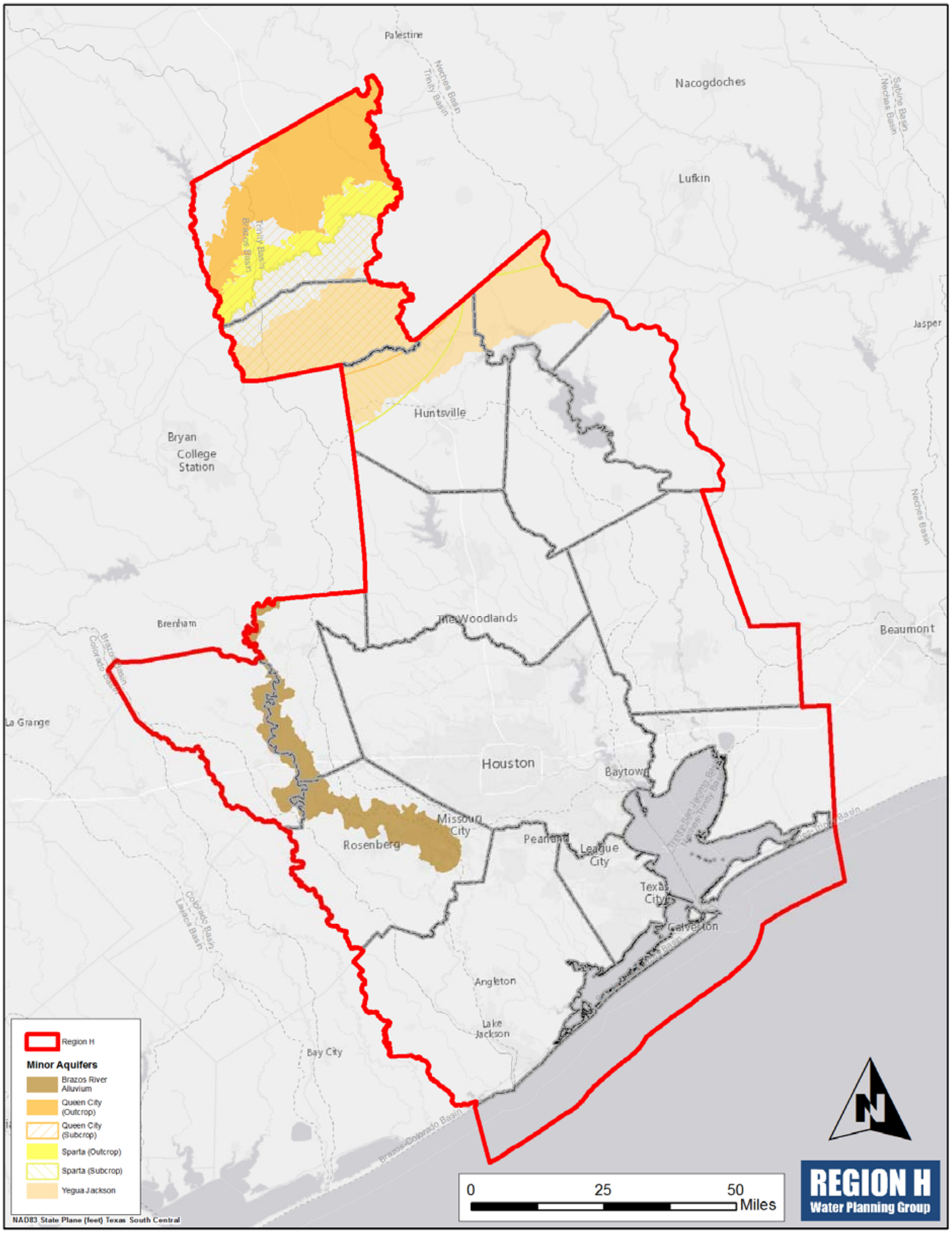


Figure 3-2 – Region H Minor Groundwater Sources



3.2.2.2 Gulf Coast Aquifer

The Gulf Coast aquifer extends from the Gulf Coast to approximately 100 to 120 miles inland in Walker and Trinity Counties. The Gulf Coast aquifer consists of four general water-producing units. The geologically youngest unit is the Chicot aquifer, followed by the Evangeline aquifer, the Jasper aquifer, and the Catahoula Formation. The Chicot and Evangeline aquifers are the more prolific water-producing units in the Gulf Coast aquifer followed by the Jasper aquifer and the Catahoula Formation. The units are composed of alternating beds of sand, silt, and clay; shale can occur at deeper depths at and below the base of the Evangeline aquifer. The Gulf Coast aquifer has sand thicknesses ranging from about 200 to 500 feet in the central and southern parts of the region with the sands containing freshwater decreasing in thickness as the aquifers approach within about 30 to 40 miles of the Gulf Coast. Formation beds vary in thickness and composition and the areal extent of individual beds normally cannot be traced over extended distances. Total aquifer sand thickness varies and can be as great as several hundred feet. The lower unit of the aquifer, the Catahoula Sandstone, is screened by wells for the City of Huntsville and other wells in Walker County. To the south, in Galveston County, the Chicot unit is screened in wells used by the City of Galveston. The aquifer is capable of yielding larger quantities of water in the central and southern parts of Region H and has been utilized over the past 100 years to provide part of the water supply, although heavy usage has also resulted in land surface subsidence and its use is now restricted in Fort Bend, Galveston, and Harris Counties for this reason.

3.2.3 Minor Aquifers

3.2.3.1 Queen City Formation

The Queen City Formation is a minor aquifer that occurs in central and southeastern Leon County and in the northern part of Madison County. The Queen City Formation is composed of sand and loosely cemented sandstone with interbedded shale layers occurring throughout. The Queen City Formation ranges in thickness from 250 to 400 feet with approximately 60 to 70 percent of the total thickness being sand according to Texas Water Commission Bulletin 6513 (1965), "Availability and Quality of Ground Water in Leon County, Texas." Groundwater in small to moderate quantities is provided by the Queen City Formation for domestic, municipal, industrial, and agricultural uses in Leon and Madison Counties.

3.2.3.2 Sparta Formation

The Sparta Formation or Sparta Sand occurs in southeastern Leon County, all of Madison County, northwestern Walker County, and northeastern Trinity County. The Sparta Formation consists of sand and interbedded clay, with the lower portion of the aquifer containing massive unconsolidated sands with a few layers of shale. The Sparta Formation ranges in thickness from 150 to 300 feet in Leon County and Madison County (Texas Workforce Commission Bulletin 6513). Groundwater from the aquifer is provided for domestic, municipal, and agricultural uses in Leon County and for domestic, municipal, manufacturing, and agricultural uses in Madison County. The Sparta Formation is the groundwater source for the Town of Madisonville and for some water supply corporations in the area.

3.2.3.3 Yegua-Jackson Aquifer

The Yegua Formation and Jackson Group make up a minor aquifer, designated as the Yegua-Jackson aquifer, which occurs within the region in parts of Madison, Walker, Trinity, and Polk Counties. The Yegua Formation consists of sand, interbedded clay, and scattered lignite. The Jackson Group includes all strata between the Yegua Formation and the Catahoula Sandstone and consists of sand, clay, sandstone, and siltstone. The Yegua Formation ranges in thickness from 1,000 to 1,500 feet; the Jackson Group is approximately 1,100 feet thick, according to Texas Board of Water Engineers Bulletin 5003 (1950), "Geology and Ground-Water Resources of Walker County, Texas." Small to moderate quantities of groundwater are provided by the Yegua-Jackson aquifer for domestic, municipal, industrial, and agricultural uses.

3.2.3.4 Brazos River Alluvium

The Brazos River alluvium occurs in the floodplain and terrace deposits of the Brazos River in Austin, Fort Bend, and Waller Counties. The Quaternary alluvial sediments consist of clay, silt, sand, and gravel according to TWDB Report 345 (1995), Aquifers of Texas, with the more permeable sand and gravel present in the lower part of the aquifer. The saturated thickness of the sediments is as much as 85 feet and the width of the alluvium ranges from less than 1 mile to approximately 7 miles, with the Brazos River located within the width of the alluvial deposits. The Brazos River alluvium supplies groundwater for domestic and agricultural purposes in Fort Bend and Waller Counties. In Austin County, it supplies groundwater for domestic, manufacturing, and agricultural uses. The aquifer may contain water with total dissolved solids that approach 1,000 mg/l and have a high total hardness due to the amounts of calcium, magnesium, and sulfate in the aquifer water.

3.2.4 Groundwater Availability

Region H relies on a significant portion of supply from groundwater-based sources. Historically, the coastal counties within the region have been significant users of groundwater, such that initiatives to assess the reliable yield from groundwater supplies and offset excess groundwater demand to alternative sources began long before these initiatives began in other parts of the State because of recognized issues with subsidence. For this reason, the issue of groundwater reliability is a mature topic within the study area and of vital importance to overall water supply planning.

3.2.4.1 Groundwater Availability in Region H

Region H contains the entirety or portions of seven entities that have authority over groundwater resources. Of these seven, two are subsidence districts with the balance being made up of groundwater conservation districts (GCDs) governed under Chapter 36 of the Texas Water Code (TWC). Of the seven entities of various types, three of these are actively engaged in regulatory plans that involve the restriction of groundwater pumpage for the sake of preserving groundwater resources or preventing undue harm to other natural resources as a result of excess groundwater withdrawal. In effect, these plans and regulations represent the availability of groundwater in these counties for practical purposes.

The Harris-Galveston Subsidence District (HGSD) was created in 1975 to "end subsidence" in those counties at the threat of impacts resulting from excess use of groundwater. Prior to that time, it was observed that subsidence had increased the risk from coastal flooding in those counties and threatened to further increase the potential for inundation along the coast and in inland areas. Through a series of regulatory plans, HGSD has curtailed impacts from Subsidence since its inception. In 2013, HGSD adopted a District Regulatory Plan that maintained existing limits on groundwater production in its three Regulatory Areas and set future reductions for Regulatory Area 3 located in north and west Harris County. These reductions are applied to water users on a basis of a percentage of their total water demand. These percentages are developed based on detailed study of long-range population and water demand projections and groundwater modeling for the region. In addition, entities are allowed to enter into Groundwater Reduction Plans (GRPs) that allow for aggregated compliance with groundwater regulation to maximize efficiency in goal attainment. Limits to the maximum annual percentage of groundwater use must be achieved on an annual basis to prevent dewatering of clay layers which causes subsidence and the incurring of disincentive fees on the part of groundwater users.

The Fort Bend Subsidence District (FBSD) was created in 1989 to address similar issues of subsidence that posed a risk to flood-prone areas within the county. In 2013, FBSD approved a District Regulatory Plan that maintained groundwater reductions for areas in the more urbanized northern and eastern portions of the county. Like the limitations placed on pumping by HGSD, these restrictions are applied as a percentage of total water demand and allow for compliance through GRPs.

The Lone Star Groundwater Conservation District (LSGCD) was created in 2001 to help Montgomery County continue its growth in a responsible manner without overpumping of the Gulf Coast Aquifer which has historically been its primary source of water for all purposes, including municipal use. Through a series of regulatory plan developments, LSGCD has set a sustainable supply for the Gulf Coast Aquifer in Montgomery County at 64,000 acre-feet per year. In response to existing pumpage outside of the limits of this supply, LSGCD took action to call on large-volume groundwater users in the county to identify and develop alternative water supplies in order to reduce pumping to sustainable levels. These limitations, which must be met in 2016 and adhered to on a long-term average in subsequent years, are based on a firm cap specified for each large-volume groundwater user based on historical use. In this way, groundwater regulation in LSGCD differs from the percentage reduction used in the HGSD and FBSD regulatory plans.

For all other counties, Region H has historically recognized exiting studies of groundwater availability in these counties as the source of information for planning purposes.

3.2.4.2 Prescribed Groundwater Availability in the 2016 Regional Water Plans

In 2010, the Groundwater Management Areas (GMAs) across Texas submitted their first round of Desired Future Conditions (DFCs) to the TWDB for the purpose of developing estimates of Modeled Available Groundwater (MAG) as described under Section 36.108 of the Texas Water Code (TWC). The GCDs adopting DFCs are required to develop management plans that include goals that are consistent with achieving the DFCs, per Section 36.1085 of the TWC.

In the fourth cycle of regional water planning, TWDB has strived to bring the efforts of the Regional Water Planning Groups (RWPGs) and GMAs together through the addition of language in the planning rules. Whereas past Regional Water Plans (RWPs) have allowed for discretion of the RWPGs in assigning groundwater availability, the 2016 round of RWP development takes a different approach. Per Section 16.053(e)(2-a) of the TWC, regional plans must be "consistent with the desired future conditions…" as developed by the GMAs. Going a step further, Title 31 of the Texas Administrative Code (TAC) Section 357.32 (d) dictates that, for regional planning, RWPGs "shall use Modeled Available Groundwater volumes for groundwater availability" unless there is no MAG volume. Therefore, for the development of the 2016 RWP, Region H groundwater supplies for traditional formations are set at the MAG as developed by TWDB from DFCs submitted by the various GMAs in 2010. Availability of existing water supplies is summarized in ***Appendix 3-DB***.

3.2.4.3 Issues in Applying Modeled Available Groundwater to Availability

This approach to groundwater supplies in the regional planning process presents several issues to the Region H RWPG as well as other RWPGs in other regions of the State. Several of these potential issues are described below for consideration by TWDB in guiding future implementation of the guidelines for RWP development.

Although GCDs are bound to the DFCs adopted by GMAs, they are not required to use the MAG as a means of achieving that goal. Section 36.1132 of the TWC states that "a district, to the extent possible, shall issue permits up to the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition." Several considerations are also provided in this section including the MAG. This guides GCDs toward regulating to the DFC with consideration of the MAG in addition to other factors but does not necessarily limit GCDs to strict adherence to the MAG. This suggests there may be means to achieve the DFC outside of the MAG. The requirement of Title 31 of the TAC, Section 357.32(d) goes beyond the language in the TWC and requires that regions plan to the MAG although it is not necessarily a binding limit for the GCDs. In effect, projects that may be developed within a GCD while still attaining the long-term goals of the DFC (DFCs are typically set as levels of drawdown over approximately a 50-year period) may be permitted but not included for the purposes of regional water planning. This is particularly an issue in GCDs that are just beginning their approach to groundwater regulation and will allow for near-term pumpage beyond the MAG and greater levels of pumpage reduction in future decades in order to achieve the adopted DFC.

The perspectives of the GMA and RWP processes are inherently different. Regional plans are intended to be built around "dry-year" demands for various water uses to create a worst case scenario for planning purposes. For this reason, year 2011 per capita demands have been selected for development of the 2016 RWPs for much of the State. This approach is conservative and reasonable for the identification of potential water needs and projects that may be required under a drought-of-record scenario. However, this approach is inadequate for the study of groundwater resources which must be evaluated over long-term averages. To model peak, dry-year demands for the entire period considered in the Groundwater Availability Models (GAMs) used in developing DFCs would result in a gross and unrealistic over-estimation of drawdown in formations and not provide useful information to the groundwater stakeholders involved in the GMA process. The de facto result is that GMAs are fundamentally required to plan in ways that produce average-year MAGs while RWPGs require peak groundwater supplies to be consistent with the peak demands they are obligated to meet. The difference between these two values produces a shortage in the RWP that is not expected to occur in reality and, therefore, requires the application of an unnecessary water management strategy (WMS) to make the plan whole.

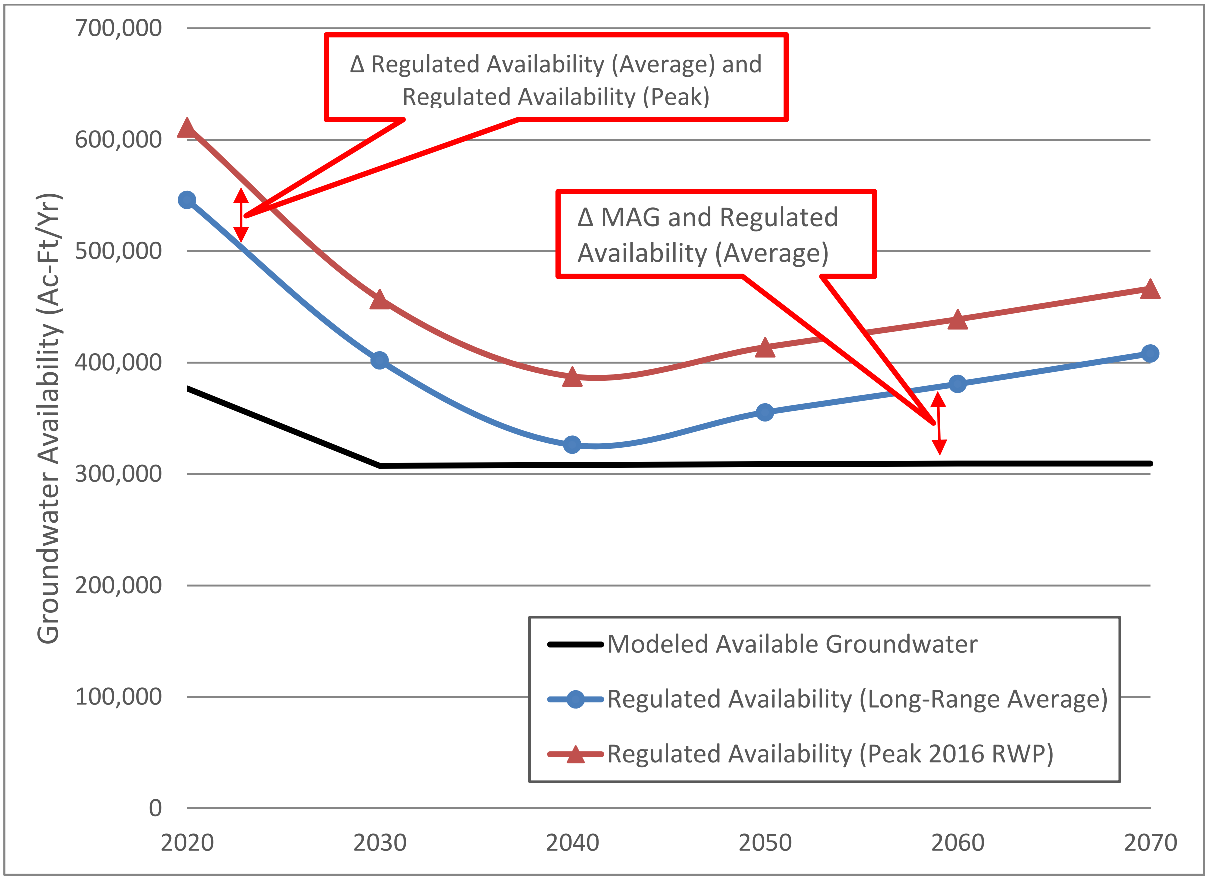
The requirement that RWPs be developed using the MAGs as the sole source of groundwater supply information may create an undue burden to the GMA process. While the majority of entities that regulate groundwater in the State target a set volume of water for their pumpage limits, that is not the case for the largest of those entities in Region H: HGSD and FBSD. Due to the intrinsic nature of the way in which groundwater regulation functions in urbanized counties that already exceed their sustainable levels of pumpage compared to other counties that are below or are just approaching their sustainable production limits, these districts regulate allowable groundwater withdrawals to a percentage of the total demand within their jurisdictions. In effect, when demands change, the availability of groundwater changes within their boundaries. As these demands typically change with each RWP development cycle, GMA 14, which includes Fort Bend, Galveston, and Harris Counties, must reevaluate the pumpage related to their DFCs each round in order to maintain consistency between the GMA-developed supplies used in RWP development and the regulation of those districts. Furthermore, there is typically a narrow window of time between the finalization of water demands and the submittal of the RWPs during which time, the GMA is required to compress its planning efforts in order to close the gap in supply. This approach is burdensome on a regional stakeholder process that has a number of their own considerations to address in addition to the issue of RWP consistency.

3.2.4.4 Case Study: Harris-Galveston and Fort Bend Subsidence Districts

As an example of the issues identified above, consider the case of the two subsidence districts in Region H. Collectively, these two districts encompass over 81 percent of the county's population and groundwater has typically served a crucial role in supplying the overall need of this area. Although HGSD and FBSD are not governed under Section 36 of the TWC and are therefore not formally part of the GMA process, the planning rules, as stated, limit groundwater availability in these jurisdictions just as in other areas covered by GCDs.

Figure 3-3 below demonstrates three representations of demand for the three counties. The most recent MAGs for these counties were developed for the 2010 DFCs submitted by GMA 14 and, therefore, these supplies do not have the benefit of population and demand updates developed since that time and without the HGSD's updated regulatory plan adopted in 2013. In addition, another dataset demonstrates the pumpage that was factored into the long-range simulations for the analysis of the HGSD and FBSD regulatory plans. These are average-year demands, appropriate for long-range study. Finally, the last dataset demonstrates the water that would be allocated to Region H WUGs in the three counties based on demands form the 2016 RWP and the regulatory plans of the two districts. This pumpage is associated with the peak, dry-year demands from the RWPs.

Figure 3-3 – HGSD and FBSD Groundwater Availability Scenarios



The difference in the three perspectives of availability represent a combination of the issues described above. First, the delta between the MAG and the long-range average regulated availability is an artifact of the disconnection between the development of projections for the RWPG and the evaluation of new pumpage scenarios by GMA 14. As demands are updated by the RWPG, supplies, represented by the MAG, lag behind as the GMA must readdress the supplies for these three counties in context of the updated demands. Unless GMA 14 can accomplish this and other activities associated with their DFC review in a very narrow window during the course of RWPG development, Region H will experience inconsistencies associated with this issue indefinitely as each planning cycle is forced to rely upon MAGs based on pumpage and demands from the previous round of planning. Addressing this issue in the current joint planning process of the RWPGs and GMAs places strain on both processes. This issue primarily impacts counties regulated in the manner of the HGSD and FBSD where availability is subject to change based on total demand.

Second, the difference is also due, in significant part, to the difference in definition of peak and long-range average demands used for groundwater planning. The MAG presented here and the one that would be considered in the future by GMA 14 will not provide adequate supply for peak demand conditions as is it not realistic to model such a condition over 50 or more years. Doing such would over-state water-level declines and other undesired impacts. This issue is inherent to the very different objectives of the GMA and RWP processes and not readily solved, even if GMAs are given adequate opportunity to address changing demands developed for the RWP process. Furthermore, this issues potentially persists in all counties where current supplies equal or approach the MAG. Where actual pumpage may occasionally, under extreme conditions, exceed the MAG but otherwise maintain a long-term average level below that limit, the RWPG is unnecessarily limited in ability to incorporate groundwater-based strategies. This is particularly true for conjunctive use strategies that rely on excess groundwater only during the most extreme drought conditions.

Combined, these issues represent a significant detriment to the RWP process. In the three counties described above, the end result is that the shortages expressed in the RWP are artificially elevated by approximately 157,000 acre-feet per year in 2070. In turn, this means that 157,000 acre-feet of additional, unneeded strategies might be incorporated into the RWP in order to meet needs that are not expected to occur in a real world scenario. In the near-term, the 2020 shortage is even greater at over 230,000 acre-feet per year. This approach inflates the cost of water projects to meet unrealistic shortages and demonstrates environmental impacts from projects that are not actually required. Finally, viable projects with adequate supply when considered outside of the RWP's one-year snapshots may be precluded from the RWP because of this problem. These side effects reduce the credibility of the overall plan and its usefulness as a tool to chart out future strategies to meet water needs.

3.2.4.5 Region H Approach to Groundwater Availability in the 2016 Regional Water Plan

Upon recognizing the issues brought about by the TWDB-prescribed methodology in applying available groundwater supplies to counties in Region H, the RHWPG considered three options in addressing the issue and provided them to TWDB in a letter dated September 24, 2014, in addition to the observations made in Section 3.2.4.3. The potential options proposed for resolving this discrepancy are as follows:

- Provide a means for a variance from 31 TAC 357.32 (d) for Region H to amend groundwater supplies with values that are consistent with local regulation.
- Allow the inclusion of a strategy in excess of MAG availability to represent use of groundwater as allowed by local regulation.
- Work with GMA 14 to produce DFCs that are more consistent with the groundwater availability required by the RWP.

In response, TWDB provided correspondence dated November 4, 2014 that indicated agreement with the issues brought about by the approach to groundwater availability in the RWP. However, TWDB indicated that the first two options to either provide for a variance or an enhanced strategy volume from the groundwater sources to match regulatory supply could not be allowed under the current rules.

Although the first two options described were declined by TWDB as possible alternatives, the third option to coordinate with GMA 14 in resolving groundwater issues in the southern Region H counties was confirmed as a potential alternative. This option was already under way since the beginning of GMA 14's effort to develop DFCs for submittal in 2015. However, the magnitude of the effort required by GMA 14 means that this process is ongoing and unable to yield updated MAGs prior to completion of the 2016 RWP.

Upon receiving TWDB's response regarding the suitability of the options and an understanding of the status of efforts by GMA 14, the Region H Water Management Strategies Committee recommended an alternative approach to leave unmet needs in the RWP associated with this disparity in groundwater availability. This decision was made in order to prevent the unrealistic application of strategies in the RWP which would lead to an exaggeration of actual project needs for Region H. Furthermore, it was recognized that adequate strategies could not realistically be developed in a timeline adequate to address resultant near-term, 2020 needs.

Throughout the RWP, water needs are discussed as the difference between available supplies and projected demands for each WUG. The difference between the regulatory and planning supplies will be referred to in the RWP as a "Rule-Based Groundwater Disparity." Needs that are a result of the disparity in groundwater supply availability will be called out separate from actual projected needs and referred to as "Needs Associated with Rule-Based Groundwater Disparity." These needs will be addressed in *Chapter 4* of the RWP. Additionally, water management strategies will be identified in *Chapter 5* to address the water needs aside from the Needs Associated with Rule-Based Groundwater Disparity as these needs will not occur under the current regulatory framework. However, it should be noted that tables output from DB17 will continue to include these artificial needs as there is no way to eliminate them from the database output. In these cases, notation will be provided to indicate that Needs Associated with Rule-Based Groundwater Disparity are included in the totals.

3.3 SURFACE WATER SOURCES

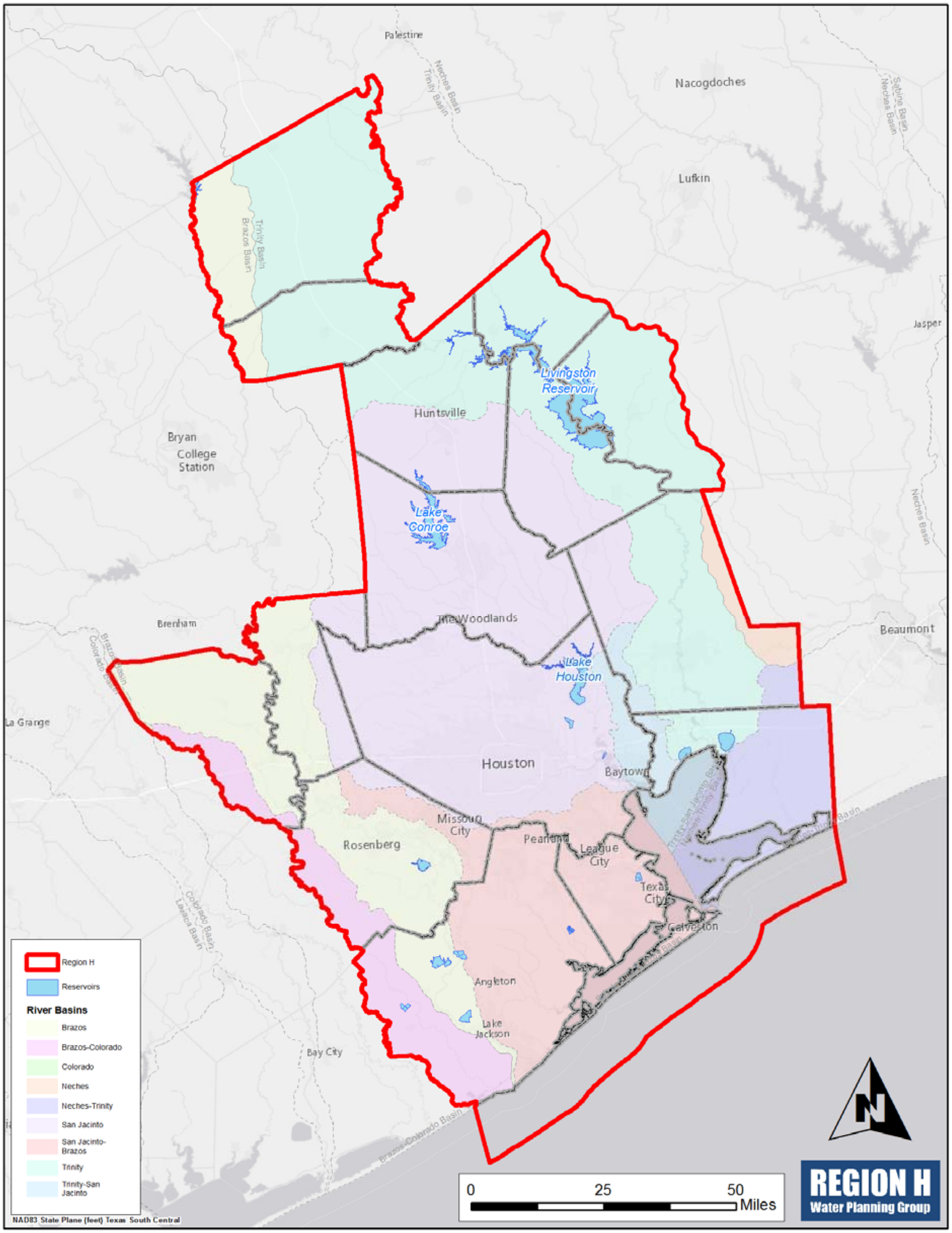
3.3.1 Surface Water Overview

Surface water in Texas is based on a prior appropriation water right system, wherein individuals or entities are granted rights to use surface water, with more senior rights having priority over junior rights. Senior rights are allowed the opportunity to fully satisfy their allowable diversion volume each month before more junior rights can divert. In practice these priorities are of limited concern in many basins for most years, due to an abundance of available surface water adequate to meet surface water demands. However, in drier portions of the State or during times of drought, priorities play an important role in determining ownership of limited surface water supplies. Water rights in the State are administered through a system of water right permits, or Certificates of Adjudication, issued by Texas Commission on Environmental Quality (TCEQ). These permits specify water right ownership, the allowable amounts of water which can be diverted, the locations of diversion, the allowable uses and basins of use, any special conditions or limitations on the permit, and a priority date establishing the right's seniority.

Surface water supply planning in Texas, and with limited exceptions the State's surface water rights permitting system, is based on the concept of "firm yield." The firm yield of a particular surface water source is defined as the amount of water that can be provided each year during drought-of-record hydrologic conditions, assuming full utilization and consumption of existing water rights and assuming that any environmental flow requirements are fully satisfied (e.g., instream flows, bay and estuary inflow). The concept of firm yield, as applied in water supply planning and water rights permitting, represents a very conservative approach to surface water availability and allocation that is intended to provide a high degree of water supply reliability.

Region H encompasses parts of three major river basins, four adjoining coastal basins, and three major water supply reservoirs as shown in *Figure 3-4*. The following sections discuss the surface water available to Region H from these sources, other surface water sources used in the Region, and determination of supply reliability.

Figure 3-4 – Region H Surface Water



3.3.2 Major Region H Reservoir Supplies

3.3.2.1 Lake Livingston / Wallisville Saltwater Barrier

Lake Livingston, which was completed in 1971 by the Trinity River Authority (TRA) and the City of Houston (COH), is located on the Trinity River in Polk, San Jacinto, and Trinity Counties; the dam is located approximately seven miles southwest of the City of Livingston. The reservoir is impounded by an earthen dam and concrete spillway and has a drainage area of over 16,000 square miles. At the conservation pool elevation of 131 feet, the reservoir has a volume of 1,791,709 acre-feet and a water surface area of 82,583 acres (approximately 129 square miles). The reservoir and dam are owned and operated by the TRA. The Wallisville Saltwater Barrier is located on the Trinity River downstream of Lake Livingston near the town of Wallisville.

Storage and diversions from Lake Livingston/Wallisville system are authorized under Certificate of Adjudication (COA) 08-4248 and COA 08-4261. Total permitted yield from the system is 1,344,000 ac-ft/yr. TRA is authorized to divert 403,200 ac-ft/yr for multiple uses. It should be noted that physical diversions are not made from Lake Wallisville, but the combined yield of Lake Livingston is increased when operated in conjunction with the Wallisville Saltwater Barrier. The remaining yield is owned by the COH. A portion of this supply is currently conveyed westward to the COH service area.

3.3.2.2 Lake Conroe

Lake Conroe is located in on the West Fork of the San Jacinto River in Montgomery County, approximately seven miles west of the City of Conroe. The reservoir, which was completed in 1973 by COH and the San Jacinto River Authority (SJRA), is impounded by an earthen dam and concrete spillway and has a drainage area of 445 square miles. At the conservation pool elevation of 201 feet above MSL, the reservoir has a volume of 411,022 acre-feet and a water surface area of 19,640 acres (approximately 30.7 square miles). Lake Conroe is operated by SJRA. COA 10-4963 authorizes 100,000 ac-ft/yr in permitted water rights from the Lake, with one third (33,333 ac-ft/yr) owned by SJRA and the remaining two thirds owned by the COH. SJRA holds an option contract to purchase water from the COH's portion of the yield of Lake Conroe. The reservoir is permitted for municipal, industrial, irrigation, mining, and recreation uses.

3.3.2.3 Lake Houston

Lake Houston, which was completed in 1954 by COH, is located on the San Jacinto River in northeastern Harris County, approximately 15 miles from downtown Houston. The lake, which is impounded by an earthen dam and concrete spillway, has a drainage area of 2,828 square miles and is operated by COH and the Coastal Water authority (CWA). At the conservation pool elevation of 41.73 feet above mean sea level, the reservoir has a volume of 124,661 acre-feet and a water surface area of 10,160 acres (approximately 15.9 square miles).

COA 10-4965, held by the COH, authorizes storage in the lake as well as 168,000 ac-ft/year of permitted diversions. Priority dates for the right are May 7, 1940 for the first 112,000 ac-ft/yr and February 26, 1944 for the remaining 56,000 ac-ft/yr. Authorized uses include municipal, industrial, irrigation, and recreation purposes. COA 10-4965 also authorizes storage of water diverted from the Trinity River Basin in Lake Houston for subsequent diversion and use. COA 10-5807 authorizes diversion of an additional 28,000 ac-ft/yr from Lake Houston for municipal and industrial purposes. The permitted amount is divided evenly between the COH and SJRA. Water diverted under COA 10-

5807 may be used in Harris, Fort Bend, Galveston, and Montgomery Counties within the San Jacinto River Basin, and in portions of Brazoria and Chambers Counties within the Trinity-San Jacinto Coastal Basin, Trinity River Basin, and San Jacinto-Brazos Coastal Basin.

3.3.3 Run-of-River and Contractual Surface Water Supplies

3.3.3.1 Brazos-Colorado Coastal Basin

Region H includes the Brazos-Colorado Coastal Basin in Brazoria and Fort Bend Counties, including Jones Creek and the lower reach of the San Bernard River. Fourteen water rights are associated with the Region H portion of the basin, with total permitted run-of-river diversions of 65,655 ac-ft/yr. Permitted uses include irrigation, industry, mining, and habitat maintenance.

3.3.3.2 Brazos River Basin

The Brazos River Authority (BRA) stores water in 11 water supply and flood control reservoirs in the middle and upper portions of the Brazos River Basin. BRA owns Possum Kingdom, Granbury, and Limestone Reservoirs, with the remainder owned by the U.S. Army Corps of Engineers. While BRA does not currently own or operate any major reservoirs within Region H, these upstream reservoirs provide water to entities in Region H through multiple water supply contracts. BRA currently has long term supply agreements with eight entities in Region H, totaling 163,450 ac-ft/yr. BRA also holds COA 12-5166 and COA 12-5167, which authorize the diversion of 850,000 ac-ft/yr of interruptible excess flows in Fort Bend County. Because these are non-priority water rights and are therefore not firm, their associated supplies are not included as reliable existing supplies in DB17.

Several entities located in Region H hold large water rights in the basin. Dow Chemical Company holds COA 12-5328, which authorizes 305,656 ac-ft/yr of diversions from the Brazos River, Oyster Creek, and Buffalo Camp Bayou for municipal, industrial, irrigation, and recreation purposes. The permit also authorizes storage in Dow's Harris Reservoir and Brazoria Reservoir.

Gulf Coast Water Authority (GCWA) holds multiple water rights in the basin. COA 12-5168 authorizes 99,932 ac-ft/yr in diversions from the Brazos River for municipal, industrial, and irrigation use, as well as 7,373 ac-ft of storage in two small reservoirs. COA 12-5171 authorizes the diversion of 125,000 ac-ft/yr from the Brazos River for municipal, industrial, irrigation, and mining purposes. GCWA also holds COA 12-5322, which authorizes 864 ac-ft of storage and the diversion of 155,000 ac-ft/yr from the Brazos River for municipal, industrial, and irrigation use.

COA 12-5325, held by NRG, authorizes storage in Smithers Lake and industrial use of 28,711 ac-ft/yr of flows from the Dry Creek tributary of Big Creek. NRG is also granted 40,000 ac-ft/yr of water rights from the Brazos River by COA 12-5320 for industrial and irrigation use.

Brazosport Water Authority (BWA) holds COA 12-5366, which authorizes the diversion of 45,000 ac-ft/yr from the Brazos River in Brazoria County for municipal use.

3.3.3.3 San Jacinto-Brazos Coastal Basin

The San Jacinto-Brazos Coastal Basin includes a combination of dense urban development, irrigated agriculture, and industry in Brazoria, Fort Bend, Harris, and Galveston Counties. Total run-of-river water rights in the basin total approximately 288,407 ac-ft/yr, excluding an authorization for Dow

Chemical Company to divert 4,209,000 ac-ft/yr of saline water from the Freeport Harbor Channel. There are several major run-of-river water rights within the basin. The City of Sugar Land holds COA 11-5170, which authorizes diversion of 18,159 ac-ft/yr from Jones and Oyster Creeks for municipal, industrial, irrigation, and recreation uses. GCWA holds COA 11-5169, which authorizes 12,000 ac-ft/yr of diversion and approximately 8,925 ac-ft of storage. COA 11-5357, also held by GCWA, authorizes 57,500 ac-ft of diversion from Chocolate, Mustang, and Halls Bayous in Brazoria County. Both of these rights include provision for municipal, industrial, irrigation, and recreational uses.

3.3.3.4 San Jacinto River Basin

The San Jacinto River Basin includes a number of run-of-river water rights in addition to the rights associated with the storage and yield of Lakes Conroe and Houston. While the majority of these rights authorize diversions of 1,000 ac-ft/yr or less, there are seventeen rights for authorizations exceeding this amount. The largest of these is COA 10-3994 held by OxyVinyls LP, which authorizes diversion of 140,000 ac-ft/yr for industrial use. The COH holds Permit 10-5826, (the Houston Bayous Permit), which authorizes the diversion of 130,000 ac-ft/yr of run-of-river supplies from Sims, Brays, Buffalo, and White Oak Bayous for municipal and industrial purposes. The Excess Flows Permit (Permit 10-5808) authorizes diversion of 80,000 ac-ft/yr of run-of-river flows at Lake Houston for municipal and industrial purposes; the permitted diversion amount is divided evenly between the COH and SJRA. COA 10-4964, also held by SJRA, authorizes diversion of 55,000 ac-ft/yr of run-of-river supply at Lake Houston for municipal, industrial, and irrigation use. This water right serves as the primary supply for the SJRA Highlands Canal System, which serves industrial users in eastern Harris County.

3.3.3.5 Trinity-San Jacinto Coastal Basin

The Trinity-San Jacinto Coastal Basin includes run-of-river water rights totaling approximately 44,578 ac-ft/yr for industrial and irrigation uses. The largest of these authorizations, COA 09-3926, is for 30,000 ac-ft/yr and is associated primarily with NRG's Cedar Bayou power generation facility.

3.3.3.6 Trinity River Basin

In addition to the yield of Lake Livingston, several entities within the Region H portion of the basin hold large water rights. COA 10-4261 grants the COH 45,000 ac-ft/yr of run-of-river rights from the Trinity River and the Old River tributary for municipal, industrial, and power generation use. COH also holds COA 10-4277 authorizing 38,000 ac-ft/yr of diversions for municipal, industrial, irrigation, and mining use. The Chambers-Liberty Counties Navigation District (CLCND) is authorized under COA 08-4279 to divert up to 112,947 ac-ft/yr from Turtle Bayou (Lake Anahuac) for municipal, industrial, irrigation, and mining uses. The right additionally authorizes 30,000 ac-ft/yr of diversion by SJRA. SJRA also holds 56,000 ac-ft/yr in water rights through partial ownership of COA 08-5271. The remaining 2,500 ac-ft/yr from COA 08-5271 is permitted to LNVA.

3.3.3.7 Neches-Trinity Coastal Basin

The portion of the Neches-Trinity Coastal Basin located within Region H includes run-of-river water right permits totaling 70,175 ac-ft/yr in permitted diversions. The largest individual right included (COA 07-4296) is the U.S. Fish and Wildlife Service water right for the Anahuac National Wildlife Refuge, which has a right for 21,000 ac-ft/yr. The remaining permits are authorized for irrigation, recreation, and wetland habitat uses.

3.3.3.8 Neches River Basin

Lake Sam Rayburn is located on the Neches River approximately 11 miles northwest of the City of Jasper in Region I. The lake is owned by the U.S. Army Corps of Engineers and operated by the Lower Neches Valley Authority (LNVA). Several entities in Region H receive supplies from the lake through contracts with LNVA, including the Trinity Bay Conservation District, Bolivar Peninsula SUD, and irrigators in Chambers and Liberty Counties. Region H does not receive run-of-river surface water from the Neches River Basin.

3.3.4 Local Supplies

Local supplies (stock ponds, small catchments, etc.) are currently used in Region H to meet a portion of livestock and mining demands. The TCEQ allows a landowner to impound up to 200 acre-feet of water without obtaining a water right, and therefore these supplies cannot be tied to specific COAs. Because these individual sources are generally undocumented and are typically unreliable under drought-of-record conditions, the Region H water plan does not include these local supplies in its analysis of existing surface water supplies.

3.3.5 Surface Water Availability

3.3.5.1 Surface Water Availability Modeling

Surface water availability was estimated using the TCEQ Water Availability Models (WAMs) for the river basins within Region H. The WAMs use the Water Rights Analysis Package (WRAP), developed at Texas A&M University, to simulate water right diversions using historical rainfall and evaporation data. The WAMs are not intended to serve as predictive tools but rather simulate the behavior of included water rights under a repeat of a certain period of historical hydrology. The model simulates a set of monthly diversion targets attempted annually against a historical inflow dataset, which is typically 50 years long and varies each year. The drought of record (DOR) for most of Texas occurred in the 1950s and is reflected in the historic dataset for each basin. Water diversions are modeled according to the parameters of each particular water right and are taken in priority order, such that the most senior water rights are satisfied before junior rights are allowed to divert water. It is important to note that the TCEQ WAMs are based on historic hydrologic data to account for rainfall and evaporation losses. While the model provides an approximation of water right availability during the DOR, the model does not predict water right availability in future droughts which may have different hydrologic conditions. The models generally do not include return flows that often increase the reliability of downstream water rights. The reliability of water rights that rely on reservoir storage is also based on assumed sedimentation rates that are projected through the planning period. While this assumption is reasonable for planning purposes, it may not reflect current sedimentation rates. The models also contain assumptions in the internal modeling routines that affect the accuracy of results. Currently, the models are also not able to simulate the interaction between groundwater and surface water supplies.

There were originally eight WAM scenarios (referred to as model runs) simulated under the TCEQ program. TWDB’s First Amended General Guidelines for Regional Water Plan Development requires the use of WAM Run 3, reflecting full authorized diversion of current water rights with no return flows, when determining the supply available to the region. Run 3 represents a conservative approach, since not all rightholders attempt to divert their full permit amount every year and diversions for municipal and manufacturing users typically return a portion of diverted water to streams as treated wastewater effluent. However, the majority of water rights do not address return flows to source streams, implying a right to full consumptive use. For this reason, and because the planning period extends 50 years into the future, use of a model reflecting full consumptive diversion by all rights is appropriate for long-term planning.

Output files are compared by reviewing the statistical frequency of meeting diversion amounts or target instream flow levels. For purposes of regional water planning, supplies availability for a water right is limited to its firm yield, the amount of water that can be diverted every year of the WAM simulation period without shortage. Regional planning groups may elect to constrain availability of a water right to a value lower than the firm yield based on stakeholder / rightholder input, to maintain an added margin of safety for reservoir supplies, or for other considerations relevant to the supply.

While availability of surface water rights is determined on a right-by-right basis, the method of representing surface water supplies in DB17 is dependent on the nature of the right. Multiple reservoirs operated as a system are treated as a single source in the database, with supplemental information showing the contribution of firm yield associated with each component reservoir. Non-system reservoirs are listed individually. Run-of river rights are typically aggregated into a single source for each county and river or coastal basin.

Specific information on modeling procedures and availability results for each basin in Region H are described in greater detail in the following subsections. Availability of existing water supplies is summarized in ***Appendix 3-DB***. Additional reference information the models executed for surface water availability estimation is available in ***Appendix 3-A***.

3.3.5.2 Brazos-Colorado Coastal Basin

Surface water supplies for the Brazos-Colorado Coastal Basin were analyzed using the TCEQ Run 3 WAM for the Colorado and Brazos-Colorado basins (08/01/2007 version). Of the 65,905 ac-ft permitted within the Region H portion of the basin, 3,211 ac-ft were determined to be firm for regional planning purposes. An additional 136 ac-ft of firm yield held by the US Fish and Wildlife Service was not included as the wetlands maintenance use specified for the permit is likely outside of the demand projected for Region H.

3.3.5.3 Brazos River Basin

Surface water supplies for the Brazos River Basin were analyzed using a modified version of the TCEQ Run 3 WAM for the Brazos and San Jacinto Brazos basins developed by the Brazos G Regional Water Planning Group (Region G). Brazos G developed models for year 2020 and year 2070 conditions, which include projected return flows, adjustments for reservoir sedimentation, and addition of recently-granted water rights. Revision of the TCEQ WAM by Brazos G was approved by the TWDB Executive Administrator. Supplies were assessed for years 2020 and 2070 conditions, with results used to linearly interpolate availabilities for years 2030 through 2060. The firm portion of run-of-river diversions was found to be 474,802 ac-ft/yr for year 2020 conditions and 497,369 ac-ft/yr for year 2070 conditions. Subsequent to model analysis, GCWA requested that DB17 firm yield for its water rights in the 2016 RWP be limited to the portions of those rights with a priority date senior to 1942 based on observations of water availability during drought conditions. This results in total run-of-river firm availability of 415,608 ac-ft/yr for year 2020 conditions and 437,954 ac-ft/yr for year 2070 conditions.

Eight entities in Region H receive supplies through water supply contracts with BRA, with a reliable year 2070 yield of 160,495 ac-ft/yr.

3.3.5.4 San Jacinto-Brazos Coastal Basin

Surface water supplies for the San Jacinto-Brazos Coastal Basin were analyzed using a modified version of the TCEQ Run 3 WAM for the Brazos and San Jacinto Brazos basins developed by Region G. Supplies were assessed for years 2020 and 2070 conditions, with results used to linearly interpolate availabilities for years 2030 through 2060. 38,826 ac-ft/yr of run-of-river supply was found to be firm for year 2020 through year 2070 conditions. Of this yield, 21,568 ac-ft/yr is associated with multi-use permits held by GCWA and the City of Sugar Land, with the rest of the firm yield coming from a number of irrigation water rights.

3.3.5.5 San Jacinto River Basin

Surface water supplies for the San Jacinto River Basin were analyzed using the most recent version of the TCEQ Run 3 WAM for the basin (11/23/2009 version). The model files were adjusted to incorporate the COH's COA 10-5826, which was granted after the most recent available Run 3 WAM for the basin was released. A total of 12,652 ac-ft/yr of run-of-river supply was found to be firm.

Reservoirs reduce the velocity of the streams they impound, causing suspended soil particles to settle; over time, storage volume is lost due to this accumulation. Therefore, sedimentation rates were determined and applied to Lake Houston and Lake Conroe to calculate the year 2020 and year 2070 storage volumes. For both sedimentation conditions, the target diversion for each reservoir was iteratively reduced until a firm yield was determined, with the diversion target for other reservoir modeled at its permitted amount. The available yield of Lake Houston is determined from two permitted diversions. The original permitted diversion of Lake Houston, 168,000 acre-feet per year, is firm throughout the planning period. This is due to the downstream location of Lake Houston on the San Jacinto River and its seniority relative to other major water rights in the basin. The firm yield of the second and less senior diversion (COA 10-5826) was 11,000 ac-ft/yr for year 2020 conditions, decreasing to 1,300 ac-ft/yr for year 2070 conditions due to sedimentation. The modeled firm yield of Lake Conroe was 79,300 ac-ft/yr for year 2020 sedimentation, decreasing slightly to 75,500 ac-ft/yr for year 2070 conditions.

3.3.5.6 Trinity-San Jacinto Coastal Basin

Surface water supplies for the Trinity-San Jacinto Coastal Basin were analyzed using the TCEQ Run 3 WAM for the basin (11/23/2009 version). Of the 14,474 ac-ft/yr in permitted run-of-river rights included in the WAM, 5,316 ac-ft/yr were found to be firm under DOR conditions. An additional 30,000 ac-ft/yr permitted by COA 09-3926 is excluded from the WAM as the diversion point is subject to salinity impacts due to tidal influence. Because the diversion is not dependent on water quality, the permit was considered to be fully firm.

3.3.5.7 Trinity River Basin

Modeling of run-of-river supplies in the Trinity River Basin utilized the TCEQ WAM Run 3 for the basin (9/19/2011 version). A total of 139,186 ac-ft/yr in run-of-river water was determined to be firm under DOR conditions. A small portion of this yield (1,054 ac-ft/yr) is held by irrigators and state agencies in Leon, Liberty, Madison, and Walker Counties. The remainder is associated with large water rights owned by the COH, SJRA, and CLCND. A modified version of the WAM authorized by TWDB and incorporating upstream return flows was used top model Lake Livingston. The full permitted amount of 1,344,000 ac-ft/yr was found to be firm.

3.3.5.8 Neches-Trinity Coastal Basin

Surface supplies in the Neches-Trinity Coastal River Basin were modeled using the TCEQ WAM Run 3 model for the basin (11/23/2009 version). Of the water right permits totaling 70,175 ac-ft/yr from the Neches-Trinity coastal basin in Region H, 37,700 ac-ft/yr were reliable during the DOR. Approximately one-third of this firm total is the U.S. Fish and Wildlife Service water right for the Anahuac National Wildlife Refuge.

3.3.5.9 Neches River Basin

Surface water availability for the Neches River Basin and the Lake Sam Rayburn / B.A. Steinhagen Reservoir System was determined by the East Texas Water Planning Group (Region I). Applicable supplies utilized by entities in Region H are reflected in DB17 as the contract amounts between LNVA and individual WUGs.

3.4 REUSE SOURCES

3.4.1 Reuse Overview

The reuse of existing water sources allows entities to increase their available supply portfolio and in some cases replace or defer more expensive projects to develop new supplies. Reuse, or reclaimed supply, is typically classified as either direct or indirect. Direct reuse infrastructure diverts return flows from a wastewater treatment facility at some point in the treatment train and conveys the water to points of use. The required infrastructure and level of treatment are dependent upon the intended use. Indirect reuse typically involves discharge of treated wastewater from one facility into a receiving body, with the bed and backs of the receiving stream used to convey the treated water to for subsequent diversion at a downstream point.

The permitting process and regulatory requirements for reuse in the State are dependent on whether the water is for municipal or industrial purposes, the intended use, and if the supply is direct or indirect. Permitting of reclaimed supplies is administered by TCEQ. All types of reuse are subject to the requirements of 30 TAC 210. If an indirect reuse supply is to be discharged into a State watercourse, it will also require a water right authorization similar to other surface water sources and will be subject to water rights restrictions and subject to the prior appropriation system.

3.4.2 Reuse Availability

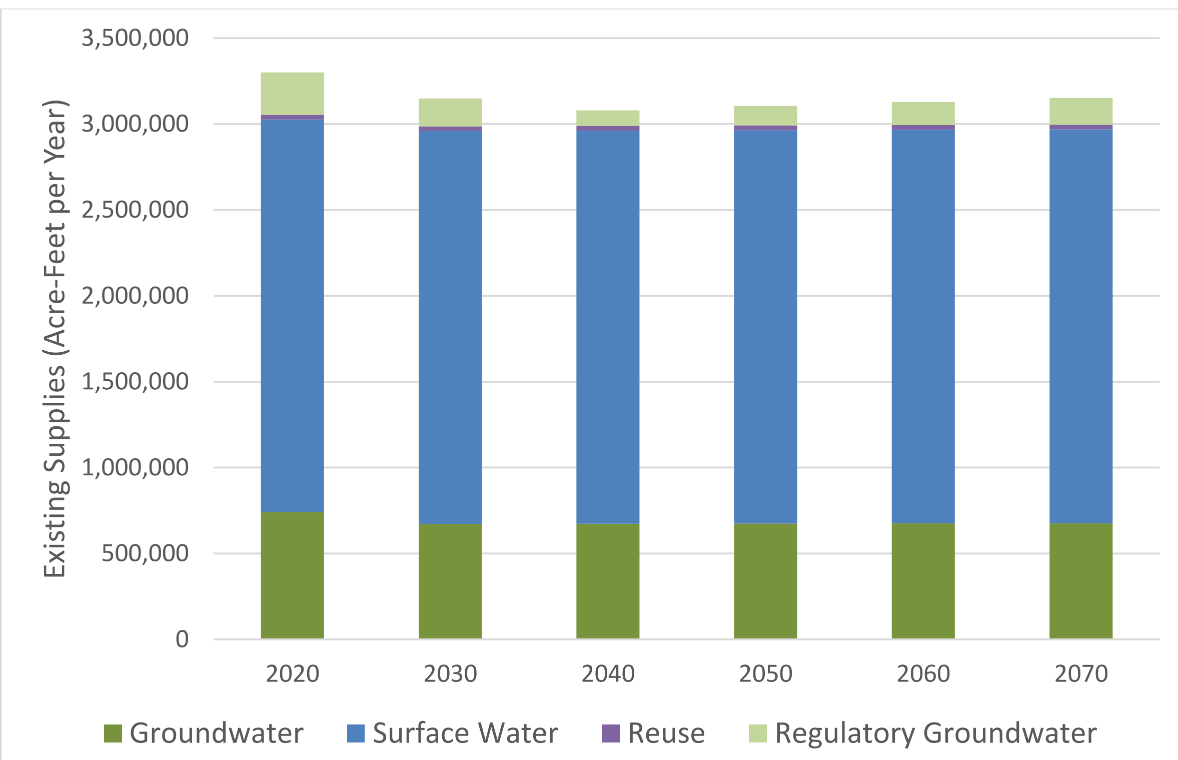
Determination of the reliable availability of reclaimed supplies presents several challenges. Permitted reuse amounts cannot be assumed to be fully reliable as existing supplies, as permitted volumes may exceed current return flow levels and permitted indirect reuse is subject to curtailment during times of drought. Even in communities or industries with longstanding direct reuse programs, the amount of reclaimed water utilized can vary considerably from year to year based on hydrologic conditions, patterns of indoor vs. outdoor water use, or industrial facility production. Reuse potential also changes over time with population. In order to estimate appropriate reliable reuse supplies, the following procedure was applied:

- Data was extracted from the TWDB water use survey for entities in Region H with reclaimed supplies, and each entity was associated with the appropriate WUG.
- For each WUG, volumes of self-supplied reuse were calculated by year for direct and indirect reuse sources.
- For WUGs with a year 2012 reuse volume of zero, reuse supplies were assumed to not be firm.
- If reuse for a WUG began in year 2012, the 2012 reuse volume was assigned as the estimated reliable supply.
- For WUGs with a longer history of reuse, the year 2011 reuse volume was assigned as the estimated reliable supply. Because of the severe drought conditions experienced during 2011, this usage is the most reasonable representation of what reuse supply the WUG would be able to expect during drought conditions.

3.5 TOTAL REGIONAL WATER AVAILABILITY

Combined, the availability of water supplies in Region H is adequate to provide for a large number of existing demands. However, it is noteworthy that the availability of supply at the source level does not necessarily translate to availability at the WUG level. The applicability of these supplies to meeting specific demands based on contracts and existing infrastructure are considered below in *Section 3.6*. The total supply availability is shown in *Figure 3-5* below. Availability of existing water supplies is summarized in ***Appendix 3-DB***.

Figure 3-5 – Total Regional Water Availability by Source Type



3.6 WHOLESALE WATER PROVIDERS AND MAJOR SUPPLY CONTRACTS

Region H depends on water supply contracts from the 25 wholesale water providers (WWPs) serving the Region to meet demands of both municipal and non-municipal users. Twenty-two of these WWPs mainly serve users within the Region, while the other three (BRA, LNVA, and TRA) provide supplies to Region H from their primary region. Approximately half of the WWPs in Region H are also WUGs, including cities and regional water authorities which serve their own needs as well as those of their contract customers. The WWPs supplying Region H are discussed in greater detail in the following subsections.

3.6.1 Baytown Area Water Authority

The Baytown Area Water Authority (BAWA) provides treated surface water to the City of Baytown as well as a number of surrounding municipal utility districts (MUDs), fresh water supply districts (FWSDs), and other communities. BAWA purchases Trinity River supplies from the COH, which are conveyed through the CWA Industrial Canal to the BAWA raw water lift station and treated at BAWA's surface water treatment plant. BAWA provides treated surface water to the following WUGs:

- City of Baytown
- Harris County WCID #1
- County-Other in Harris County (San Jacinto and Trinity-San Jacinto Basins)

3.6.2 Brazosport Water Authority

BWA service area includes treated water customers in the southern portion of Brazoria County, including seven municipalities, Dow Chemical, and two state prison units. BWA is supplied by its own water right through the Harris and Brazoria Reservoirs. BWA provides raw surface water to the following WUG and WWP entities:

- City of Angleton
- City of Brazoria
- City of Clute
- City of Freeport
- City of Lake Jackson
- City of Oyster Creek
- City of Richwood
- County-Other in Brazoria County (San Jacinto-Brazos Basin)
- Dow Chemical USA

3.6.3 Brazos River Authority

BRA operates multiple reservoirs and holds a substantial portion of the water rights in the Brazos River Basin. BRA provides raw surface water to the following WUG and WWP entities:

- Dow Chemical USA
- GCWA
- NRG
- Pecan Grove MUD
- City of Richmond
- City of Rosenberg

- City of Sugar Land
- Irrigation in Waller County (Brazos River Basin)

3.6.4 Central Harris County Regional Water Authority

Central Harris County Regional Water Authority (CHCRWA) provides water supply to communities in central Harris County north of the COH. Districts within NHCRWA's boundaries include Fallbrook UD, Rankin Road West MUD, Harris County UD 16, and Harris County MUDs 33, 150, 200, 205, 215, 217, 304, and 399. Member districts of CHCRWA are partially supplied through their own groundwater production. CHCRWA also purchases water from the COH to meet demands within its service area.

3.6.5 Chambers-Liberty Counties Navigation District

The CLCND provides raw water through its canal system to the City of Anahuac, the Trinity Bay Conservation District, and irrigators in Chambers County. CLCND is supplied through its own water rights from the Trinity River and Lake Anahuac. CLCND supplies the following WUGs:

- City of Anahuac
- Trinity Bay Conservation District
- Irrigation in Chambers County (Neches-Trinity Basin)

3.6.6 City of Galveston

The City of Galveston purchases wholesale treated water from GCWA, which is conveyed from GCWA's Thomas Mackey Water Treatment Plant to Galveston Island via pipeline. This water is used to meet needs for the city. Galveston also sells a portion of the water to Galveston County MUD #1 and the City of Jamaica Beach.

3.6.7 City of Houston

The COH is the most populous WUG in Region H and also the largest WWP in terms of overall water supply. Major surface water supplies held by the City include majority ownership of the firm yield of Lakes Conroe, Houston, and Livingston. The City also owns run-of-river water rights. In the Trinity River Basin, COH holds two major water rights permitted for industrial, irrigation and other uses. The City also holds water rights authorizing withdrawals from several bayous in the San Jacinto Basin and diversion of excess run-of-river flows at Lake Houston (shared permit with SJRA). Additional permitted sources include both direct and indirect reuse. COH also produces groundwater which is primarily used to meet its own demands but also makes up a small portion of the supply to other customers through either direct supply of groundwater or blending with other supply sources. COH's WUG and WWP customers include:

- BAWA
- City of Bellaire
- City of Bunker Hill Village
- CHCRWA
- Chimney Hill MUD
- Clear Brook City MUD
- Clear Lake City Water Authority

- County-Other in Harris County (multiple utility districts)
- County-Other in Montgomery County
- City of Deer Park
- City of Friendswood
- City of Galena Park
- Greenwood Utility District
- Harris County MUDs #8, 49, 55, 96, and 158
- City of Hedwig Village
- City of Hilshire Village
- City of Humble
- City of Hunters Creek Village
- Irrigation in Liberty County
- City of Jacinto City
- City of Jersey Village
- La Porte Area Water Authority
- City of League City
- Manufacturing in Chambers County (Trinity-San Jacinto Basin)
- Manufacturing in Harris County
- North Channel Water Authority
- North Fort Bend Water Authority
- North Harris County Regional Water Authority
- NRG
- City of Pasadena
- City of Pearland
- City of Piney Point Village
- SJRA
- City of South Houston
- City of Southside Place
- Steam-Electric Power in Harris County
- Sunbelt FWSD
- West Harris County Regional Water Authority
- City of West University Place
- Windfern Forest Utility District

3.6.8 City of Huntsville

The City of Huntsville provides water to its own municipal service are as well as surrounding communities in the County-Other WUG in Walker County. The City's water demands are met partially with self-supplied groundwater. Huntsville also receives surface water from a contract with TRA through the Huntsville Regional Water Supply System, of which a portion is conveyed to manufacturing demands outside of Region H.

3.6.9 City of Missouri City

The City of Missouri City supplies users within its service area primarily with self-supplied groundwater and surface water supplies purchased on a wholesale basis from GCWA and diverted from GCWA's raw water canal system. The City also receives supplies from Fort Bend County WCID #2. Customers currently served or anticipated to be served surface water by the City include Sienna Plantation and Fort Bend County MUD #129.

3.6.10 City of Pasadena

The City of Pasadena supplies water to customers within its own boundaries as well as to the City of Seabrook (which in turn provides some of this water to the City of El Lago) and manufacturing located in Harris County. Pasadena utilizes self-supplied groundwater as well as water purchased from the COH and the Clear Lake City Water Authority (CLCWA).

3.6.11 City of Sugar Land

The City of Sugar Land supplies water to customers within its own boundaries as well as to users in its extra-territorial jurisdiction including the Riverstone development (County-Other in Fort Bend County). In addition to self-supplied groundwater, the City has contracts with both GCWA and BRA for surface water supply.

3.6.12 Clear Lake City Water Authority

CLCWA obtains its water supplies through a contract with the COH. CLCWA provides water supply to WUGs in southeast Harris County, including:

- City of Houston (retail service in the Clear Lake area)
- City of Nassau Bay
- City of Pasadena
- Taylor Lake Village
- Manufacturing in Harris County (San Jacinto-Brazos Basin)

3.6.13 Dow Chemical USA

Dow Chemical is supplied primarily by its own water rights on the lower Brazos River, with the ability to receive a smaller amount of water through a contract with BRA. Dow supplies manufacturing demands in Brazoria County, including its own facilities.

3.6.14 Fort Bend County WCID #2

Fort Bend County WCID #2 receives raw surface water through a contract with GCWA and provides this supply to customers primarily in northeastern Fort Bend County. WUGs are served directly through retail water supply to individual customers within the Fort Bend WCID #2 service area. WUGs served include:

- City of Meadows Place
- City of Missouri City (limited to portions of City of Missouri City)
- City of Stafford (groundwater and surface water)

3.6.15 Galveston County WCID #1

Galveston County WCID #1 purchases treated water supplies on wholesale basis from GCWA. Supplies are provided to the following WUGs:

- City of Dickinson
- City of League City (retail service to small number of connections)
- City of Texas City (retail service to small number of connections)

3.6.16 Gulf Coast Water Authority

GCWA is a major water provider to municipal, manufacturing, and irrigation users in the San Jacinto-Brazos and lower Brazos Basins. GCWA provides raw water to users in Fort Bend, Brazoria, and Galveston Counties through an extensive canal network. Treated water is also supplied through a pipeline system to a number of users in Galveston County. GCWA is primarily supplied by its own rights on the Brazos River, with additional supplies purchased through a contract with BRA. WUGs with supply contracts from GCWA include:

- Bacliff MUD
- County-Other in Galveston County
- City of Galveston
- Fort Bend County WCID #2 (raw)
- Galveston County WCID #1
- City of Hitchcock
- Irrigation in Fort Bend, Brazoria, and Galveston Counties (raw)
- City of Kemah
- Clear Lake Shores
- City of La Marque
- City of League City
- Manufacturing in Brazoria and Galveston Counties (raw)
- City of Missouri City (raw)
- NRG
- City of Pearland (raw)
- Pecan Grove MUD #1 (raw)
- San Leon MUD
- City of Santa Fe
- City of Sugar Land (raw)
- City of Texas City
- Tiki Island

3.6.17 La Porte Area Water Authority

The La Porte Area Water Authority (LAWA) purchases water on a wholesale basis from the COH. This water is supplied to entities in Harris County, including:

- City of La Porte
- City of Shoreacres
- County-Other in Harris County (San Jacinto-Brazos Basin)

3.6.18 Lower Neches Valley Authority

LNVA holds rights to both reservoir yield and run-of-river supplies in the Neches River Basin and serves customers through an extensive canal system in Jefferson, Chambers, and Liberty County. LNVA also owns a portion of the water rights from the former Devers Canal Company. LNVA customers in Region H include:

- Irrigation in Chambers County (Neches-Trinity Basin)
- Irrigation in Liberty County (Neches-Trinity Basin)
- Trinity Bay Conservation District
- Bolivar Peninsula SUD

3.6.19 North Channel Water Authority

North Channel Water Authority (NCWA) receives water under contract from COH which it provides to its constituent water districts as well as to a small number of manufacturing customers in Harris County. Supplies listed under NCWA also include self-supplied groundwater produced by constituent water districts.

3.6.20 North Fort Bend Water Authority

North Fort Bend Water Authority (NFBWA) provides water supply to communities in northern Fort Bend County and a small portion of western Harris County. Member districts of NFBWA are partially supplied through their own groundwater production. NFBWA also purchases water from the COH to meet demands within its service area.

3.6.21 North Harris County Regional Water Authority

North Harris County Regional Water Authority (NHCRWA) provides water supply to communities in northern and northwestern Harris County north of the COH. Member districts of NHCRWA are partially supplied through their own groundwater production. NHCRWA also purchases water from the COH to meet demands within its service area.

3.6.22 NRG

NRG operates several steam-electric power generation facilities within Region H, as well as providing water supply to other power generation and irrigation water users. In the eastern portion of the Region, NRG is supplied largely by its own water right in the Trinity-San Jacinto Basin and by groundwater, as well as through contract with COH. In Fort Bend County, NRG is supplied through a combination of its own Brazos River Basin rights, groundwater, and a contract with BRA. WUGs served by NRG include:

- Irrigation in Fort Bend County (Brazos Basin)
- Steam-Electric Power in Chambers County (Trinity-San Jacinto Basin)
- Steam-Electric Power in Fort Bend County (Brazos Basin)
- Steam-Electric Power in Harris County (San Jacinto Basin)

3.6.23 San Jacinto River Authority

SJRA acts as a major water provider in Harris and Montgomery Counties. SJRA holds partial ownership of the Lake Conroe water right, which it uses to serve irrigation and power generation customers as well as participants in the SJRA Joint GRP in Montgomery County. SJRA also serves as the water provider to The Woodlands, supplying the community's demands through a combination of groundwater and surface water. SJRA also holds run-of-river rights in the San Jacinto and Trinity Basins and a portion of Lake Houston reservoir supply, which are used to meet municipal, manufacturing, and irrigation demands in Harris County through SJRA's Highlands Canal system. SJRA's customers include:

- City of Conroe
- County-Other in Montgomery County
- Crosby MUD
- Harris County MUD #50
- Irrigation in Harris County (San Jacinto Basin)
- Irrigation in Montgomery County (San Jacinto Basin)
- Manufacturing in Harris County (Trinity-San Jacinto Basin)
- Montgomery County WCID #1
- Newport MUD
- City of Oak Ridge North
- Rayford Road MUD
- Southern Montgomery County MUD
- Steam-Electric Power in Montgomery County
- The Woodlands

3.6.24 Trinity River Authority

TRA holds a number of water rights in the Trinity River Basin and provides supply to several planning areas, including Region H. Contracts from TRA to entities in Region H are associated exclusively with TRA's share of the Lake Livingston permit. Supplied entities in Region H include:

- County-Other in Polk County (Trinity Basin)
- County-Other in San Jacinto County (Trinity Basin)
- County-Other in Trinity County (Trinity Basin)
- City of Groveton
- City of Huntsville
- Irrigation in Chambers County (Neches-Trinity Basin)
- Irrigation in Liberty County (Trinity and Neches-Trinity Basins)
- Irrigation in San Jacinto County (Trinity Basin)
- Lake Livingston Water Supply & Sewer Service Company
- City of Livingston
- Mining in Polk County (Trinity Basin)
- Town of Riverside
- Riverside WSC
- San Jacinto SUD
- City of Trinity
- Trinity Rural WSC

3.6.25 West Harris County Regional Water Authority

West Harris County Regional Water Authority (WHCRWA) provides water supply to communities in western and northwestern Harris County. Member districts of WHCRWA are partially supplied through their own groundwater production. WHCRWA also purchases water from the COH to meet demands within its service area.

3.7 ASSIGNMENT OF SOURCES

The assignment of existing available water supplies to WWPs and WUGs within Region H requires consideration of many potential sources of information and the application of multiple supply allocation processes to account for differences in physical, contractual, and regulatory constraints across the Region. The processes associated with allocation of reuse supplies and assignment of water right yield to owning entities can be applied in a simple and consistent manner across the Region. Contractual supply arrangements vary in complexity from simple, single-source agreements with a defined volume to more complex arrangements with open-ended commitments, potential for source blending, indirect rearrangement of supplies, or contracts limited by source availability. Assignment of groundwater resources is particularly complex as groundwater available to individual WUG is not driven by a set of water rights but rather can be influenced by local groundwater regulation, WUG pumping capacity, and overall availability of groundwater in an area relative to the demand for the resource. The procedures applied in assigning existing water supplies, along with the information considered in each process, are discussed in greater detail in the following subsections. Existing water supplies assigned to each WUG and WWP are summarized in ***Appendix 3-DB***.

3.7.1 Groundwater

Due to the complexity of groundwater supplies in Region H, including the use of several groundwater formations and the presence of multiple entities with regulatory authority, assignment of groundwater resources in the Regional Plan cannot follow a single rigid methodology for all counties. While some counties have the ability to meet much or all of their projected demand with groundwater, others are limited by hydrogeological conditions or regulatory factors. As such, the process of assignment of existing groundwater supplies to individual WUGs was performed on a county-by-county basis and included consideration of a broad variety of factors, including TWDB-supplied MAG values, historical water use, groundwater production capacity, projected water demand, regulatory requirements of GCDs or subsidence districts, and ongoing implementation of GRPs. Groundwater allocation strategies are discussed in greater detail in the following subsections.

3.7.1.1 Counties within Subsidence Districts

As noted in the section on groundwater availability, allowable groundwater pumpage in Fort Bend, Harris, and Galveston Counties is determined by the regulatory requirements established by the FBSD and the HGSD. These Districts have established several regulatory sub-areas, with allowable groundwater pumpage within these sub-areas limited to a certain percentage of an entity's overall water use. For certain sub-areas, these percentages also reduce over time. Entities are allowed to enter into GRPs that allow for regional compliance with groundwater regulation to maximize efficiency in goal attainment. Multiple entities may participate together in a joint GRP, with some converting wholly or partially to alternative water sources and allowing others to continue growth on groundwater so long as the composite use by participating entities meets regulatory restrictions. These regulations served as the primary driver of the following groundwater allocation procedure:

1. A geospatial analysis was performed to determine the sub-area(s) associated with each WUG. Each WUG county-basin split was assigned the sub-area in which it had the greatest coverage. The majority of WUGs were in a single regulatory sub-area.
2. Certain large WUG county-basin splits were determined to be of such size that assignment of a single sub-area was inadequate to capture regulatory availability correctly. In these cases, a further spatial analysis of the projected census block level population within each regulatory sub-area was performed, with population used to develop ratios of demand for subsets of the WUG county-basin split. This methodology was applied for the COH in Harris County, County-Other in Harris County, and County-Other within the Brazos Basin for Fort Bend County.
3. Projected water demands for each WUG county-basin split were multiplied by the percentage of allowable groundwater for the appropriate regulatory sub-area to calculate a preliminary value of allowable groundwater pumpage.
4. For WUGs which do not produce their own groundwater but rather purchase groundwater supplies from another entity, allowable groundwater pumpage volumes were reassigned from the purchasing WUG to the supplying WUG.
5. Allowable groundwater pumpage amounts were reassigned among joint GRP participants. If specific volumes of conversion or allowed groundwater expansion for currently-implemented GRP stages were know, these values were used. Otherwise, for participants continuing growth on groundwater sources, the difference between projected demand and allowable pumpage was calculated and then deducted from allowable pumpage for entities converting to alternative water supplies.
6. Allowable groundwater pumpage amounts were further constrained by existing groundwater production capacities. Because of the historical reliance of the coastal counties in Region H on groundwater and a longer history of urbanization, this impacted a limited number of WUGs, primarily in Fort Bend and Galveston counties. These WUGS tended to be either non-municipal uses with limited historical use of groundwater and younger or smaller municipal developments anticipated to experience substantial growth in demand in the future.
7. Because groundwater availability for the Regional Plan is limited to the MAG rather than regulatory availability, each WUG's share of the MAG was calculated by dividing its allowable pumpage as calculated in steps 1 through 6 above by the total allowable pumpage calculated for all WUGs in the county and multiplying the resultant percentage by the MAG.

3.7.1.2 Montgomery County

Allowable groundwater production in Montgomery County is determined by the regulatory requirements established by the LSGCD. The LSGCD District Regulatory Plan requires large volume groundwater users (LVGUs), defined as entities producing 10,000,000 gallons or more of groundwater, to reduce their groundwater production to not more than 70 percent of their Total Qualifying Demand (TQD, equivalent to permitted Year 2009 groundwater pumpage). Because this regulatory approach is based on a reference value rather than a demand percentage, estimates of existing allowable pumpage in Montgomery County remain level over time. LSGCD has provided flexibility in methods for achieving the mandated groundwater reduction, including granting early conversion credits to entities converting before specific dates and allowing entities to meet their reduction goals in composite form through joint GRPs. Additionally, LVGUs may produce groundwater in excess of 70 percent of their TQD in some years, provided that their average production from year

2016 through year 2045 meets the conversion requirement. These regulations served as the primary driver of the following groundwater allocation procedure:

1. The WUG associated with each LVGU was identified through a geospatial analysis. Certain WUGS, particularly County-Other and non-municipal WUGs, were typically associated with multiple LVGUs.
2. A preliminary estimate of allowable groundwater pumpage was calculated for each LVGU by multiplying its TQD by 70 percent.
3. After preliminary calculations, portions of allowable groundwater pumpage for some LVGUs were reassigned in accordance with relevant GRPs.
4. No changes were made for GRPs relying solely on conservation or allowing shortages.
5. For small joint GRPs with a strategy of basic underconversion and overconversion of constituent LVGUs, excess pumpage from underconverting participants was deducted from allowable pumpage by overconverting participants.
6. For entities relying upon self-generated or purchased early conversion credits, allowable groundwater pumpage was increased under the assumption that such credits would be depleted at a constant rate between 2016 and 2045. After 2045, availabilities for these entities reverted to the preliminary estimate.
7. The SJRA Joint GRP involved several steps based on participant type and base allowable pumpage. Allowable pumpage for participants converting partially to surface water were assigned based on their Year 2016 target conversion percentage. For participants remaining on groundwater with base allowable pumpage sufficient to meet Year 2020 projected demands, no changes were made. For participants remaining on groundwater with base allowable pumpage below Year 2020 projected demands, allowable pumpage was increased to 2020 demands and confirmation was made that composite allowable groundwater use across joint GRP participants did not exceed 70 percent of the composite TQD.
8. LVGU allowable pumpage as determined in steps 1 through 3 was rolled up to the WUG level. Because some WUGs include both LVGU and non-LVGU entities, total allowable pumpage for these entities was set equal to the sum of LVGU allowable pumpage and Year 2020 projected WUG demand less the TQD of LVGUs within the WUG to prevent double-counting. This impacted non-municipal WUGs and County-Other.
9. Availability of named WUGs which are not currently LVGUs was set to 31 ac-ft/yr for each WUG, reflecting the maximum amount of groundwater such WUGs can produce without converting to LVGU status.

Because groundwater availability for the Regional Plan is limited to the MAG rather than regulatory availability, each WUG's share of the MAG was calculated by dividing its allowable pumpage as calculated in steps 1 through 5 above by the total allowable pumpage calculating for all WUGs in the county and multiplying the resultant percentage by the MAG.

3.7.1.3 Counties with Adequate Groundwater Resources

Based on MAG values and projected demands, groundwater supplies were determined to be adequate through year 2070 for Austin, Leon, Liberty, Madison, Polk, San Jacinto, Trinity, Walker, and Waller Counties. These counties, the majority of which are located in the northern portion of the region, are less urbanized and less heavily industrialized than the densely-populated coastal counties within the region. The northern counties also have limited access to firm surface water rights and contracts and primarily utilize groundwater supplies. Due to these factors, a majority of the WUGs in these counties are not projected to have needs through year 2070; where needs are projected in these counties, estimated shortages are a factor of infrastructure limitations. The following procedure was applied in the allocation process:

1. Identification of the source groundwater formation or formations for each WUG within the county was determined using data from TWDB's Historical Groundwater Use records. In cases where source formation was listed as unknown or information on the WUG was unavailable, source formation was estimated from WUG location.
2. Maximum existing groundwater production capacity for each WUG was estimated. Available sources of information on production capacity varied by WUG, with the least restrictive (highest estimated groundwater production capability) applied as the WUG limit. Primary references included Region H WUG survey responses, listed production capacities from TCEQ's Water Utility Database (WUD), or maximum historical pumpage for years 2000-2011 calculated from TWDB's Historical Groundwater Use records.
3. In the event that adequate data was not available from the preferred data sources, groundwater production capacity was assumed to be equal to estimated year 2010 demands under drought conditions. For municipal WUGs, this demand was approximated as year 2010 population multiplied by the WUG's baseline per-capita demand as developed for the RWP. For non-municipal demands, year 2010 drought condition demands were estimated to match projected year 2020 demand, as non-municipal demands in the northern counties are projected to remain level or change relatively slowly.
4. For WUGs with both surface and groundwater supplies, available surface water was deducted from the portion of projected demand assigned to groundwater.
5. Groundwater from the appropriate source formation was allocated to each WUG in an amount not to exceed the lesser of the projected demand for each decade and the estimated groundwater production capacity.

3.7.1.4 Counties with Inadequate Groundwater Resources

Brazoria and Chambers Counties were determined to have inadequate groundwater availability to meet demands due to the size of demands relative to the MAG. These counties, which are located in the eastern and southern portion of the Region, include both rural and heavily urbanized / industrialized areas and rely upon both groundwater and surface water. In some cases the groundwater available to these counties is adequate to meet near-term demand not otherwise served by surface water, but growing demands exceed groundwater supply by year 2070. Any available groundwater in these counties not assigned as an existing supply is solely a result of estimated infrastructure limitations. The following procedure was applied in the allocation process:

1. Procedures 1 through 5 as described in the section regarding counties with adequate groundwater were applied to determine a preliminary allowable supply for municipal WUGS, which typically have high-capacity wells of greater deepness than non-municipal use.
2. If availability could support other WUGs up to their demand or production capacity, assignment was also made to mon-municipal WUGs on a case-by-case basis. Priority was given to WUGs with non-agricultural uses due to an assumption of deeper well infrastructure, and to WUGs without access to alternate surface water supplies.
3. If MAG supply remained after steps 1 and 2 above, WUGs which were not yet assigned groundwater supply were allocated remaining available groundwater in an amount proportional to their demand or estimated production capacity.

3.7.2 Surface Water

Surface water sources included as existing supplies in the Regional Plan are associated with permanent water rights granted by the TCEQ. As such, reliable (firm) supplies from both reservoir and run-of-river sources were allocated to specific right holders in accordance to the terms of each water right. Large water rights in the Region are typically held by WWPs or named WUGs; smaller rights are generally held by non-municipal entities (irrigation, manufacturing, etc.) and were allocated to the appropriate non-municipal WUG based on use type and location of demand. For purposes of the Regional Planning process, run-of-river water rights are also grouped in the Plan by basin and county of origin.

3.7.3 Reuse

The existing reliable yield of reuse sources in Region H were determined in accordance with the procedures previously described in the section regarding reuse availability. The majority of existing reuse supplies in the region are direct reuse systems and were therefore allocated to their originating WUG. Indirect reuse sources currently in place were also assumed to be used to meet demands within the originating WUGs or its customers.

3.7.4 Contracts

Contractual supplies were assigned in accordance with the most recent available information regarding contractual relationships, contract volume or maximum, limitations on existing conveyance infrastructure, and source. Sources of information included the 2016 Region H survey, stakeholder correspondence, available information on service area boundaries, and the 2011 Region H Water Plan. The majority of contracts reflected in the Plan consist of the WWP-to-WWP and WWP-to-WUG transfers as discussed in *Section 3.6*. While contractual supply agreements among utility districts and similar entities are common in Region H, only a relatively small number are reflected in the Plan as the majority of these transfers occur internal to either a regional water authority WUG or County-Other WUG and therefore do not need to be reflected separately in the plan.

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APPENDIX 3-A

WATER AVAILABILITY MODEL INPUT FILES

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Table 3-A1 – Summary of Region H WAM Model Runs for Existing Supply

Model Files	Basin	Purpose	Run Date	Run By	Notes
bwam3_2020.dat bwam3.dis bwam3.eva bwam3.inf	Brazos and San Jacinto-Brazos	Determination of run-off-river firm reliability for the Brazos and San Jacinto Brazos Basins.	12/3/2013	Freese and Nichols, Inc.	Model developed by Region G (Brazos G) Water Planning Group and provided to Region H.
bwam3_2070.dat bwam3.dis bwam3.eva bwam3.inf	Brazos and San Jacinto-Brazos	Determination of run-off-river firm reliability for the Brazos and San Jacinto Brazos Basins.	12/4/2013	Freese and Nichols, Inc.	Model developed by Region G (Brazos G) Water Planning Group and provided to Region H.
C3.dat C3.dis C3.eva C3.inf	Brazos-Colorado	Determination of run-off-river firm reliability for the Brazos-Colorado Coastal Basin.	4/24/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (8/1/2007 version).
NT.dat NT.dis NT.eva NT.inf	Neches-Trinity	Determination of run-off-river firm reliability for the Neches-Trinity Coastal Basin.	2/3/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (11/23/2009 version).
SJ_ROR.dat SJ_ROR.dis SJ_ROR.eva SJ_ROR.inf	San Jacinto	Determination of run-off-river firm reliability for the San Jacinto River Basin.	5/8/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (11/23/2009 version), with integration of new water rights in accordance with TWDB requirements.
SJ2020LkConroe.dat SJ2020LkConroe.dis SJ2020LkConroe.eva SJ2020LkConroe.inf	San Jacinto	Determination of near-term reservoir firm yield for Lake Conroe.	5/8/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (11/23/2009 version), with integration of new water rights in accordance with TWDB requirements.

Model Files	Basin	Purpose	Run Date	Run By	Notes
SJ2020LkHouston.dat SJ2020LkHouston.dis SJ2020LkHouston.eva SJ2020LkHouston.inf	San Jacinto	Determination of near-term reservoir firm yield for Lake Houston.	5/8/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (11/23/2009 version), with integration of new water rights in accordance with TWDB requirements.
SJ2070LkConroe.dat SJ2070LkConroe.dis SJ2070LkConroe.eva SJ2070LkConroe.inf	San Jacinto	Determination of long-term reservoir firm yield for Lake Conroe.	5/8/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (11/23/2009 version), with integration of new water rights in accordance with TWDB requirements.
SJ2070LkHouston.dat SJ2070LkHouston.dis SJ2070LkHouston.eva SJ2070LkHouston.inf	San Jacinto	Determination of long-term reservoir firm yield for Houston.	5/8/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (11/23/2009 version), with integration of new water rights in accordance with TWDB requirements.
TSJ3.dat TSJ3.dis TSJ3.eva TSJ3.inf	Trinity-San Jacinto	Determination of run-off-river firm reliability for the Trinity-San Jacinto Coastal Basin.	3/7/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (11/23/2009 version).
trin3adopt.dat trin3adopt.dis trin3adopt.eva trin3adopt.inf	Trinity	Determination of run-off-river firm reliability for the Trinity River Basin.	5/12/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (9/19/2011 version).
trinSB3_2020.dat trinSB3_2020.dis trinSB3_2020.eva trinSB3_2020.inf	Trinity	Determination of reservoir firm yield for Lake Livingston, estimated 2020 conditions.	5/10/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (9/19/2011 version), modified for inclusion of projected return flows from Region C. Modified assumption approved by TWDB Executive Administrator on 2/28/2012.

Model Files	Basin	Purpose	Run Date	Run By	Notes
trinSB3_2030.dat trinSB3_2030.dis trinSB3_2030.eva trinSB3_2030.inf	Trinity	Determination of reservoir firm yield for Lake Livingston, estimated 2030 conditions.	5/10/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (9/19/2011 version), modified for inclusion of projected return flows from Region C. Modified assumption approved by TWDB Executive Administrator on 2/28/2012.
trinSB3_2040.dat trinSB3_2040.dis trinSB3_2040.eva trinSB3_2040.inf	Trinity	Determination of reservoir firm yield for Lake Livingston, estimated 2040 conditions.	5/10/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (9/19/2011 version), modified for inclusion of projected return flows from Region C. Modified assumption approved by TWDB Executive Administrator on 2/28/2012.
trinSB3_2050.dat trinSB3_2050.dis trinSB3_2050.eva trinSB3_2050.inf	Trinity	Determination of reservoir firm yield for Lake Livingston, estimated 2050 conditions.	5/10/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (9/19/2011 version), modified for inclusion of projected return flows from Region C. Modified assumption approved by TWDB Executive Administrator on 2/28/2012.
trinSB3_2060.dat trinSB3_2060.dis trinSB3_2060.eva trinSB3_2060.inf	Trinity	Determination of reservoir firm yield for Lake Livingston, estimated 2060 conditions.	5/10/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (9/19/2011 version), modified for inclusion of projected return flows from Region C. Modified assumption approved by TWDB Executive Administrator on 2/28/2012.
trinSB3_2070.dat trinSB3_2070.dis trinSB3_2070.eva trinSB3_2070.inf	Trinity	Determination of reservoir firm yield for Lake Livingston, estimated 2070 conditions.	5/10/2012	Freese and Nichols, Inc.	TCEQ WAM Run 3 (9/19/2011 version), modified for inclusion of projected return flows from Region C. Modified assumption approved by TWDB Executive Administrator on 2/28/2012.

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APPENDIX 3-DB

DB17 REPORTS

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SOURCE AVAILABILITY

REGION H

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
BRAZOS RIVER ALLUVIUM AQUIFER	AUSTIN	BRAZOS	FRESH	7,944	7,944	7,944	7,944	7,944	7,944
BRAZOS RIVER ALLUVIUM AQUIFER	WALLER	BRAZOS	FRESH	12,027	12,027	12,027	12,027	12,027	12,027
CARRIZO-WILCOX AQUIFER	LEON	BRAZOS	FRESH	3,612	3,403	3,325	3,351	3,356	3,356
CARRIZO-WILCOX AQUIFER	LEON	TRINITY	FRESH	10,863	11,244	11,567	11,821	11,840	11,840
CARRIZO-WILCOX AQUIFER	MADISON	BRAZOS	FRESH	379	369	350	333	332	332
CARRIZO-WILCOX AQUIFER	MADISON	TRINITY	FRESH	2,480	2,399	2,304	2,219	2,210	2,210
CARRIZO-WILCOX AQUIFER	TRINITY	TRINITY	FRESH	1,101	1,101	1,101	1,101	1,101	1,101
CARRIZO-WILCOX AQUIFER	WALKER	TRINITY	FRESH	2,099	2,099	2,099	2,099	2,099	2,099
GULF COAST AQUIFER	AUSTIN	BRAZOS	FRESH	6,585	6,585	6,585	6,585	6,585	6,585
GULF COAST AQUIFER	AUSTIN	BRAZOS-COLORADO	FRESH	15,608	15,608	15,608	15,608	15,608	15,608
GULF COAST AQUIFER	AUSTIN	COLORADO	FRESH	121	121	121	121	121	121
GULF COAST AQUIFER	BRAZORIA	BRAZOS	FRESH	6,658	6,658	6,658	6,658	6,658	6,658
GULF COAST AQUIFER	BRAZORIA	BRAZOS-COLORADO	FRESH	11,648	11,648	11,648	11,648	11,648	11,648
GULF COAST AQUIFER	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	32,090	32,090	32,090	32,090	32,090	32,090
GULF COAST AQUIFER	CHAMBERS	NECHES-TRINITY	FRESH	9,527	9,527	9,527	9,527	9,527	9,527
GULF COAST AQUIFER	CHAMBERS	TRINITY	FRESH	10,112	10,112	10,112	10,112	10,112	10,112
GULF COAST AQUIFER	CHAMBERS	TRINITY-SAN JACINTO	FRESH	2,068	2,068	2,068	2,068	2,068	2,068
GULF COAST AQUIFER	FORT BEND	BRAZOS	FRESH	52,923	43,673	43,189	42,862	42,953	42,953
GULF COAST AQUIFER	FORT BEND	BRAZOS-COLORADO	FRESH	22,023	18,095	17,715	17,043	17,077	17,077
GULF COAST AQUIFER	FORT BEND	SAN JACINTO	FRESH	9,524	9,043	8,809	8,642	8,650	8,650
GULF COAST AQUIFER	FORT BEND	SAN JACINTO-BRAZOS	FRESH	24,235	21,266	22,457	23,765	23,810	23,810
GULF COAST AQUIFER	GALVESTON	NECHES-TRINITY	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	GALVESTON	SAN JACINTO-BRAZOS	FRESH	5,257	5,867	5,841	5,814	5,815	5,815
GULF COAST AQUIFER	HARRIS	SAN JACINTO	FRESH	249,851	197,553	197,326	196,992	197,270	197,270
GULF COAST AQUIFER	HARRIS	SAN JACINTO-BRAZOS	FRESH	7,202	6,798	7,563	8,428	8,440	8,440
GULF COAST AQUIFER	HARRIS	TRINITY-SAN JACINTO	FRESH	5,893	5,026	5,141	5,259	5,266	5,266
GULF COAST AQUIFER	LIBERTY	NECHES	FRESH	5,074	5,074	5,074	5,074	5,074	5,074
GULF COAST AQUIFER	LIBERTY	NECHES-TRINITY	FRESH	364	364	364	364	364	364
GULF COAST AQUIFER	LIBERTY	SAN JACINTO	FRESH	5,852	5,852	5,852	5,852	5,852	5,852
GULF COAST AQUIFER	LIBERTY	TRINITY	FRESH	22,887	22,887	22,887	22,887	22,887	22,887
GULF COAST AQUIFER	LIBERTY	TRINITY-SAN JACINTO	FRESH	8,856	8,856	8,856	8,856	8,856	8,856
GULF COAST AQUIFER	MONTGOMERY	SAN JACINTO	FRESH	61,629	61,629	61,629	61,629	61,629	61,629

SOURCE AVAILABILITY

REGION H

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
GULF COAST AQUIFER	POLK	TRINITY	FRESH	21,830	21,830	21,783	21,783	21,783	21,783
GULF COAST AQUIFER	SAN JACINTO	SAN JACINTO	FRESH	10,368	10,368	10,368	10,368	10,368	10,368
GULF COAST AQUIFER	SAN JACINTO	TRINITY	FRESH	8,811	8,811	8,811	8,811	8,811	8,811
GULF COAST AQUIFER	WALKER	SAN JACINTO	FRESH	9,116	9,116	9,116	9,116	9,116	9,116
GULF COAST AQUIFER	WALKER	TRINITY	FRESH	8,873	8,873	8,797	8,797	8,797	8,797
GULF COAST AQUIFER	WALLER	BRAZOS	FRESH	14,933	14,933	14,933	14,933	14,933	14,933
GULF COAST AQUIFER	WALLER	SAN JACINTO	FRESH	26,694	26,694	26,694	26,694	26,694	26,694
GULF COAST AQUIFER | CATAHOULA FORMATION	MONTGOMERY	SAN JACINTO	BRACKISH	4,391	4,391	4,391	4,391	4,391	4,391
QUEEN CITY AQUIFER	LEON	BRAZOS	FRESH	245	245	245	245	245	245
QUEEN CITY AQUIFER	LEON	TRINITY	FRESH	349	349	349	349	349	349
QUEEN CITY AQUIFER	MADISON	BRAZOS	FRESH	1	1	1	1	1	1
QUEEN CITY AQUIFER	MADISON	TRINITY	FRESH	379	379	379	379	379	379
QUEEN CITY AQUIFER	TRINITY	TRINITY	FRESH	0	0	0	0	0	0
QUEEN CITY AQUIFER	WALKER	TRINITY	FRESH	229	229	229	229	229	229
SAN BERNARD RIVER ALLUVIUM AQUIFER	AUSTIN	BRAZOS-COLORADO	FRESH	520	520	520	520	520	520
SAN JACINTO RIVER ALLUVIUM AQUIFER	WALKER	SAN JACINTO	FRESH	1,450	1,450	1,450	1,450	1,450	1,450
SPARTA AQUIFER	LEON	BRAZOS	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	LEON	TRINITY	FRESH	21	21	21	21	21	21
SPARTA AQUIFER	MADISON	BRAZOS	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	MADISON	TRINITY	FRESH	3,313	3,313	3,313	3,313	3,313	3,313
SPARTA AQUIFER	TRINITY	TRINITY	FRESH	302	302	302	302	302	302
SPARTA AQUIFER	WALKER	SAN JACINTO	FRESH	266	266	266	266	266	266
SPARTA AQUIFER	WALKER	TRINITY	FRESH	2,084	2,084	2,084	2,084	2,084	2,084
TRINITY RIVER ALLUVIUM AQUIFER	WALKER	TRINITY	FRESH	3,913	3,913	3,913	3,913	3,913	3,913
YEGUA-JACKSON AQUIFER	LEON	TRINITY	FRESH	4	4	4	4	4	4
YEGUA-JACKSON AQUIFER	MADISON	BRAZOS	FRESH	63	63	63	63	63	63
YEGUA-JACKSON AQUIFER	MADISON	TRINITY	FRESH	1,055	1,055	1,055	1,055	1,055	1,055
YEGUA-JACKSON AQUIFER	POLK	TRINITY	FRESH	0	0	0	0	0	0
YEGUA-JACKSON AQUIFER	TRINITY	TRINITY	FRESH	2,191	2,191	2,191	2,191	2,191	2,191
YEGUA-JACKSON AQUIFER	WALKER	SAN JACINTO	FRESH	351	351	351	351	351	351
YEGUA-JACKSON AQUIFER	WALKER	TRINITY	FRESH	3,823	3,823	3,823	3,823	3,823	3,823
	GROUNDWATER TOTAL SOURCE AVAILABILITY			**742,067**	**672,561**	**673,289**	**674,231**	**674,721**	**674,721**

REGION H

REUSE	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
DIRECT REUSE	FORT BEND	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0

SOURCE AVAILABILITY

REGION H

REUSE	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
DIRECT REUSE | ALVIN	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	77	77	77	77	77	77
DIRECT REUSE | BACLIFF MUD	GALVESTON	SAN JACINTO-BRAZOS	FRESH	68	68	68	68	68	68
DIRECT REUSE | CHIMNEY HILL MUD	HARRIS	SAN JACINTO	FRESH	5	5	5	5	5	5
DIRECT REUSE | COUNTY-OTHER	FORT BEND	SAN JACINTO-BRAZOS	FRESH	916	916	916	916	916	916
DIRECT REUSE | COUNTY-OTHER	GALVESTON	SAN JACINTO-BRAZOS	FRESH	82	82	82	82	82	82
DIRECT REUSE | COUNTY-OTHER	HARRIS	SAN JACINTO	FRESH	233	233	233	233	233	233
DIRECT REUSE | COUNTY-OTHER	HARRIS	SAN JACINTO-BRAZOS	FRESH	436	436	436	436	436	436
DIRECT REUSE | FORT BEND COUNTY MUD #25	FORT BEND	SAN JACINTO-BRAZOS	FRESH	405	405	405	405	405	405
DIRECT REUSE | FREEPORT	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	3	3	3	3	3	3
DIRECT REUSE | GALVESTON	GALVESTON	SAN JACINTO-BRAZOS	FRESH	337	337	337	337	337	337
DIRECT REUSE | HARRIS COUNTY MUD #11	HARRIS	SAN JACINTO	FRESH	5	5	5	5	5	5
DIRECT REUSE | HOUSTON	HARRIS	SAN JACINTO	FRESH	1,452	1,452	1,452	1,452	1,452	1,452
DIRECT REUSE | LA PORTE	HARRIS	SAN JACINTO-BRAZOS	FRESH	196	196	196	196	196	196
DIRECT REUSE | LAKE JACKSON	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	747	747	747	747	747	747
DIRECT REUSE | LEAGUE CITY	GALVESTON	SAN JACINTO-BRAZOS	FRESH	555	555	555	555	555	555
DIRECT REUSE | MANUFACTURING	BRAZORIA	BRAZOS	FRESH	485	485	485	485	485	485
DIRECT REUSE | MANUFACTURING	FORT BEND	SAN JACINTO-BRAZOS	FRESH	524	524	524	524	524	524
DIRECT REUSE | MANUFACTURING	HARRIS	SAN JACINTO	FRESH	25	25	25	25	25	25
DIRECT REUSE | MANUFACTURING	LEON	TRINITY	FRESH	27	27	27	27	27	27
DIRECT REUSE | MANVEL	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	46	46	46	46	46	46
DIRECT REUSE | MONTGOMERY COUNTY MUD #123	MONTGOMERY	SAN JACINTO	FRESH	69	69	69	69	69	69
DIRECT REUSE | PANORAMA VILLAGE	MONTGOMERY	SAN JACINTO	FRESH	43	43	43	43	43	43
DIRECT REUSE | PEARLAND	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	314	1,154	1,154	1,154	1,154	1,154
DIRECT REUSE | RIVER PLANTATION MUD	MONTGOMERY	SAN JACINTO	FRESH	236	236	236	236	236	236
DIRECT REUSE | ROSENBERG	FORT BEND	BRAZOS	FRESH	29	29	29	29	29	29
DIRECT REUSE | SOUTH HOUSTON	HARRIS	SAN JACINTO	FRESH	29	29	29	29	29	29
DIRECT REUSE | THE WOODLANDS	MONTGOMERY	SAN JACINTO	FRESH	1,314	1,314	1,314	1,314	1,314	1,314
DIRECT REUSE | TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	NECHES-TRINITY	FRESH	399	399	399	399	399	399

SOURCE AVAILABILITY

REGION H

REUSE	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
INDIRECT REUSE | HOUSTON	HARRIS	SAN JACINTO	FRESH	2,239	2,239	2,239	2,239	2,239	2,239
INDIRECT REUSE | SJRA	HARRIS	SAN JACINTO	FRESH	14,944	14,944	14,944	14,944	14,944	14,944
INDIRECT REUSE | THE WOODLANDS	MONTGOMERY	SAN JACINTO	FRESH	144	144	144	144	144	144
REUSE TOTAL SOURCE AVAILABILITY				**26,384**	**27,224**	**27,224**	**27,224**	**27,224**	**27,224**

REGION H

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
BRAZOS RUN-OF-RIVER	BRAZORIA	BRAZOS	FRESH	167,759	170,768	173,777	176,786	179,795	182,808
BRAZOS RUN-OF-RIVER	FORT BEND	BRAZOS	FRESH	247,788	249,246	250,704	252,162	253,620	255,085
BRAZOS RUN-OF-RIVER	WALLER	BRAZOS	FRESH	61	61	61	61	61	61
BRAZOS-COLORADO RUN-OF-RIVER	BRAZORIA	BRAZOS-COLORADO	FRESH	3,211	3,211	3,211	3,211	3,211	3,211
CONROE LAKE/RESERVOIR	RESERVOIR	SAN JACINTO	FRESH	79,300	78,540	77,780	77,020	76,260	75,500
HOUSTON LAKE/RESERVOIR	RESERVOIR	SAN JACINTO	FRESH	179,000	177,060	175,120	173,180	171,240	169,300
LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	RESERVOIR	TRINITY	FRESH	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000
NECHES-TRINITY RUN-OF-RIVER	CHAMBERS	NECHES-TRINITY	FRESH	37,700	37,700	37,700	37,700	37,700	37,700
SAN JACINTO RUN-OF-RIVER	HARRIS	SAN JACINTO	FRESH	12,511	12,511	12,511	12,511	12,511	12,511
SAN JACINTO RUN-OF-RIVER	MONTGOMERY	SAN JACINTO	FRESH	141	141	141	141	141	141
SAN JACINTO-BRAZOS RUN-OF-RIVER	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	32,599	32,599	32,599	32,599	32,599	32,599
SAN JACINTO-BRAZOS RUN-OF-RIVER	FORT BEND	SAN JACINTO-BRAZOS	FRESH	5,803	5,803	5,803	5,803	5,803	5,803
SAN JACINTO-BRAZOS RUN-OF-RIVER	GALVESTON	SAN JACINTO-BRAZOS	FRESH	36	36	36	36	36	36
SAN JACINTO-BRAZOS RUN-OF-RIVER	HARRIS	SAN JACINTO-BRAZOS	FRESH	388	388	388	388	388	388
TRINITY RUN-OF-RIVER	CHAMBERS	TRINITY	FRESH	60,835	60,835	60,835	60,835	60,835	60,835
TRINITY RUN-OF-RIVER	LEON	TRINITY	FRESH	156	156	156	156	156	156
TRINITY RUN-OF-RIVER	LIBERTY	TRINITY	FRESH	51,077	51,077	51,077	51,077	51,077	51,077
TRINITY RUN-OF-RIVER	MADISON	TRINITY	FRESH	169	169	169	169	169	169
TRINITY RUN-OF-RIVER	POLK	TRINITY	FRESH	26,510	26,510	26,510	26,510	26,510	26,510
TRINITY RUN-OF-RIVER	WALKER	TRINITY	FRESH	439	439	439	439	439	439
TRINITY-SAN JACINTO RUN-OF-RIVER	CHAMBERS	TRINITY-SAN JACINTO	SALINE	30,000	30,000	30,000	30,000	30,000	30,000
TRINITY-SAN JACINTO RUN-OF-RIVER	CHAMBERS	TRINITY-SAN JACINTO	FRESH	1,213	1,213	1,213	1,213	1,213	1,213
TRINITY-SAN JACINTO RUN-OF-RIVER	HARRIS	TRINITY-SAN JACINTO	FRESH	2,198	2,198	2,198	2,198	2,198	2,198

SOURCE AVAILABILITY

REGION H

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRINITY-SAN JACINTO RUN-OF-RIVER	LIBERTY	TRINITY-SAN JACINTO	FRESH	1,905	1,905	1,905	1,905	1,905	1,905
SURFACE WATER TOTAL SOURCE AVAILABILITY				**2,284,799**	**2,286,566**	**2,288,333**	**2,290,100**	**2,291,867**	**2,293,645**
REGION H TOTAL SOURCE AVAILABILITY				**3,053,250**	**2,986,351**	**2,988,846**	**2,991,555**	**2,993,812**	**2,995,590**

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
AUSTIN COUNTY							
BRAZOS BASIN							
BELLVILLE	H | GULF COAST AQUIFER | AUSTIN COUNTY	1,217	1,286	1,366	1,468	1,588	1,722
SAN FELIPE	H | GULF COAST AQUIFER | AUSTIN COUNTY	208	208	208	208	208	208
SEALY	H | GULF COAST AQUIFER | AUSTIN COUNTY	1,377	1,514	1,667	1,859	2,081	2,329
COUNTY-OTHER	H | GULF COAST AQUIFER | AUSTIN COUNTY	1,856	2,148	2,475	2,883	3,019	3,019
MANUFACTURING	H | GULF COAST AQUIFER | AUSTIN COUNTY	89	89	89	89	89	89
MINING	H | GULF COAST AQUIFER | AUSTIN COUNTY	97	97	97	97	97	68
LIVESTOCK	H | GULF COAST AQUIFER | AUSTIN COUNTY	1,171	1,171	1,171	1,171	1,171	1,171
IRRIGATION	H | GULF COAST AQUIFER | AUSTIN COUNTY	2,398	2,398	2,398	2,398	2,398	2,398
BRAZOS BASIN TOTAL EXISTING SUPPLY		**8,413**	**8,911**	**9,471**	**10,173**	**10,651**	**11,004**
BRAZOS-COLORADO BASIN							
SEALY	H | GULF COAST AQUIFER | AUSTIN COUNTY	3	3	4	4	5	5
WALLIS	H | GULF COAST AQUIFER | AUSTIN COUNTY	161	165	171	180	193	207
COUNTY-OTHER	H | GULF COAST AQUIFER | AUSTIN COUNTY	437	487	487	487	487	487
MANUFACTURING	H | GULF COAST AQUIFER | AUSTIN COUNTY	19	21	23	24	26	28
MINING	H | GULF COAST AQUIFER | AUSTIN COUNTY	28	28	28	28	28	20
LIVESTOCK	H | GULF COAST AQUIFER | AUSTIN COUNTY	329	329	329	329	329	329
IRRIGATION	H | GULF COAST AQUIFER | AUSTIN COUNTY	4,080	4,080	4,080	4,080	4,080	4,080
BRAZOS-COLORADO BASIN TOTAL EXISTING SUPPLY		**5,057**	**5,113**	**5,122**	**5,132**	**5,148**	**5,156**
COLORADO BASIN							
COUNTY-OTHER	H | GULF COAST AQUIFER | AUSTIN COUNTY	39	43	49	55	63	72
MINING	H | GULF COAST AQUIFER | AUSTIN COUNTY	2	2	2	2	2	2
LIVESTOCK	H | GULF COAST AQUIFER | AUSTIN COUNTY	23	23	23	23	23	23
COLORADO BASIN TOTAL EXISTING SUPPLY		**64**	**68**	**74**	**80**	**88**	**97**
AUSTIN COUNTY TOTAL EXISTING SUPPLY		**13,534**	**14,092**	**14,667**	**15,385**	**15,887**	**16,257**
BRAZORIA COUNTY							
BRAZOS BASIN							
BAILEY'S PRAIRIE	H | GULF COAST AQUIFER | BRAZORIA COUNTY	26	26	26	27	28	28
BRAZORIA	H | BRAZOS RUN-OF-RIVER	73	72	71	70	69	69
FREEPORT	H | BRAZOS RUN-OF-RIVER	227	244	260	274	287	295
FREEPORT	H | GULF COAST AQUIFER | BRAZORIA COUNTY	1	1	1	1	1	0
LAKE JACKSON	H | BRAZOS RUN-OF-RIVER	15	18	25	29	35	42
LAKE JACKSON	H | DIRECT REUSE	5	5	5	5	5	5
LAKE JACKSON	H | GULF COAST AQUIFER | BRAZORIA COUNTY	19	21	26	32	38	44
VARNER CREEK UD	H | GULF COAST AQUIFER | BRAZORIA COUNTY	213	207	201	201	201	201
WEST COLUMBIA	H | GULF COAST AQUIFER | BRAZORIA COUNTY	369	354	340	341	341	343
COUNTY-OTHER	H | GULF COAST AQUIFER | BRAZORIA COUNTY	942	1,067	1,273	1,484	1,706	1,828
MANUFACTURING	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	16,000	15,744	15,488	15,232	14,976	14,720
MANUFACTURING	H | BRAZOS RUN-OF-RIVER	6,536	6,644	6,753	6,862	6,971	7,079
MANUFACTURING	H | DIRECT REUSE	485	485	485	485	485	485
MANUFACTURING	H | GULF COAST AQUIFER | BRAZORIA COUNTY	25	25	25	25	25	25

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
BRAZORIA COUNTY							
BRAZOS BASIN							
MINING	H | GULF COAST AQUIFER | BRAZORIA COUNTY	24	22	21	20	18	17
LIVESTOCK	H | GULF COAST AQUIFER | BRAZORIA COUNTY	109	101	95	89	83	76
IRRIGATION	H | BRAZOS RUN-OF-RIVER	2,712	2,712	2,712	2,712	2,712	2,712
IRRIGATION	H | GULF COAST AQUIFER | BRAZORIA COUNTY	1,973	1,832	1,730	1,619	1,499	1,388
BRAZOS BASIN TOTAL EXISTING SUPPLY		**29,754**	**29,580**	**29,537**	**29,508**	**29,480**	**29,357**
BRAZOS-COLORADO BASIN							
BRAZORIA	H | BRAZOS RUN-OF-RIVER	263	264	265	266	267	267
FREEPORT	H | BRAZOS RUN-OF-RIVER	2	2	3	3	3	3
JONES CREEK	H | GULF COAST AQUIFER | BRAZORIA COUNTY	207	200	193	192	192	193
SWEENY	H | GULF COAST AQUIFER | BRAZORIA COUNTY	540	525	513	508	509	511
WEST COLUMBIA	H | GULF COAST AQUIFER | BRAZORIA COUNTY	68	65	64	64	65	66
COUNTY-OTHER	H | BRAZOS RUN-OF-RIVER	420	420	420	420	420	420
COUNTY-OTHER	H | GULF COAST AQUIFER | BRAZORIA COUNTY	4,771	4,890	5,061	5,153	5,172	5,184
MANUFACTURING	H | BRAZOS-COLORADO RUN-OF-RIVER	3,211	3,211	3,211	3,211	3,211	3,211
MANUFACTURING	H | GULF COAST AQUIFER | BRAZORIA COUNTY	1,854	1,722	1,626	1,521	1,409	1,305
MINING	H | GULF COAST AQUIFER | BRAZORIA COUNTY	46	43	40	38	35	32
LIVESTOCK	H | GULF COAST AQUIFER | BRAZORIA COUNTY	306	284	268	251	232	215
IRRIGATION	H | GULF COAST AQUIFER | BRAZORIA COUNTY	4,669	4,335	4,094	3,831	3,547	3,285
BRAZOS-COLORADO BASIN TOTAL EXISTING SUPPLY		**16,357**	**15,961**	**15,758**	**15,458**	**15,062**	**14,692**
SAN JACINTO-BRAZOS BASIN							
ALVIN	H | DIRECT REUSE	77	77	77	77	77	77
ALVIN	H | GULF COAST AQUIFER | BRAZORIA COUNTY	4,644	4,866	5,161	5,587	6,186	6,983
ANGLETON	H | BRAZOS RUN-OF-RIVER	2,016	2,016	2,016	2,016	2,016	2,016
ANGLETON	H | GULF COAST AQUIFER | BRAZORIA COUNTY	104	104	104	104	104	39
BAILEY'S PRAIRIE	H | GULF COAST AQUIFER | BRAZORIA COUNTY	63	64	63	63	64	65
BRAZORIA COUNTY MUD #2	H | GULF COAST AQUIFER | BRAZORIA COUNTY	2,199	2,190	2,185	2,183	2,183	2,184
BRAZORIA COUNTY MUD #3	H | GULF COAST AQUIFER | BRAZORIA COUNTY	566	558	560	565	572	584
BROOKSIDE VILLAGE	H | GULF COAST AQUIFER | BRAZORIA COUNTY	198	207	258	325	406	504
CLUTE	H | BRAZOS RUN-OF-RIVER	1,120	1,120	1,120	1,120	1,120	1,120
CLUTE	H | GULF COAST AQUIFER | BRAZORIA COUNTY	328	303	295	301	315	331
DANBURY	H | GULF COAST AQUIFER | BRAZORIA COUNTY	176	169	163	160	159	159
FREEPORT	H | BRAZOS RUN-OF-RIVER	2,011	1,994	1,977	1,963	1,950	1,942
FREEPORT	H | DIRECT REUSE	3	3	3	3	3	3
FREEPORT	H | GULF COAST AQUIFER | BRAZORIA COUNTY	6	6	6	6	6	1
HILLCREST	H | GULF COAST AQUIFER | BRAZORIA COUNTY	118	115	112	111	111	111
HOLIDAY LAKES	H | GULF COAST AQUIFER | BRAZORIA COUNTY	75	75	75	75	76	76
IOWA COLONY	H | GULF COAST AQUIFER | BRAZORIA COUNTY	292	326	381	431	479	508
LAKE JACKSON	H | BRAZOS RUN-OF-RIVER	2,225	2,222	2,215	2,211	2,205	2,198
LAKE JACKSON	H | DIRECT REUSE	742	742	742	742	742	742
LAKE JACKSON	H | GULF COAST AQUIFER | BRAZORIA COUNTY	2,817	2,634	2,526	2,441	2,372	2,316

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
BRAZORIA COUNTY							
SAN JACINTO-BRAZOS BASIN							
MANVEL	H | DIRECT REUSE	46	46	46	46	46	46
MANVEL	H | GULF COAST AQUIFER | BRAZORIA COUNTY	1,658	2,033	2,033	2,033	2,033	2,033
OYSTER CREEK	H | BRAZOS RUN-OF-RIVER	106	106	106	106	106	106
OYSTER CREEK	H | GULF COAST AQUIFER | BRAZORIA COUNTY	133	123	117	113	111	109
PEARLAND	H | GULF COAST AQUIFER | BRAZORIA COUNTY	2,578	3,000	3,673	4,325	4,934	5,402
PEARLAND	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	15,177	14,885	14,541	14,332	14,055	14,137
RICHWOOD	H | BRAZOS RUN-OF-RIVER	263	263	263	263	263	263
RICHWOOD	H | GULF COAST AQUIFER | BRAZORIA COUNTY	105	97	94	94	98	102
BRAZORIA COUNTY MUD #21	H | GULF COAST AQUIFER | BRAZORIA COUNTY	549	568	610	653	695	724
BRAZORIA COUNTY MUD #6	H | GULF COAST AQUIFER | BRAZORIA COUNTY	681	676	676	676	677	680
COUNTY-OTHER	H | BRAZOS RUN-OF-RIVER	420	420	420	420	420	420
COUNTY-OTHER	H | GULF COAST AQUIFER | BRAZORIA COUNTY	7,099	6,698	6,392	6,039	5,647	5,274
MANUFACTURING	H | BRAZOS RUN-OF-RIVER	156,845	159,167	161,486	163,805	166,125	168,448
MANUFACTURING	H | GULF COAST AQUIFER | BRAZORIA COUNTY	0	725	685	641	593	549
MANUFACTURING	H | SAN JACINTO-BRAZOS RUN-OF-RIVER	12,964	13,033	13,102	13,172	13,241	13,310
MINING	H | GULF COAST AQUIFER | BRAZORIA COUNTY	164	152	144	134	125	115
LIVESTOCK	H | GULF COAST AQUIFER | BRAZORIA COUNTY	996	925	873	817	757	701
IRRIGATION	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	4,390	4,412	4,434	4,457	4,480	4,502
IRRIGATION	H | GULF COAST AQUIFER | BRAZORIA COUNTY	7,538	6,999	6,610	6,185	5,727	5,305
IRRIGATION	H | SAN JACINTO-BRAZOS RUN-OF-RIVER	16,669	16,669	16,669	16,669	16,669	16,669
SAN JACINTO-BRAZOS BASIN TOTAL EXISTING SUPPLY		**248,161**	**250,788**	**253,013**	**255,464**	**257,948**	**260,854**
BRAZORIA COUNTY TOTAL EXISTING SUPPLY		**294,272**	**296,329**	**298,308**	**300,430**	**302,490**	**304,903**
CHAMBERS COUNTY							
NECHES-TRINITY BASIN							
ANAHUAC	H | TRINITY RUN-OF-RIVER	894	893	893	896	894	893
TRINITY BAY CONSERVATION DISTRICT	H | DIRECT REUSE	316	316	316	316	316	316
TRINITY BAY CONSERVATION DISTRICT	H | TRINITY RUN-OF-RIVER	730	730	730	730	730	730
TRINITY BAY CONSERVATION DISTRICT	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	1,793	2,091	2,408	2,766	3,162	3,582
COUNTY-OTHER	H | GULF COAST AQUIFER | CHAMBERS COUNTY	34	78	121	168	219	273
MINING	H | GULF COAST AQUIFER | CHAMBERS COUNTY	3,316	3,316	3,316	3,316	3,316	3,316
LIVESTOCK	H | GULF COAST AQUIFER | CHAMBERS COUNTY	312	312	312	312	312	312
IRRIGATION	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	16,499	16,499	16,499	16,499	16,499	16,499
IRRIGATION	H | NECHES-TRINITY RUN-OF-RIVER	35,037	35,037	35,037	35,037	35,037	35,037
IRRIGATION	H | TRINITY RUN-OF-RIVER	38,000	38,000	38,000	38,000	38,000	38,000
IRRIGATION	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	37,000	37,000	37,000	37,000	37,000	37,000
NECHES-TRINITY BASIN TOTAL EXISTING SUPPLY		**133,931**	**134,272**	**134,632**	**135,040**	**135,485**	**135,958**

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
CHAMBERS COUNTY							
TRINITY BASIN							
ANAHUAC	H | TRINITY RUN-OF-RIVER	211	212	212	209	211	212
BEACH CITY	H | GULF COAST AQUIFER | CHAMBERS COUNTY	31	31	31	31	31	31
MONT BELVIEU	H | GULF COAST AQUIFER | CHAMBERS COUNTY	1,680	2,134	2,434	2,434	2,434	2,434
OLD RIVER-WINFREE	H | GULF COAST AQUIFER | CHAMBERS COUNTY	121	121	121	121	121	121
TRINITY BAY CONSERVATION DISTRICT	H | DIRECT REUSE	83	83	83	83	83	83
TRINITY BAY CONSERVATION DISTRICT	H | TRINITY RUN-OF-RIVER	191	191	191	191	191	191
TRINITY BAY CONSERVATION DISTRICT	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	469	546	629	722	826	936
COVE	H | GULF COAST AQUIFER | CHAMBERS COUNTY	79	96	114	134	157	181
COUNTY-OTHER	H | GULF COAST AQUIFER | CHAMBERS COUNTY	874	989	1,116	1,258	1,417	1,584
MANUFACTURING	H | GULF COAST AQUIFER | CHAMBERS COUNTY	1,988	1,988	1,988	1,988	1,988	1,988
MINING	H | GULF COAST AQUIFER | CHAMBERS COUNTY	956	956	956	956	956	956
LIVESTOCK	H | GULF COAST AQUIFER | CHAMBERS COUNTY	83	83	83	83	83	83
IRRIGATION	H | GULF COAST AQUIFER | CHAMBERS COUNTY	60	60	60	60	60	60
IRRIGATION	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	9,800	9,800	9,800	9,800	9,800	9,800
TRINITY BASIN TOTAL EXISTING SUPPLY		**16,626**	**17,290**	**17,818**	**18,070**	**18,358**	**18,660**
TRINITY-SAN JACINTO BASIN							
BAYTOWN	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	796	917	1,036	1,157	1,279	1,403
BEACH CITY	H | GULF COAST AQUIFER | CHAMBERS COUNTY	253	253	253	253	253	253
MONT BELVIEU	H | GULF COAST AQUIFER | CHAMBERS COUNTY	505	641	727	727	727	727
COUNTY-OTHER	H | GULF COAST AQUIFER | CHAMBERS COUNTY	514	598	689	791	903	1,022
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,231	1,231	1,231	1,231	1,231	1,231
MANUFACTURING	H | GULF COAST AQUIFER | CHAMBERS COUNTY	156	156	156	156	156	156
MANUFACTURING	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	30,920	30,920	30,920	30,920	30,920	30,920
MINING	H | GULF COAST AQUIFER | CHAMBERS COUNTY	1,237	1,237	1,237	1,237	1,237	1,237
STEAM ELECTRIC POWER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,120	1,120	1,120	1,120	1,120	1,120
STEAM ELECTRIC POWER	H | TRINITY-SAN JACINTO RUN-OF-RIVER SALINE	30,000	30,000	30,000	30,000	30,000	30,000
LIVESTOCK	H | GULF COAST AQUIFER | CHAMBERS COUNTY	159	159	159	159	112	73
IRRIGATION	H | GULF COAST AQUIFER | CHAMBERS COUNTY	20	20	20	20	20	0
IRRIGATION	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,000	2,000	2,000	2,000	2,000	2,000
IRRIGATION	H | TRINITY-SAN JACINTO RUN-OF-RIVER	1,213	1,213	1,213	1,213	1,213	1,213
TRINITY-SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**70,124**	**70,465**	**70,761**	**70,984**	**71,171**	**71,355**
CHAMBERS COUNTY TOTAL EXISTING SUPPLY		**220,681**	**222,027**	**223,211**	**224,094**	**225,014**	**225,973**
FORT BEND COUNTY							
BRAZOS BASIN							
BEASLEY	H | GULF COAST AQUIFER | FORT BEND COUNTY	4	6	8	11	15	20
FAIRCHILDS	H | GULF COAST AQUIFER | FORT BEND COUNTY	64	77	76	79	88	103

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
FORT BEND COUNTY **BRAZOS BASIN**							
FORT BEND COUNTY MUD #25	H | DIRECT REUSE	51	51	51	51	51	51
FORT BEND COUNTY MUD #25	H | GULF COAST AQUIFER | FORT BEND COUNTY	72	43	39	36	33	31
FULSHEAR	H | GULF COAST AQUIFER | FORT BEND COUNTY	63	70	78	83	88	90
MISSOURI CITY	H | BRAZOS RUN-OF-RIVER	644	723	776	801	813	810
MISSOURI CITY	H | GULF COAST AQUIFER | FORT BEND COUNTY	399	291	359	405	423	416
NEEDVILLE	H | GULF COAST AQUIFER | FORT BEND COUNTY	93	96	84	78	75	72
PECAN GROVE MUD #1	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	3,770	3,768	3,768	3,767	3,765	3,764
PECAN GROVE MUD #1	H | BRAZOS RUN-OF-RIVER	2,217	2,228	2,240	2,251	2,262	2,274
PECAN GROVE MUD #1	H | GULF COAST AQUIFER | FORT BEND COUNTY	952	565	499	459	428	401
PLANTATION MUD	H | GULF COAST AQUIFER | FORT BEND COUNTY	284	207	182	166	154	144
PLEAK	H | GULF COAST AQUIFER | FORT BEND COUNTY	76	52	49	48	47	47
RICHMOND	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	1,962	1,932	1,902	1,872	1,842	1,814
RICHMOND	H | GULF COAST AQUIFER | FORT BEND COUNTY	964	594	548	532	523	516
ROSENBERG	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	4,069	4,001	3,931	3,860	3,789	3,716
ROSENBERG	H | DIRECT REUSE	29	29	29	29	29	29
ROSENBERG	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,997	1,137	1,067	1,033	1,028	1,035
SIMONTON	H | GULF COAST AQUIFER | FORT BEND COUNTY	71	86	99	106	111	113
SUGAR LAND	H | BRAZOS RUN-OF-RIVER	5,068	5,026	5,193	5,364	5,510	5,591
SUGAR LAND	H | GULF COAST AQUIFER | FORT BEND COUNTY	6,722	4,136	4,119	4,177	4,214	4,137
SUGAR LAND	H | SAN JACINTO-BRAZOS RUN-OF-RIVER	3,061	3,036	3,137	3,241	3,329	3,377
NORTH FORT BEND WATER AUTHORITY	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,015	988	4,514	5,892	6,131	5,823
NORTH FORT BEND WATER AUTHORITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	776	917	3,620	4,640	4,931	4,894
FORT BEND COUNTY MUD #116	H | GULF COAST AQUIFER | FORT BEND COUNTY	276	190	201	206	212	216
FORT BEND COUNTY MUD #129	H | BRAZOS RUN-OF-RIVER	349	349	349	349	349	349
FORT BEND COUNTY MUD #129	H | GULF COAST AQUIFER | FORT BEND COUNTY	316	275	316	345	356	333
FORT BEND COUNTY MUD #121	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	344	344	344	344	344	344
FORT BEND COUNTY MUD #121	H | GULF COAST AQUIFER | FORT BEND COUNTY	188	122	130	138	147	153
GREATWOOD	H | GULF COAST AQUIFER | FORT BEND COUNTY	999	752	674	619	579	543
SIENNA PLANTATION	H | BRAZOS RUN-OF-RIVER	959	963	868	813	777	770
SIENNA PLANTATION	H | GULF COAST AQUIFER | FORT BEND COUNTY	563	438	483	526	567	609
WESTON LAKES	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,127	1,274	1,241	1,227	1,225	1,220

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
FORT BEND COUNTY							
BRAZOS BASIN							
COUNTY-OTHER	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	742	742	742	742	742	742
COUNTY-OTHER	H | BRAZOS RUN-OF-RIVER	99	99	99	99	99	99
COUNTY-OTHER	H | GULF COAST AQUIFER | FORT BEND COUNTY	9,222	10,621	10,891	12,429	14,797	17,751
MANUFACTURING	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	314	314	314	314	314	314
MANUFACTURING	H | BRAZOS RUN-OF-RIVER	509	500	491	482	473	464
MANUFACTURING	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,110	702	651	610	539	477
MINING	H | BRAZOS RUN-OF-RIVER	465	447	429	411	393	378
MINING	H | GULF COAST AQUIFER | FORT BEND COUNTY	28	31	21	14	9	6
STEAM ELECTRIC POWER	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	83,000	83,000	83,000	83,000	83,000	83,000
STEAM ELECTRIC POWER	H | BRAZOS RUN-OF-RIVER	46,631	46,829	47,027	47,225	47,423	47,621
LIVESTOCK	H | GULF COAST AQUIFER | FORT BEND COUNTY	395	420	379	349	326	304
IRRIGATION	H | BRAZOS RUN-OF-RIVER	12,000	12,000	12,000	12,000	12,000	12,000
IRRIGATION	H | GULF COAST AQUIFER | FORT BEND COUNTY	7,109	7,572	6,828	6,290	5,868	5,483
BRAZOS BASIN TOTAL EXISTING SUPPLY		**201,168**	**198,043**	**203,846**	**207,513**	**210,218**	**212,444**
BRAZOS-COLORADO BASIN							
BEASLEY	H | GULF COAST AQUIFER | FORT BEND COUNTY	49	54	53	55	60	67
NEEDVILLE	H | GULF COAST AQUIFER | FORT BEND COUNTY	112	116	103	96	93	92
ROSENBERG	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	1	4	9	15	21	30
ROSENBERG	H | GULF COAST AQUIFER | FORT BEND COUNTY	1	1	3	5	7	10
COUNTY-OTHER	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,020	1,778	1,932	1,780	1,660	1,551
MINING	H | GULF COAST AQUIFER | FORT BEND COUNTY	11	12	8	5	3	2
LIVESTOCK	H | GULF COAST AQUIFER | FORT BEND COUNTY	139	149	134	123	115	108
IRRIGATION	H | GULF COAST AQUIFER | FORT BEND COUNTY	13,160	14,019	12,641	11,645	10,863	10,150
BRAZOS-COLORADO BASIN TOTAL EXISTING SUPPLY		**14,493**	**16,133**	**14,883**	**13,724**	**12,822**	**12,010**
SAN JACINTO BASIN							
HOUSTON	H | GULF COAST AQUIFER | FORT BEND COUNTY	2,440	1,568	1,441	1,359	1,296	1,228
HOUSTON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	445	1,601	1,833	2,044	2,235	2,385
HOUSTON	H | SAN JACINTO INDIRECT REUSE	2,239	2,239	2,239	2,239	2,239	2,239
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	H | GULF COAST AQUIFER | FORT BEND COUNTY	347	59	50	45	44	44
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	635	621	584	552	545	540
KATY	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,132	1,462	1,318	1,215	1,136	1,064
MISSOURI CITY	H | BRAZOS RUN-OF-RIVER	1,988	1,950	1,924	1,865	1,833	1,832
MISSOURI CITY	H | GULF COAST AQUIFER | FORT BEND COUNTY	746	518	526	507	488	476
STAFFORD	H | BRAZOS RUN-OF-RIVER	508	518	529	540	554	569
STAFFORD	H | GULF COAST AQUIFER | FORT BEND COUNTY	244	1	16	31	49	67

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
FORT BEND COUNTY							
SAN JACINTO BASIN							
SUGAR LAND	H | BRAZOS RUN-OF-RIVER	372	341	321	304	290	282
SUGAR LAND	H | GULF COAST AQUIFER | FORT BEND COUNTY	534	322	288	265	247	230
SUGAR LAND	H | SAN JACINTO-BRAZOS RUN-OF-RIVER	225	206	194	183	175	170
NORTH FORT BEND WATER AUTHORITY	H | GULF COAST AQUIFER | FORT BEND COUNTY	15,742	11,310	10,404	9,671	9,099	8,592
NORTH FORT BEND WATER AUTHORITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	11,238	9,741	8,215	7,535	7,247	7,153
MEADOWS PLACE	H | GULF COAST AQUIFER | FORT BEND COUNTY	685	575	517	479	449	423
COUNTY-OTHER	H | GULF COAST AQUIFER | FORT BEND COUNTY	63	47	50	49	48	46
MANUFACTURING	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,367	863	801	752	664	587
LIVESTOCK	H | GULF COAST AQUIFER | FORT BEND COUNTY	47	50	45	42	39	36
IRRIGATION	H | GULF COAST AQUIFER | FORT BEND COUNTY	387	412	372	343	320	299
SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**41,384**	**34,404**	**31,667**	**30,020**	**28,997**	**28,262**
SAN JACINTO-BRAZOS BASIN							
HOUSTON	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,572	965	910	873	845	816
HOUSTON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,730	2,366	2,571	2,751	2,915	3,071
ARCOLA	H | GULF COAST AQUIFER | FORT BEND COUNTY	144	135	147	158	165	171
FORT BEND COUNTY MUD #23	H | GULF COAST AQUIFER | FORT BEND COUNTY	897	688	631	592	561	534
FORT BEND COUNTY MUD #25	H | DIRECT REUSE	354	354	354	354	354	354
FORT BEND COUNTY MUD #25	H | GULF COAST AQUIFER | FORT BEND COUNTY	505	304	275	256	243	231
FULSHEAR	H | GULF COAST AQUIFER | FORT BEND COUNTY	874	678	631	596	568	540
MISSOURI CITY	H | BRAZOS RUN-OF-RIVER	5,460	5,454	5,460	5,508	5,520	5,503
MISSOURI CITY	H | GULF COAST AQUIFER | FORT BEND COUNTY	4,096	2,876	3,058	3,235	3,270	3,194
PEARLAND	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	544	539	658	784	911	1,028
PECAN GROVE MUD #1	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	30	31	30	30	30	30
PECAN GROVE MUD #1	H | BRAZOS RUN-OF-RIVER	18	18	18	18	18	18
PECAN GROVE MUD #1	H | GULF COAST AQUIFER | FORT BEND COUNTY	7	4	4	4	3	3
STAFFORD	H | BRAZOS RUN-OF-RIVER	1,223	1,211	1,200	1,190	1,176	1,161
STAFFORD	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,393	835	763	717	686	660
SUGAR LAND	H | BRAZOS RUN-OF-RIVER	3,894	3,967	3,820	3,666	3,534	3,461
SUGAR LAND	H | GULF COAST AQUIFER | FORT BEND COUNTY	5,572	3,713	3,404	3,172	2,980	2,810
SUGAR LAND	H | SAN JACINTO-BRAZOS RUN-OF-RIVER	2,352	2,396	2,307	2,214	2,134	2,091
NORTH FORT BEND WATER AUTHORITY	H | GULF COAST AQUIFER | FORT BEND COUNTY	10,201	9,609	9,626	9,601	9,512	9,314
NORTH FORT BEND WATER AUTHORITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	9,166	10,699	9,605	9,300	9,313	9,450
MEADOWS PLACE	H | GULF COAST AQUIFER | FORT BEND COUNTY	65	54	48	44	41	39
SIENNA PLANTATION	H | BRAZOS RUN-OF-RIVER	2,604	2,600	2,695	2,750	2,786	2,793

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
FORT BEND COUNTY							
SAN JACINTO-BRAZOS BASIN							
SIENNA PLANTATION	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,529	1,181	1,499	1,780	2,033	2,209
COUNTY-OTHER	H | DIRECT REUSE	916	916	916	916	916	916
COUNTY-OTHER	H | GULF COAST AQUIFER | FORT BEND COUNTY	5,896	3,902	4,137	4,362	4,548	4,681
MANUFACTURING	H | BRAZOS RUN-OF-RIVER	647	647	647	647	647	647
MANUFACTURING	H | DIRECT REUSE	524	524	524	524	524	524
MANUFACTURING	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,795	1,133	1,051	987	871	770
MINING	H | GULF COAST AQUIFER | FORT BEND COUNTY	7	4	3	2	1	1
LIVESTOCK	H | GULF COAST AQUIFER | FORT BEND COUNTY	135	143	129	119	111	104
IRRIGATION	H | GULF COAST AQUIFER | FORT BEND COUNTY	1,682	1,792	1,616	1,489	1,389	1,298
IRRIGATION	H | SAN JACINTO-BRAZOS RUN-OF-RIVER	165	165	165	165	165	165
SAN JACINTO-BRAZOS BASIN TOTAL EXISTING SUPPLY		**65,997**	**59,903**	**58,902**	**58,804**	**58,770**	**58,587**
FORT BEND COUNTY TOTAL EXISTING SUPPLY		**323,042**	**308,483**	**309,298**	**310,061**	**310,807**	**311,303**
GALVESTON COUNTY							
NECHES-TRINITY BASIN							
BOLIVAR PENINSULA SUD	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	6,000	6,000	6,000	6,000	6,000	6,000
COUNTY-OTHER	H | GULF COAST AQUIFER | GALVESTON COUNTY	1	1	1	1	1	2
MINING	H | GULF COAST AQUIFER | GALVESTON COUNTY	7	7	8	8	9	8
LIVESTOCK	H | GULF COAST AQUIFER | GALVESTON COUNTY	5	5	5	5	5	5
IRRIGATION	H | GULF COAST AQUIFER | GALVESTON COUNTY	2	2	2	2	2	2
NECHES-TRINITY BASIN TOTAL EXISTING SUPPLY		**6,015**	**6,015**	**6,016**	**6,016**	**6,017**	**6,017**
SAN JACINTO-BRAZOS BASIN							
GALVESTON	H | BRAZOS RUN-OF-RIVER	18,813	18,933	19,050	19,167	19,282	19,397
GALVESTON	H | DIRECT REUSE	337	337	337	337	337	337
GALVESTON	H | GULF COAST AQUIFER | GALVESTON COUNTY	1,429	1,584	1,573	1,568	1,574	1,585
BACLIFF MUD	H | BRAZOS RUN-OF-RIVER	1,081	1,088	1,095	1,101	1,108	1,115
BACLIFF MUD	H | DIRECT REUSE	68	68	68	68	68	68
BACLIFF MUD	H | GULF COAST AQUIFER | GALVESTON COUNTY	7	7	7	7	7	7
BAYOU VISTA	H | BRAZOS RUN-OF-RIVER	409	411	414	416	419	422
BAYOU VISTA	H | GULF COAST AQUIFER | GALVESTON COUNTY	24	25	23	21	20	20
CLEAR LAKE SHORES	H | BRAZOS RUN-OF-RIVER	333	334	337	339	341	343
DICKINSON	H | BRAZOS RUN-OF-RIVER	2,644	2,667	2,691	2,714	2,737	2,761
DICKINSON	H | GULF COAST AQUIFER | GALVESTON COUNTY	177	193	186	183	183	184
FRIENDSWOOD	H | GULF COAST AQUIFER | GALVESTON COUNTY	420	464	464	469	483	501
FRIENDSWOOD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	9,398	9,049	8,933	8,847	8,802	8,760
HITCHCOCK	H | BRAZOS RUN-OF-RIVER	1,363	1,371	1,380	1,388	1,397	1,405
HITCHCOCK	H | GULF COAST AQUIFER | GALVESTON COUNTY	32	32	32	32	32	32
JAMAICA BEACH	H | BRAZOS RUN-OF-RIVER	261	259	259	260	263	266
KEMAH	H | BRAZOS RUN-OF-RIVER	478	481	484	487	490	493
KEMAH	H | GULF COAST AQUIFER | GALVESTON COUNTY	102	140	137	133	130	128
LA MARQUE	H | BRAZOS RUN-OF-RIVER	2,527	2,543	2,558	2,574	2,589	2,605

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
GALVESTON COUNTY							
SAN JACINTO-BRAZOS BASIN							
LA MARQUE	H | GULF COAST AQUIFER | GALVESTON COUNTY	270	304	288	275	267	260
LEAGUE CITY	H | BRAZOS RUN-OF-RIVER	2,938	2,949	2,960	2,971	2,983	2,993
LEAGUE CITY	H | DIRECT REUSE	540	540	540	540	540	540
LEAGUE CITY	H | GULF COAST AQUIFER | GALVESTON COUNTY	1,221	1,423	1,446	1,449	1,436	1,412
LEAGUE CITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	17,838	17,836	17,844	17,853	17,854	17,853
SAN LEON MUD	H | BRAZOS RUN-OF-RIVER	1,623	1,632	1,641	1,652	1,662	1,672
SAN LEON MUD	H | GULF COAST AQUIFER | GALVESTON COUNTY	1	1	1	1	1	1
SANTA FE	H | BRAZOS RUN-OF-RIVER	908	914	920	926	932	937
SANTA FE	H | GULF COAST AQUIFER | GALVESTON COUNTY	146	155	148	143	141	140
TEXAS CITY	H | BRAZOS RUN-OF-RIVER	9,100	9,158	9,216	9,275	9,333	9,392
TEXAS CITY	H | GULF COAST AQUIFER | GALVESTON COUNTY	609	684	679	674	677	678
TIKI ISLAND	H | BRAZOS RUN-OF-RIVER	327	329	330	333	335	337
COUNTY-OTHER	H | BRAZOS RUN-OF-RIVER	217	218	219	220	222	224
COUNTY-OTHER	H | DIRECT REUSE	82	82	82	82	82	82
COUNTY-OTHER	H | GULF COAST AQUIFER | GALVESTON COUNTY	219	251	251	253	257	260
MANUFACTURING	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	25,817	25,976	26,137	26,295	26,455	26,615
MANUFACTURING	H | BRAZOS RUN-OF-RIVER	30,054	30,240	30,425	30,608	30,788	30,972
MANUFACTURING	H | GULF COAST AQUIFER | GALVESTON COUNTY	334	334	334	334	334	334
MINING	H | GULF COAST AQUIFER | GALVESTON COUNTY	26	29	31	32	32	33
LIVESTOCK	H | GULF COAST AQUIFER | GALVESTON COUNTY	17	18	17	16	16	15
IRRIGATION	H | GULF COAST AQUIFER | GALVESTON COUNTY	208	208	208	208	208	208
IRRIGATION	H | SAN JACINTO-BRAZOS RUN-OF-RIVER	36	36	36	36	36	36
SAN JACINTO-BRAZOS BASIN TOTAL EXISTING SUPPLY		**132,434**	**133,303**	**133,781**	**134,287**	**134,853**	**135,423**
GALVESTON COUNTY TOTAL EXISTING SUPPLY		**138,449**	**139,318**	**139,797**	**140,303**	**140,870**	**141,440**
HARRIS COUNTY							
SAN JACINTO BASIN							
HOUSTON	H | DIRECT REUSE	1,452	1,452	1,452	1,452	1,452	1,452
HOUSTON	H | GULF COAST AQUIFER | HARRIS COUNTY	97,453	75,551	73,378	74,321	76,064	77,998
HOUSTON	H | HOUSTON LAKE/RESERVOIR	35,902	35,902	35,902	35,902	35,902	35,902
HOUSTON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	273,383	269,002	267,109	263,571	259,676	255,308
HOUSTON	H | SAN JACINTO RUN-OF-RIVER	5,785	5,785	5,785	5,785	5,785	5,785
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	H | GULF COAST AQUIFER | HARRIS COUNTY	50,674	33,075	23,255	23,050	22,952	22,740
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	H | HOUSTON LAKE/RESERVOIR	34,828	34,828	34,828	34,828	34,828	34,828
PASADENA	H | GULF COAST AQUIFER | HARRIS COUNTY	1,052	1,159	1,598	1,553	1,535	1,517
PASADENA	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	29,496	29,552	29,611	29,668	29,719	29,770

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
HARRIS COUNTY							
SAN JACINTO BASIN							
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	H | GULF COAST AQUIFER | HARRIS COUNTY	27,950	17,275	11,177	11,484	11,327	11,125
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	31,341	31,355	31,392	31,424	31,431	31,436
BAYTOWN	H | GULF COAST AQUIFER | HARRIS COUNTY	25	27	37	36	35	35
BAYTOWN	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	512	507	503	500	496	492
BELLAIRE	H | GULF COAST AQUIFER | HARRIS COUNTY	456	534	784	810	847	886
BELLAIRE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	3,043	3,236	3,463	3,735	4,056	4,411
BLUE BELL MANOR UTILITY COMPANY	H | GULF COAST AQUIFER | HARRIS COUNTY	387	301	299	292	288	283
BUNKER HILL VILLAGE	H | GULF COAST AQUIFER | HARRIS COUNTY	195	229	336	346	359	373
BUNKER HILL VILLAGE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,301	1,387	1,485	1,596	1,722	1,858
CHIMNEY HILL MUD	H | DIRECT REUSE	5	5	5	5	5	5
CHIMNEY HILL MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	244	150	101	96	94	92
CHIMNEY HILL MUD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	175	341	447	446	451	458
CROSBY MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	38	42	58	56	55	55
CROSBY MUD	H | SAN JACINTO RUN-OF-RIVER	988	988	988	988	988	988
DEER PARK	H | GULF COAST AQUIFER | HARRIS COUNTY	81	89	120	115	113	110
DEER PARK	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,214	1,210	1,196	1,198	1,213	1,232
EL DORADO UD	H | GULF COAST AQUIFER | HARRIS COUNTY	156	119	117	113	109	105
FOUNTAINVIEW SUBDIVISION	H | GULF COAST AQUIFER | HARRIS COUNTY	74	44	29	28	27	26
GALENA PARK	H | GULF COAST AQUIFER | HARRIS COUNTY	50	53	71	68	66	65
GALENA PARK	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	912	912	912	912	912	912
GREEN TRAILS MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	333	254	249	239	231	222
HARRIS COUNTY MUD #11	H | DIRECT REUSE	5	5	5	5	5	5
HARRIS COUNTY MUD #11	H | GULF COAST AQUIFER | HARRIS COUNTY	199	153	150	146	142	139
HARRIS COUNTY MUD #132	H | GULF COAST AQUIFER | HARRIS COUNTY	538	411	402	385	372	357
HARRIS COUNTY MUD #151	H | GULF COAST AQUIFER | HARRIS COUNTY	606	466	457	437	422	405
HARRIS COUNTY MUD #152	H | GULF COAST AQUIFER | HARRIS COUNTY	663	513	507	489	474	459
HARRIS COUNTY MUD #153	H | GULF COAST AQUIFER | HARRIS COUNTY	719	550	539	516	497	478
HARRIS COUNTY MUD #154	H | GULF COAST AQUIFER | HARRIS COUNTY	447	342	336	324	315	307
HARRIS COUNTY MUD #158	H | GULF COAST AQUIFER | HARRIS COUNTY	224	137	91	87	83	79

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HARRIS COUNTY							
SAN JACINTO BASIN							
HARRIS COUNTY MUD #158	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	160	311	404	398	398	398
HARRIS COUNTY MUD #180	H | GULF COAST AQUIFER | HARRIS COUNTY	308	243	240	229	220	212
HARRIS COUNTY MUD #189	H | GULF COAST AQUIFER | HARRIS COUNTY	214	166	165	160	156	153
HARRIS COUNTY MUD #345	H | GULF COAST AQUIFER | HARRIS COUNTY	471	362	355	340	327	316
HARRIS COUNTY MUD #46	H | GULF COAST AQUIFER | HARRIS COUNTY	398	303	296	283	272	262
HARRIS COUNTY MUD #5	H | GULF COAST AQUIFER | HARRIS COUNTY	213	135	94	94	96	99
HARRIS COUNTY MUD #5	H | HOUSTON LAKE/RESERVOIR	152	305	418	435	462	491
HARRIS COUNTY MUD #50	H | GULF COAST AQUIFER | HARRIS COUNTY	114	69	48	46	44	43
HARRIS COUNTY MUD #50	H | SAN JACINTO RUN-OF-RIVER	560	560	560	560	560	560
HARRIS COUNTY MUD #8	H | GULF COAST AQUIFER | HARRIS COUNTY	58	61	81	76	73	71
HARRIS COUNTY MUD #8	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	388	370	354	354	352	352
HARRIS COUNTY UD #14	H | GULF COAST AQUIFER | HARRIS COUNTY	122	99	100	99	100	103
HARRIS COUNTY UD #15	H | GULF COAST AQUIFER | HARRIS COUNTY	312	249	250	249	250	248
HARRIS COUNTY WCID #1	H | GULF COAST AQUIFER | HARRIS COUNTY	241	148	102	101	100	100
HARRIS COUNTY WCID #1	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	754	754	753	753	753	753
HARRIS COUNTY WCID #133	H | GULF COAST AQUIFER | HARRIS COUNTY	394	299	296	290	288	286
HEDWIG VILLAGE	H | GULF COAST AQUIFER | HARRIS COUNTY	177	207	303	311	322	332
HEDWIG VILLAGE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,182	1,258	1,342	1,435	1,540	1,654
HILSHIRE VILLAGE	H | GULF COAST AQUIFER | HARRIS COUNTY	82	53	39	42	44	47
HILSHIRE VILLAGE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	59	122	174	191	210	233
HUMBLE	H | GULF COAST AQUIFER | HARRIS COUNTY	1,127	834	633	651	661	662
HUMBLE	H | HOUSTON LAKE/RESERVOIR	806	1,894	2,794	3,002	3,170	3,298
HUNTERS CREEK VILLAGE	H | GULF COAST AQUIFER | HARRIS COUNTY	282	332	489	504	524	544
HUNTERS CREEK VILLAGE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,882	2,013	2,158	2,323	2,507	2,707
JACINTO CITY	H | GULF COAST AQUIFER | HARRIS COUNTY	93	98	137	134	134	132
JACINTO CITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	889	889	889	889	889	889
JERSEY VILLAGE	H | GULF COAST AQUIFER | HARRIS COUNTY	732	457	315	306	301	295
JERSEY VILLAGE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	829	1,040	1,394	1,411	1,439	1,473
KATY	H | GULF COAST AQUIFER | HARRIS COUNTY	1,924	1,513	1,493	1,446	1,410	1,370
LA PORTE	H | DIRECT REUSE	13	13	13	13	13	13
LA PORTE	H | GULF COAST AQUIFER | HARRIS COUNTY	19	20	28	27	27	26
LA PORTE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	445	452	458	462	468	475

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HARRIS COUNTY							
SAN JACINTO BASIN							
LONGHORN TOWN UD	H | GULF COAST AQUIFER | HARRIS COUNTY	172	133	130	125	120	116
MASON CREEK UD	H | GULF COAST AQUIFER | HARRIS COUNTY	760	576	563	539	519	499
MISSOURI CITY	H | BRAZOS RUN-OF-RIVER	513	478	445	431	439	460
MISSOURI CITY	H | GULF COAST AQUIFER | HARRIS COUNTY	371	259	192	200	211	223
NORTH BELT UD	H | GULF COAST AQUIFER | HARRIS COUNTY	204	156	153	148	144	141
NORTH GREEN MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	285	218	213	205	198	191
NORTHWEST PARK MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	1,845	1,443	1,426	1,387	1,360	1,331
PARKWAY UD	H | GULF COAST AQUIFER | HARRIS COUNTY	62	70	94	89	87	83
PARKWAY UD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	416	422	416	413	414	417
PINEY POINT VILLAGE	H | GULF COAST AQUIFER | HARRIS COUNTY	209	251	376	394	418	442
PINEY POINT VILLAGE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,394	1,518	1,658	1,822	2,003	2,203
SOUTH HOUSTON	H | DIRECT REUSE	29	29	29	29	29	29
SOUTH HOUSTON	H | GULF COAST AQUIFER | HARRIS COUNTY	233	255	350	341	338	336
SOUTH HOUSTON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	4,139	4,139	4,139	4,139	4,139	4,139
SOUTHSIDE PLACE	H | GULF COAST AQUIFER | HARRIS COUNTY	32	36	53	53	55	57
SOUTHSIDE PLACE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	210	219	230	245	263	282
SPRING VALLEY	H | GULF COAST AQUIFER | HARRIS COUNTY	628	502	500	492	491	488
STAFFORD	H | BRAZOS RUN-OF-RIVER	30	32	32	31	31	31
STAFFORD	H | GULF COAST AQUIFER | HARRIS COUNTY	31	21	14	14	14	14
SUNBELT FWSD	H | GULF COAST AQUIFER | HARRIS COUNTY	1,014	782	768	745	734	723
SUNBELT FWSD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	486	507	853	900	975	1,062
THE WOODLANDS	H | DIRECT REUSE	183	183	183	183	183	183
THE WOODLANDS	H | GULF COAST AQUIFER | HARRIS COUNTY	2,786	2,258	1,980	1,994	2,000	1,993
TOMBALL	H | GULF COAST AQUIFER | HARRIS COUNTY	1,346	883	629	623	620	614
TRAIL OF THE LAKES MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	625	488	476	457	441	425
WALLER	H | GULF COAST AQUIFER | HARRIS COUNTY	35	22	15	16	16	17
WALLER	H | GULF COAST AQUIFER | WALLER COUNTY	25	50	70	72	77	82
WEST HARRIS COUNTY MUD #6	H | GULF COAST AQUIFER | HARRIS COUNTY	196	156	152	147	144	139
WINDFERN FOREST UD	H | GULF COAST AQUIFER | HARRIS COUNTY	353	219	148	141	135	130
WINDFERN FOREST UD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	253	498	655	650	650	650
WOODCREEK MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	173	131	128	122	119	114
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	H | GULF COAST AQUIFER | HARRIS COUNTY	2,008	1,342	958	954	959	963

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
HARRIS COUNTY							
SAN JACINTO BASIN							
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	H | HOUSTON LAKE/RESERVOIR	2,374	2,374	2,374	2,374	2,374	2,374
NORTH FORT BEND WATER AUTHORITY	H | GULF COAST AQUIFER | HARRIS COUNTY	814	511	351	337	327	315
NORTH FORT BEND WATER AUTHORITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	660	483	400	365	349	343
WEST UNIVERSITY PLACE	H | GULF COAST AQUIFER | HARRIS COUNTY	346	400	579	592	614	636
WEST UNIVERSITY PLACE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,308	2,423	2,562	2,733	2,939	3,167
HARRIS COUNTY MUD #119	H | GULF COAST AQUIFER | HARRIS COUNTY	302	229	224	216	210	203
GREENWOOD UD	H | GULF COAST AQUIFER | HARRIS COUNTY	43	53	72	68	67	65
GREENWOOD UD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	287	318	316	316	319	322
KINGS MANOR MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	44	28	19	18	18	17
KINGS MANOR MUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	27	26	20	15	9	5
MOUNT HOUSTON ROAD MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	297	257	257	257	254	249
HARRIS COUNTY MUD #278	H | GULF COAST AQUIFER | HARRIS COUNTY	579	527	492	471	453	435
HARRIS COUNTY MUD #400 - WEST	H | GULF COAST AQUIFER | HARRIS COUNTY	470	377	373	364	354	342
HARRIS COUNTY MUD #49	H | GULF COAST AQUIFER | HARRIS COUNTY	273	213	209	202	195	189
HARRIS COUNTY MUD #49	H | HOUSTON LAKE/RESERVOIR	142	142	241	246	252	257
HARRIS COUNTY MUD #96	H | GULF COAST AQUIFER | HARRIS COUNTY	244	156	113	115	118	119
HARRIS COUNTY MUD #96	H | HOUSTON LAKE/RESERVOIR	175	355	500	533	566	590
HARRIS COUNTY MUD #148 - KINGSLAKE	H | GULF COAST AQUIFER | HARRIS COUNTY	32	36	50	48	46	45
HARRIS COUNTY MUD #148 - KINGSLAKE	H | HOUSTON LAKE/RESERVOIR	215	221	219	219	221	222
HARRIS COUNTY WCID #74	H | GULF COAST AQUIFER | HARRIS COUNTY	470	364	359	347	338	329
NEWPORT MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	397	252	175	171	168	165
NEWPORT MUD	H | SAN JACINTO RUN-OF-RIVER	896	896	896	896	896	896
THE COMMONS WATER SUPPLY INC	H | GULF COAST AQUIFER | HARRIS COUNTY	215	170	167	162	157	152
HARRIS COUNTY MUD #106	H | GULF COAST AQUIFER | HARRIS COUNTY	780	605	599	580	564	545
HARRIS COUNTY MUD #290	H | GULF COAST AQUIFER | HARRIS COUNTY	365	287	285	276	268	260
HARRIS COUNTY MUD #221	H | GULF COAST AQUIFER | HARRIS COUNTY	239	192	189	183	179	174

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
HARRIS COUNTY							
SAN JACINTO BASIN							
HARRIS COUNTY WCID #96	H | GULF COAST AQUIFER | HARRIS COUNTY	814	560	384	368	354	340
HARRIS COUNTY WCID #96	H | HOUSTON LAKE/RESERVOIR	583	1,274	1,698	1,697	1,695	1,694
NORTH CHANNEL WATER AUTHORITY	H | GULF COAST AQUIFER | HARRIS COUNTY	1,224	1,347	1,853	1,797	1,768	1,733
NORTH CHANNEL WATER AUTHORITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	8,891	8,891	8,891	8,891	8,891	8,891
COUNTY-OTHER	H | DIRECT REUSE	233	233	233	233	233	233
COUNTY-OTHER	H | GULF COAST AQUIFER | HARRIS COUNTY	12,384	9,998	9,137	8,843	9,114	9,311
COUNTY-OTHER	H | HOUSTON LAKE/RESERVOIR	609	609	609	609	609	609
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	52,995	52,995	52,995	52,995	52,995	52,995
MANUFACTURING	H | DIRECT REUSE	25	25	25	25	25	25
MANUFACTURING	H | GULF COAST AQUIFER | HARRIS COUNTY	15,446	17,953	25,759	25,483	24,155	22,850
MANUFACTURING	H | HOUSTON LAKE/RESERVOIR	54,650	54,650	54,650	54,650	54,650	54,650
MANUFACTURING	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	155,153	155,153	155,153	155,153	155,153	155,153
MANUFACTURING	H | SAN JACINTO RUN-OF-RIVER	331	331	331	331	331	331
MANUFACTURING	H | TRINITY RUN-OF-RIVER	26,510	26,510	26,510	26,510	26,510	26,510
MINING	H | GULF COAST AQUIFER | HARRIS COUNTY	174	191	257	244	233	222
STEAM ELECTRIC POWER	H | GULF COAST AQUIFER | HARRIS COUNTY	1,341	1,727	2,786	3,155	3,613	4,127
STEAM ELECTRIC POWER	H | HOUSTON LAKE/RESERVOIR	4,849	4,849	4,849	4,849	4,849	4,849
STEAM ELECTRIC POWER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	15,826	15,826	15,826	15,826	15,826	15,826
LIVESTOCK	H | GULF COAST AQUIFER | HARRIS COUNTY	603	388	277	266	257	247
IRRIGATION	H | GULF COAST AQUIFER | HARRIS COUNTY	3,913	4,311	5,912	5,661	5,454	5,244
IRRIGATION	H | SAN JACINTO RUN-OF-RIVER	2,734	2,734	2,734	2,734	2,734	2,734
IRRIGATION	H | SAN JACINTO-BRAZOS RUN-OF-RIVER	388	388	388	388	388	388
SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**1,012,022**	**954,684**	**947,675**	**945,533**	**943,576**	**941,250**
SAN JACINTO-BRAZOS BASIN							
HOUSTON	H | GULF COAST AQUIFER | HARRIS COUNTY	2,566	3,221	4,948	5,280	5,644	6,026
HOUSTON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	11,292	13,872	15,324	18,470	22,009	26,071
PASADENA	H | GULF COAST AQUIFER | HARRIS COUNTY	316	345	472	455	446	438
PASADENA	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	10,542	10,486	10,427	10,370	10,319	10,268
DEER PARK	H | GULF COAST AQUIFER | HARRIS COUNTY	176	198	279	275	275	274
DEER PARK	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,645	2,702	2,771	2,855	2,960	3,066
EL LAGO	H | GULF COAST AQUIFER | HARRIS COUNTY	19	20	27	26	25	24
EL LAGO	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	331	323	315	314	310	306
FRIENDSWOOD	H | GULF COAST AQUIFER | HARRIS COUNTY	252	327	493	518	544	572
FRIENDSWOOD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	4,042	4,391	4,507	4,593	4,638	4,680

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HARRIS COUNTY							
SAN JACINTO-BRAZOS BASIN							
HARRIS COUNTY MUD #55	H | GULF COAST AQUIFER | HARRIS COUNTY	605	385	268	266	278	293
HARRIS COUNTY MUD #55	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	3,878	3,878	3,878	3,878	3,878	3,878
LA PORTE	H | DIRECT REUSE	183	183	183	183	183	183
LA PORTE	H | GULF COAST AQUIFER | HARRIS COUNTY	270	290	394	376	366	356
LA PORTE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	6,410	6,403	6,397	6,393	6,387	6,380
LEAGUE CITY	H | DIRECT REUSE	15	15	15	15	15	15
LEAGUE CITY	H | GULF COAST AQUIFER | HARRIS COUNTY	23	28	42	42	41	40
LEAGUE CITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	642	644	636	627	626	627
NASSAU BAY	H | GULF COAST AQUIFER | HARRIS COUNTY	64	70	96	93	90	88
NASSAU BAY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,184	2,184	2,184	2,184	2,184	2,184
PEARLAND	H | GULF COAST AQUIFER | HARRIS COUNTY	243	325	531	570	592	601
PEARLAND	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,199	2,496	2,721	2,804	2,954	2,755
SEABROOK	H | GULF COAST AQUIFER | HARRIS COUNTY	111	121	167	160	157	153
SEABROOK	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,909	1,917	1,925	1,926	1,930	1,934
SHOREACRES	H | GULF COAST AQUIFER | HARRIS COUNTY	20	22	30	29	28	27
SHOREACRES	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	363	363	363	363	363	363
TAYLOR LAKE VILLAGE	H | GULF COAST AQUIFER | HARRIS COUNTY	40	43	58	55	54	52
TAYLOR LAKE VILLAGE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,730	1,730	1,730	1,730	1,730	1,730
WEBSTER	H | GULF COAST AQUIFER | HARRIS COUNTY	231	271	390	387	384	378
WEBSTER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	8,921	8,921	8,921	8,921	8,921	8,921
SAGEMEADOW UD	H | GULF COAST AQUIFER | HARRIS COUNTY	87	98	141	143	147	150
SAGEMEADOW UD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	818	818	818	818	818	818
KIRKMONT MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	46	53	77	79	82	85
KIRKMONT MUD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	371	371	371	371	371	371
CLEAR BROOK CITY MUD	H | GULF COAST AQUIFER | HARRIS COUNTY	198	222	320	322	327	329
CLEAR BROOK CITY MUD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,800	2,800	2,800	2,800	2,800	2,800
COUNTY-OTHER	H | DIRECT REUSE	436	436	436	436	436	436
COUNTY-OTHER	H | GULF COAST AQUIFER | HARRIS COUNTY	230	296	452	473	499	520
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,548	2,548	2,548	2,548	2,548	2,548
MANUFACTURING	H | GULF COAST AQUIFER | HARRIS COUNTY	5,090	5,930	8,525	8,445	7,999	7,562
MANUFACTURING	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	77,875	77,875	77,875	77,875	77,875	77,875
MINING	H | GULF COAST AQUIFER | HARRIS COUNTY	12	13	17	16	16	15
STEAM ELECTRIC POWER	H | GULF COAST AQUIFER | HARRIS COUNTY	71	91	147	166	190	218
SAN JACINTO-BRAZOS BASIN TOTAL EXISTING SUPPLY		**152,804**	**157,725**	**165,019**	**168,650**	**172,439**	**176,410**

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
HARRIS COUNTY							
TRINITY-SAN JACINTO BASIN							
HOUSTON	H | GULF COAST AQUIFER | HARRIS COUNTY	21	13	9	9	8	9
HOUSTON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	29	38	42	43	44	44
BAYTOWN	H | GULF COAST AQUIFER | HARRIS COUNTY	544	589	799	767	749	732
BAYTOWN	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	11,062	10,946	10,831	10,713	10,595	10,475
HARRIS COUNTY WCID #1	H | GULF COAST AQUIFER | HARRIS COUNTY	10	6	5	4	4	4
HARRIS COUNTY WCID #1	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	30	30	31	31	31	31
COUNTY-OTHER	H | GULF COAST AQUIFER | HARRIS COUNTY	629	648	823	858	891	919
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,233	1,233	1,233	1,233	1,233	1,233
MANUFACTURING	H | GULF COAST AQUIFER | HARRIS COUNTY	5,599	6,523	9,377	9,289	8,799	8,319
MANUFACTURING	H | HOUSTON LAKE/RESERVOIR	5,500	4,530	3,560	2,590	1,620	650
MANUFACTURING	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,456	1,456	1,456	1,456	1,456	1,456
MANUFACTURING	H | SAN JACINTO INDIRECT REUSE	9,836	9,836	9,836	9,836	9,836	9,836
MANUFACTURING	H | SAN JACINTO RUN-OF-RIVER	1,217	1,217	1,217	1,217	1,217	1,217
MANUFACTURING	H | TRINITY RUN-OF-RIVER	51,328	51,328	51,328	51,328	51,328	51,328
MINING	H | GULF COAST AQUIFER | HARRIS COUNTY	10	11	14	14	13	13
LIVESTOCK	H | GULF COAST AQUIFER | HARRIS COUNTY	16	18	24	23	23	22
IRRIGATION	H | GULF COAST AQUIFER | HARRIS COUNTY	425	468	642	615	592	569
IRRIGATION	H | TRINITY-SAN JACINTO RUN-OF-RIVER	2,198	2,198	2,198	2,198	2,198	2,198
TRINITY-SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**91,143**	**91,088**	**93,425**	**92,224**	**90,637**	**89,055**
HARRIS COUNTY TOTAL EXISTING SUPPLY		**1,255,969**	**1,203,497**	**1,206,119**	**1,206,407**	**1,206,652**	**1,206,715**
LEON COUNTY							
BRAZOS BASIN							
JEWETT	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	63	74	82	94	105	115
NORMANGEE	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	27	28	29	31	33	34
CONCORD-ROBBINS WSC	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	167	168	169	179	188	198
COUNTY-OTHER	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	142	143	145	152	159	165
COUNTY-OTHER	H | QUEEN CITY AQUIFER | LEON COUNTY	77	78	79	83	87	90
MINING	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	721	721	623	459	296	190
LIVESTOCK	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	425	425	425	425	425	425
IRRIGATION	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	71	71	71	71	71	71
BRAZOS BASIN TOTAL EXISTING SUPPLY		**1,693**	**1,708**	**1,623**	**1,494**	**1,364**	**1,288**
TRINITY BASIN							
BUFFALO	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	374	375	375	381	389	397
CENTERVILLE	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	180	189	195	207	218	230
FLO COMMUNITY WSC	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	297	286	278	276	280	284
JEWETT	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	175	202	225	259	288	318
NORMANGEE	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	81	84	86	91	96	102
CONCORD-ROBBINS WSC	H | QUEEN CITY AQUIFER | LEON COUNTY	46	47	47	50	53	55

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
LEON COUNTY							
TRINITY BASIN							
OAKWOOD	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	74	71	70	70	70	70
COUNTY-OTHER	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	502	535	569	627	677	728
COUNTY-OTHER	H | QUEEN CITY AQUIFER | LEON COUNTY	25	25	25	25	25	25
COUNTY-OTHER	H | SPARTA AQUIFER | LEON COUNTY	11	11	11	11	11	11
MANUFACTURING	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	807	834	834	834	834	834
MANUFACTURING	H | DIRECT REUSE	27	27	27	27	27	27
MINING	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	1,681	1,681	1,454	1,071	689	444
LIVESTOCK	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	969	969	969	969	969	969
LIVESTOCK	H | QUEEN CITY AQUIFER | LEON COUNTY	324	324	324	324	324	324
LIVESTOCK	H | SPARTA AQUIFER | LEON COUNTY	10	10	10	10	10	10
IRRIGATION	H | CARRIZO-WILCOX AQUIFER | LEON COUNTY	57	57	57	57	57	57
IRRIGATION	H | TRINITY RUN-OF-RIVER	156	156	156	156	156	156
TRINITY BASIN TOTAL EXISTING SUPPLY		**5,796**	**5,883**	**5,712**	**5,445**	**5,173**	**5,041**
LEON COUNTY TOTAL EXISTING SUPPLY		**7,489**	**7,591**	**7,335**	**6,939**	**6,537**	**6,329**
LIBERTY COUNTY							
NECHES BASIN							
DAISETTA	H | GULF COAST AQUIFER | LIBERTY COUNTY	46	49	53	57	62	67
HARDIN WSC	H | GULF COAST AQUIFER | LIBERTY COUNTY	30	37	44	51	57	63
WEST HARDIN WSC	I | GULF COAST AQUIFER | HARDIN COUNTY	24	27	29	32	34	37
COUNTY-OTHER	H | GULF COAST AQUIFER | LIBERTY COUNTY	105	109	114	119	126	133
MANUFACTURING	H | GULF COAST AQUIFER | LIBERTY COUNTY	176	176	176	176	176	176
MINING	H | GULF COAST AQUIFER | LIBERTY COUNTY	31	31	31	31	31	31
LIVESTOCK	H | GULF COAST AQUIFER | LIBERTY COUNTY	62	62	62	62	62	62
IRRIGATION	H | GULF COAST AQUIFER | LIBERTY COUNTY	100	100	100	100	100	100
NECHES BASIN TOTAL EXISTING SUPPLY		**574**	**591**	**609**	**628**	**648**	**669**
NECHES-TRINITY BASIN							
COUNTY-OTHER	H | GULF COAST AQUIFER | LIBERTY COUNTY	14	15	16	17	19	20
MINING	H | GULF COAST AQUIFER | LIBERTY COUNTY	22	22	22	22	22	22
LIVESTOCK	H | GULF COAST AQUIFER | LIBERTY COUNTY	21	21	21	21	21	21
IRRIGATION	H | GULF COAST AQUIFER | LIBERTY COUNTY	25	25	25	25	25	25
IRRIGATION	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	5,400	5,400	5,400	5,400	5,400	5,400
IRRIGATION	H | TRINITY RUN-OF-RIVER	1,067	1,067	1,067	1,067	1,067	1,067
IRRIGATION	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	23,000	23,000	23,000	23,000	23,000	23,000
NECHES-TRINITY BASIN TOTAL EXISTING SUPPLY		**29,549**	**29,550**	**29,551**	**29,552**	**29,554**	**29,555**
SAN JACINTO BASIN							
CLEVELAND	H | GULF COAST AQUIFER | LIBERTY COUNTY	1,551	1,539	1,531	1,537	1,555	1,575
PLUM GROVE	H | GULF COAST AQUIFER | LIBERTY COUNTY	81	87	94	102	110	118
TARKINGTON SUD	H | GULF COAST AQUIFER | LIBERTY COUNTY	320	363	406	452	499	543
COUNTY-OTHER	H | GULF COAST AQUIFER | LIBERTY COUNTY	1,641	1,861	2,065	2,099	2,099	2,099
MANUFACTURING	H | GULF COAST AQUIFER | LIBERTY COUNTY	128	128	128	128	128	128

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
LIBERTY COUNTY							
SAN JACINTO BASIN							
MINING	H | GULF COAST AQUIFER | LIBERTY COUNTY	79	79	79	79	79	79
LIVESTOCK	H | GULF COAST AQUIFER | LIBERTY COUNTY	84	84	84	84	84	84
IRRIGATION	H | GULF COAST AQUIFER | LIBERTY COUNTY	50	50	50	50	50	50
SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**3,934**	**4,191**	**4,437**	**4,531**	**4,604**	**4,676**
TRINITY BASIN							
AMES	H | GULF COAST AQUIFER | LIBERTY COUNTY	100	106	112	121	131	140
DAISETTA	H | GULF COAST AQUIFER | LIBERTY COUNTY	82	89	95	103	111	119
DAYTON	H | GULF COAST AQUIFER | LIBERTY COUNTY	2,266	2,889	3,489	4,100	4,694	5,264
HARDIN	H | GULF COAST AQUIFER | LIBERTY COUNTY	122	134	146	160	173	187
HARDIN WSC	H | GULF COAST AQUIFER | LIBERTY COUNTY	410	504	596	692	788	880
KENEFICK	H | GULF COAST AQUIFER | LIBERTY COUNTY	76	83	89	97	104	112
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | GULF COAST AQUIFER | LIBERTY COUNTY	196	258	319	380	438	494
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	97	114	128	141	153	163
LIBERTY	H | GULF COAST AQUIFER | LIBERTY COUNTY	1,543	1,620	1,698	1,790	1,892	1,992
OLD RIVER-WINFREE	H | GULF COAST AQUIFER | LIBERTY COUNTY	16	17	18	20	21	23
TARKINGTON SUD	H | GULF COAST AQUIFER | LIBERTY COUNTY	96	109	122	135	149	163
WOODLAND HILLS WATER COMPANY	H | GULF COAST AQUIFER | LIBERTY COUNTY	500	661	818	980	1,138	1,290
COUNTY-OTHER	H | GULF COAST AQUIFER | LIBERTY COUNTY	2,300	2,000	1,740	1,517	1,327	1,151
MANUFACTURING	H | GULF COAST AQUIFER | LIBERTY COUNTY	62	62	62	62	62	62
MINING	H | GULF COAST AQUIFER | LIBERTY COUNTY	94	94	94	94	94	94
LIVESTOCK	H | GULF COAST AQUIFER | LIBERTY COUNTY	267	267	267	267	267	267
IRRIGATION	H | GULF COAST AQUIFER | LIBERTY COUNTY	353	353	353	353	353	353
IRRIGATION	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	5,601	5,601	5,601	5,601	5,601	5,601
IRRIGATION	H | TRINITY RUN-OF-RIVER	16,292	16,292	16,292	16,292	16,292	16,292
TRINITY BASIN TOTAL EXISTING SUPPLY		**30,473**	**31,253**	**32,039**	**32,905**	**33,788**	**34,647**
TRINITY-SAN JACINTO BASIN							
DAYTON	H | GULF COAST AQUIFER | LIBERTY COUNTY	7	9	11	13	15	16
COUNTY-OTHER	H | GULF COAST AQUIFER | LIBERTY COUNTY	377	408	436	470	507	545
MINING	H | GULF COAST AQUIFER | LIBERTY COUNTY	26	26	26	26	26	26
LIVESTOCK	H | GULF COAST AQUIFER | LIBERTY COUNTY	20	20	20	20	20	20
IRRIGATION	H | GULF COAST AQUIFER | LIBERTY COUNTY	1,363	1,363	1,363	1,363	1,363	1,363
IRRIGATION	H | TRINITY-SAN JACINTO RUN-OF-RIVER	1,905	1,905	1,905	1,905	1,905	1,905
TRINITY-SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**3,698**	**3,731**	**3,761**	**3,797**	**3,836**	**3,875**
LIBERTY COUNTY TOTAL EXISTING SUPPLY		**68,228**	**69,316**	**70,397**	**71,413**	**72,430**	**73,422**

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
MADISON COUNTY							
BRAZOS BASIN							
COUNTY-OTHER	H | SPARTA AQUIFER | MADISON COUNTY	207	216	226	238	250	250
MINING	H | CARRIZO-WILCOX AQUIFER | MADISON COUNTY	119	119	119	108	65	39
LIVESTOCK	H | CARRIZO-WILCOX AQUIFER | MADISON COUNTY	152	152	152	152	152	152
IRRIGATION	H | CARRIZO-WILCOX AQUIFER | MADISON COUNTY	2	2	2	2	2	2
BRAZOS BASIN TOTAL EXISTING SUPPLY		**480**	**489**	**499**	**500**	**469**	**443**
TRINITY BASIN							
MADISONVILLE	H | SPARTA AQUIFER | MADISON COUNTY	870	909	947	998	1,053	1,107
NORMANGEE	H | CARRIZO-WILCOX AQUIFER | MADISON COUNTY	14	14	15	16	17	17
COUNTY-OTHER	H | CARRIZO-WILCOX AQUIFER | MADISON COUNTY	13	14	14	15	16	17
COUNTY-OTHER	H | QUEEN CITY AQUIFER | MADISON COUNTY	59	92	123	164	208	303
COUNTY-OTHER	H | SPARTA AQUIFER | MADISON COUNTY	1,453	1,453	1,453	1,453	1,453	1,453
COUNTY-OTHER	H | YEGUA-JACKSON AQUIFER | MADISON COUNTY	76	117	156	209	265	270
MANUFACTURING	H | SPARTA AQUIFER | MADISON COUNTY	226	226	226	226	226	226
MINING	H | CARRIZO-WILCOX AQUIFER | MADISON COUNTY	478	478	478	430	258	155
STEAM ELECTRIC POWER		0	0	0	0	0	0
LIVESTOCK	H | CARRIZO-WILCOX AQUIFER | MADISON COUNTY	553	553	553	553	553	553
LIVESTOCK	H | SPARTA AQUIFER | MADISON COUNTY	130	130	130	130	130	130
LIVESTOCK	H | YEGUA-JACKSON AQUIFER | MADISON COUNTY	189	189	189	189	189	189
IRRIGATION	H | SPARTA AQUIFER | MADISON COUNTY	14	14	14	14	14	14
IRRIGATION	H | TRINITY RUN-OF-RIVER	169	169	169	169	169	169
TRINITY BASIN TOTAL EXISTING SUPPLY		**4,244**	**4,358**	**4,467**	**4,566**	**4,551**	**4,603**
MADISON COUNTY TOTAL EXISTING SUPPLY		**4,724**	**4,847**	**4,966**	**5,066**	**5,020**	**5,046**
MONTGOMERY COUNTY							
SAN JACINTO BASIN							
HOUSTON	H | GULF COAST AQUIFER | HARRIS COUNTY	0	277	712	1,135	1,556	1,678
HOUSTON	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	1,098	1,098	1,098	1,098	1,098	1,098
CLEVELAND	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	24	24	24	24	24	24
CONROE	H | CONROE LAKE/RESERVOIR	8,624	8,624	8,624	8,624	8,624	8,624
CONROE	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	4,108	4,108	4,108	4,108	4,108	4,108
CUT AND SHOOT	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	180	180	180	180	180	180
EAST PLANTATION UD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	181	181	181	181	181	181
MAGNOLIA	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	629	629	629	629	629	629
MONTGOMERY COUNTY MUD #18	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	958	958	958	958	958	958
MONTGOMERY COUNTY MUD #18	H | GULF COAST AQUIFER BRACKISH | MONTGOMERY COUNTY	868	1,071	1,071	1,071	1,071	1,071

EXISTING WATER SUPPLY

REGION H		EXISTING SUPPLY (ACRE-FEET PER YEAR)					
	SOURCE REGION | SOURCE NAME	2020	2030	2040	2050	2060	2070
MONTGOMERY COUNTY							
SAN JACINTO BASIN							
MONTGOMERY COUNTY MUD #19	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	359	359	359	359	359	359
MONTGOMERY COUNTY MUD #8	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	545	545	545	545	545	545
MONTGOMERY COUNTY MUD #8	H | GULF COAST AQUIFER BRACKISH | MONTGOMERY COUNTY	340	340	340	340	340	340
MONTGOMERY COUNTY MUD #9	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	448	448	448	448	448	448
MONTGOMERY COUNTY MUD #9	H | GULF COAST AQUIFER BRACKISH | MONTGOMERY COUNTY	388	388	388	388	388	388
MONTGOMERY COUNTY UD #2	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	264	264	264	264	264	264
MONTGOMERY COUNTY UD #3	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	235	235	235	235	235	235
MONTGOMERY COUNTY UD #3	H | GULF COAST AQUIFER BRACKISH | MONTGOMERY COUNTY	277	295	336	356	354	250
MONTGOMERY COUNTY UD #4	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	228	228	228	228	228	228
MONTGOMERY COUNTY UD #4	H | GULF COAST AQUIFER BRACKISH | MONTGOMERY COUNTY	527	626	702	743	745	849
MONTGOMERY COUNTY WCID #1	H | CONROE LAKE/RESERVOIR	195	195	195	195	195	195
MONTGOMERY COUNTY WCID #1	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	57	57	57	57	57	57
NEW CANEY MUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	629	629	629	629	629	629
OAK RIDGE NORTH	H | CONROE LAKE/RESERVOIR	375	375	375	375	375	375
OAK RIDGE NORTH	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	162	162	162	162	162	162
PANORAMA VILLAGE	H | DIRECT REUSE	43	43	43	43	43	43
PANORAMA VILLAGE	H | GULF COAST AQUIFER BRACKISH | MONTGOMERY COUNTY	518	518	518	518	518	518
PATTON VILLAGE	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	115	115	115	115	115	115
POINT AQUARIUS MUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	293	293	293	293	293	293
RAYFORD ROAD MUD	H | CONROE LAKE/RESERVOIR	642	642	642	642	642	642
RAYFORD ROAD MUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	304	304	304	304	304	304
RIVER PLANTATION MUD	H | DIRECT REUSE	236	236	236	236	236	236
RIVER PLANTATION MUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	452	452	452	452	452	452
ROMAN FOREST	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	244	244	244	244	244	244
SHENANDOAH	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	888	888	888	888	888	888
SOUTHERN MONTGOMERY COUNTY MUD	H | CONROE LAKE/RESERVOIR	668	668	668	668	668	668
SOUTHERN MONTGOMERY COUNTY MUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	184	184	184	184	184	184
SPLENDORA	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	491	491	491	491	491	491

EXISTING WATER SUPPLY

REGION H		EXISTING SUPPLY (ACRE-FEET PER YEAR)					
	SOURCE REGION | SOURCE NAME	2020	2030	2040	2050	2060	2070
MONTGOMERY COUNTY							
SAN JACINTO BASIN							
SPRING CREEK UD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	493	493	493	493	493	493
STANLEY LAKE MUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	377	377	377	377	377	377
STANLEY LAKE MUD	H | GULF COAST AQUIFER BRACKISH | MONTGOMERY COUNTY	440	547	654	706	706	706
THE WOODLANDS	H | CONROE LAKE/RESERVOIR	15,250	15,250	15,250	15,250	15,250	15,250
THE WOODLANDS	H | DIRECT REUSE	1,131	1,131	1,131	1,131	1,131	1,131
THE WOODLANDS	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	7,512	7,512	7,512	7,512	7,512	7,512
THE WOODLANDS	H | SAN JACINTO INDIRECT REUSE	144	144	144	144	144	144
THE WOODLANDS	H | SAN JACINTO RUN-OF-RIVER	116	116	116	116	116	116
WILLIS	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	624	624	624	624	624	624
WOODBRANCH	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	84	84	84	84	84	84
MONTGOMERY	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	482	482	482	482	482	482
STAGECOACH	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	24	24	24	24	24	24
PORTER SUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	619	619	619	619	619	619
BENDERS LANDING WATER SYSTEM	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	1,672	1,672	1,672	1,672	1,672	1,672
DOBBIN-PLANTERSVILLE WSC	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	157	157	157	157	157	157
DOBBIN-PLANTERSVILLE WSC	H | GULF COAST AQUIFER BRACKISH | MONTGOMERY COUNTY	269	269	269	269	269	269
KINGS MANOR MUD	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	224	225	231	236	242	246
LAKE WINDCREST WATER SYSTEM	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	700	700	700	700	700	700
INDIGO LAKE WATER SYSTEM	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	866	866	866	866	866	866
MONTGOMERY COUNTY MUD #89	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	587	587	587	587	587	587
MONTGOMERY COUNTY MUD #94	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	452	452	452	452	452	452
MONTGOMERY COUNTY MUD #83	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	329	329	329	329	329	329
WESTWOOD NORTH WSC	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	268	268	268	268	268	268
MONTGOMERY COUNTY MUD #15	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	380	380	380	380	380	380
COUNTY-OTHER	H | CONROE LAKE/RESERVOIR	1,129	1,129	1,129	1,129	1,129	1,129
COUNTY-OTHER	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	22,936	22,936	22,936	22,936	22,936	22,936
MANUFACTURING	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	1,408	1,408	1,408	1,408	1,408	1,408
MINING	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	1,110	1,110	1,110	1,110	1,110	1,110
STEAM ELECTRIC POWER	H | CONROE LAKE/RESERVOIR	7,841	7,841	7,841	7,841	7,841	7,841
STEAM ELECTRIC POWER	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	6,345	6,345	6,345	6,345	6,345	6,345

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
MONTGOMERY COUNTY							
SAN JACINTO BASIN							
LIVESTOCK	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	398	398	398	398	398	398
IRRIGATION	H | CONROE LAKE/RESERVOIR	1,145	1,145	1,145	1,145	1,145	1,145
IRRIGATION	H | GULF COAST AQUIFER | MONTGOMERY COUNTY	479	479	479	479	479	479
IRRIGATION	H | SAN JACINTO RUN-OF-RIVER	25	25	25	25	25	25
SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**102,793**	**103,498**	**104,163**	**104,704**	**105,131**	**105,257**
MONTGOMERY COUNTY TOTAL EXISTING SUPPLY		**102,793**	**103,498**	**104,163**	**104,704**	**105,131**	**105,257**
POLK COUNTY							
TRINITY BASIN							
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | GULF COAST AQUIFER | POLK COUNTY	1,066	1,178	1,275	1,357	1,425	1,479
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	528	519	512	505	497	488
LIVINGSTON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	5,600	5,600	5,600	5,600	5,600	5,600
ONALASKA	H | GULF COAST AQUIFER | POLK COUNTY	316	390	449	501	544	579
COUNTY-OTHER	H | GULF COAST AQUIFER | POLK COUNTY	1,942	2,047	2,131	2,218	2,305	2,381
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	30	30	30	30	30	30
MINING	H | GULF COAST AQUIFER | POLK COUNTY	92	92	72	46	21	9
MINING	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	32	32	32	32	32	32
LIVESTOCK	H | GULF COAST AQUIFER | POLK COUNTY	144	144	144	144	144	144
TRINITY BASIN TOTAL EXISTING SUPPLY		**9,750**	**10,032**	**10,245**	**10,433**	**10,598**	**10,742**
POLK COUNTY TOTAL EXISTING SUPPLY		**9,750**	**10,032**	**10,245**	**10,433**	**10,598**	**10,742**
SAN JACINTO COUNTY							
SAN JACINTO BASIN							
COLDSPRING	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	40	42	45	47	50	52
SAN JACINTO SUD	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	68	70	72	77	81	85
SAN JACINTO SUD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	80	79	79	80	80	80
COUNTY-OTHER	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	1,317	1,413	1,490	1,586	1,672	1,752
MANUFACTURING	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	11	12	13	14	15	16
MINING	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	6	6	6	6	6	6
LIVESTOCK	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	193	193	193	193	193	193
IRRIGATION	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	130	130	130	130	130	130
SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**1,845**	**1,945**	**2,028**	**2,133**	**2,227**	**2,314**
TRINITY BASIN							
COLDSPRING	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	78	84	87	94	98	103

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
SAN JACINTO COUNTY							
TRINITY BASIN							
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	271	295	316	340	359	377
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	134	130	127	127	125	124
POINT BLANK	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	89	95	99	105	111	116
RIVERSIDE WSC	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	39	43	46	49	52	54
RIVERSIDE WSC	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	8	8	8	8	8	8
SHEPHERD	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	314	334	349	370	390	409
SAN JACINTO SUD	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	169	177	182	192	203	212
SAN JACINTO SUD	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	200	201	201	200	200	200
COUNTY-OTHER	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	758	812	856	912	962	1,008
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	336	336	336	336	336	336
MINING	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	2	2	2	2	2	2
LIVESTOCK	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	193	193	193	193	193	193
IRRIGATION	H | GULF COAST AQUIFER | SAN JACINTO COUNTY	65	65	65	65	65	65
IRRIGATION	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	120	120	120	120	120	120
TRINITY BASIN TOTAL EXISTING SUPPLY		**2,776**	**2,895**	**2,987**	**3,113**	**3,224**	**3,327**
SAN JACINTO COUNTY TOTAL EXISTING SUPPLY		**4,621**	**4,840**	**5,015**	**5,246**	**5,451**	**5,641**
TRINITY COUNTY							
TRINITY BASIN							
GROVETON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	342	344	342	340	342	340
GROVETON	H | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	35	36	35	34	35	36
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	133	131	127	122	121	121
TRINITY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,196	1,196	1,196	1,196	1,196	1,196
TRINITY RURAL WSC	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	348	347	346	344	344	344
TRINITY RURAL WSC	H | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	128	128	128	128	128	128
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	405	404	404	404	405	404
MINING		0	0	0	0	0	0
LIVESTOCK	H | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	249	249	249	249	249	249
TRINITY BASIN TOTAL EXISTING SUPPLY		**2,836**	**2,835**	**2,827**	**2,817**	**2,820**	**2,818**
TRINITY COUNTY TOTAL EXISTING SUPPLY		**2,836**	**2,835**	**2,827**	**2,817**	**2,820**	**2,818**

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
WALKER COUNTY							
SAN JACINTO BASIN							
HUNTSVILLE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	16,101	16,101	16,101	16,102	16,101	16,100
NEW WAVERLY	H | GULF COAST AQUIFER | WALKER COUNTY	181	184	185	188	192	195
WALKER COUNTY SUD	H | GULF COAST AQUIFER | WALKER COUNTY	447	461	470	483	495	506
COUNTY-OTHER	H | GULF COAST AQUIFER | WALKER COUNTY	1,727	1,764	1,770	1,770	1,770	1,770
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,603	1,640	1,666	1,691	1,709	1,723
MANUFACTURING	H | GULF COAST AQUIFER | WALKER COUNTY	293	293	293	293	293	293
MINING	H | GULF COAST AQUIFER | WALKER COUNTY	5	5	5	5	5	5
LIVESTOCK	H | GULF COAST AQUIFER | WALKER COUNTY	306	306	306	306	306	306
IRRIGATION	H | GULF COAST AQUIFER | WALKER COUNTY	320	320	320	320	320	320
SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**20,983**	**21,074**	**21,116**	**21,158**	**21,191**	**21,218**
TRINITY BASIN							
HUNTSVILLE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	3,299	3,299	3,299	3,298	3,299	3,300
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | GULF COAST AQUIFER | WALKER COUNTY	27	28	29	30	30	31
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	14	12	12	11	10	10
RIVERSIDE WSC	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	67	67	67	67	67	67
RIVERSIDE WSC	H | YEGUA-JACKSON AQUIFER | WALKER COUNTY	350	386	412	436	455	470
TRINITY RURAL WSC	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	27	28	29	31	31	31
WALKER COUNTY SUD	H | GULF COAST AQUIFER | WALKER COUNTY	298	308	314	322	331	338
WALKER COUNTY SUD	H | YEGUA-JACKSON AQUIFER | WALKER COUNTY	298	307	313	321	330	338
RIVERSIDE	H | GULF COAST AQUIFER | WALKER COUNTY	45	45	45	45	45	45
RIVERSIDE	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	10	10	10	10	10	10
THE CONSOLIDATED WSC	I | HOUSTON COUNTY LAKE/RESERVOIR	10	10	11	12	12	13
COUNTY-OTHER	H | GULF COAST AQUIFER | WALKER COUNTY	1,242	1,207	1,181	1,162	1,155	1,151
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,397	1,360	1,334	1,309	1,291	1,277
COUNTY-OTHER	H | YEGUA-JACKSON AQUIFER | WALKER COUNTY	263	255	249	246	244	243
MANUFACTURING	H | GULF COAST AQUIFER | WALKER COUNTY	19	19	19	19	19	19
MANUFACTURING	H | TRINITY RUN-OF-RIVER	337	337	337	337	337	337
MINING	H | GULF COAST AQUIFER | WALKER COUNTY	6	6	6	6	6	6
LIVESTOCK	H | GULF COAST AQUIFER | WALKER COUNTY	137	137	137	137	137	137
LIVESTOCK	H | QUEEN CITY AQUIFER | WALKER COUNTY	62	62	62	62	62	62
LIVESTOCK	H | YEGUA-JACKSON AQUIFER | WALKER COUNTY	147	147	147	147	147	147

EXISTING WATER SUPPLY

REGION H	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
WALKER COUNTY							
TRINITY BASIN							
IRRIGATION	H | GULF COAST AQUIFER | WALKER COUNTY	50	50	50	50	50	50
IRRIGATION	H | TRINITY RUN-OF-RIVER	102	102	102	102	102	102
IRRIGATION	H | YEGUA-JACKSON AQUIFER | WALKER COUNTY	203	203	203	203	203	203
TRINITY BASIN TOTAL EXISTING SUPPLY		**8,410**	**8,385**	**8,368**	**8,363**	**8,373**	**8,387**
WALKER COUNTY TOTAL EXISTING SUPPLY		**29,393**	**29,459**	**29,484**	**29,521**	**29,564**	**29,605**
WALLER COUNTY							
BRAZOS BASIN							
BROOKSHIRE	H | GULF COAST AQUIFER | WALLER COUNTY	663	782	921	1,080	1,262	1,460
HEMPSTEAD	H | GULF COAST AQUIFER | WALLER COUNTY	1,304	1,490	1,703	1,944	2,011	2,011
PINE ISLAND	H | GULF COAST AQUIFER | WALLER COUNTY	144	144	144	144	144	144
PRAIRIE VIEW	H | GULF COAST AQUIFER | WALLER COUNTY	1,436	1,669	1,934	2,232	2,567	2,933
G & W WSC	H | GULF COAST AQUIFER | WALLER COUNTY	111	146	187	231	281	335
COUNTY-OTHER	H | GULF COAST AQUIFER | WALLER COUNTY	1,470	1,756	2,054	2,132	2,132	2,132
MANUFACTURING	H | GULF COAST AQUIFER | WALLER COUNTY	115	115	115	115	115	115
MINING	H | GULF COAST AQUIFER | WALLER COUNTY	4	4	4	4	4	4
LIVESTOCK	H | GULF COAST AQUIFER | WALLER COUNTY	824	824	824	824	824	824
IRRIGATION	G | BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	50	50	50	50	50	50
IRRIGATION	H | BRAZOS RUN-OF-RIVER	61	61	61	61	61	61
IRRIGATION	H | GULF COAST AQUIFER | WALLER COUNTY	6,901	6,901	6,901	6,901	6,901	6,901
BRAZOS BASIN TOTAL EXISTING SUPPLY		**13,083**	**13,942**	**14,898**	**15,718**	**16,352**	**16,970**
SAN JACINTO BASIN							
KATY	H | GULF COAST AQUIFER | WALLER COUNTY	354	434	527	628	742	866
PRAIRIE VIEW	H | GULF COAST AQUIFER | WALLER COUNTY	131	152	176	202	233	266
WALLER	H | GULF COAST AQUIFER | WALLER COUNTY	356	379	407	440	479	523
G & W WSC	H | GULF COAST AQUIFER | WALLER COUNTY	339	448	571	709	861	1,028
COUNTY-OTHER	H | GULF COAST AQUIFER | WALLER COUNTY	1,575	1,817	2,099	2,422	2,790	2,846
MANUFACTURING	H | GULF COAST AQUIFER | WALLER COUNTY	19	21	23	25	27	29
MINING	H | GULF COAST AQUIFER | WALLER COUNTY	3	3	3	3	3	3
LIVESTOCK	H | GULF COAST AQUIFER | WALLER COUNTY	245	245	245	245	245	245
IRRIGATION	H | GULF COAST AQUIFER | WALLER COUNTY	14,084	14,084	14,084	14,084	14,084	14,084
SAN JACINTO BASIN TOTAL EXISTING SUPPLY		**17,106**	**17,583**	**18,135**	**18,758**	**19,464**	**19,890**
WALLER COUNTY TOTAL EXISTING SUPPLY		**30,189**	**31,525**	**33,033**	**34,476**	**35,816**	**36,860**
	REGION H TOTAL EXISTING SUPPLY	**2,505,970**	**2,447,689**	**2,458,865**	**2,467,295**	**2,475,087**	**2,482,311**

SOURCE WATER BALANCE (AVAILABILITY - WUG SUPPLY)

REGION H

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
BRAZOS RIVER ALLUVIUM AQUIFER	AUSTIN	BRAZOS	FRESH	7,944	7,944	7,944	7,944	7,944	7,944
BRAZOS RIVER ALLUVIUM AQUIFER	WALLER	BRAZOS	FRESH	12,027	12,027	12,027	12,027	12,027	12,027
CARRIZO-WILCOX AQUIFER	LEON	BRAZOS	FRESH	2,807	2,596	2,515	2,524	2,513	2,497
CARRIZO-WILCOX AQUIFER	LEON	TRINITY	FRESH	4,808	5,090	5,673	6,346	6,789	7,017
CARRIZO-WILCOX AQUIFER	MADISON	BRAZOS	FRESH	106	96	77	71	113	139
CARRIZO-WILCOX AQUIFER	MADISON	TRINITY	FRESH	1,422	1,340	1,244	1,205	1,366	1,468
CARRIZO-WILCOX AQUIFER	TRINITY	TRINITY	FRESH	1,101	1,101	1,101	1,101	1,101	1,101
CARRIZO-WILCOX AQUIFER	WALKER	TRINITY	FRESH	2,099	2,099	2,099	2,099	2,099	2,099
GULF COAST AQUIFER	AUSTIN	BRAZOS	FRESH	1,057	933	792	615	408	205
GULF COAST AQUIFER	AUSTIN	BRAZOS-COLORADO	FRESH	7,666	7,236	6,808	6,273	5,986	5,828
GULF COAST AQUIFER	AUSTIN	COLORADO	FRESH	57	53	47	41	33	24
GULF COAST AQUIFER	BRAZORIA	BRAZOS	FRESH	1,147	1,063	1,003	937	865	800
GULF COAST AQUIFER	BRAZORIA	BRAZOS-COLORADO	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	CHAMBERS	NECHES-TRINITY	FRESH	5,865	5,821	5,778	5,731	5,680	5,626
GULF COAST AQUIFER	CHAMBERS	TRINITY	FRESH	3,094	2,466	1,976	1,763	1,525	1,274
GULF COAST AQUIFER	CHAMBERS	TRINITY-SAN JACINTO	FRESH	370	192	60	9	0	0
GULF COAST AQUIFER	FORT BEND	BRAZOS	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	FORT BEND	BRAZOS-COLORADO	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	FORT BEND	SAN JACINTO	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	FORT BEND	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	GALVESTON	NECHES-TRINITY	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	GALVESTON	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	HARRIS	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	HARRIS	TRINITY-SAN JACINTO	FRESH	0	0	0	0	0	0
GULF COAST AQUIFER	LIBERTY	NECHES	FRESH	4,472	4,458	4,443	4,426	4,406	4,386
GULF COAST AQUIFER	LIBERTY	NECHES-TRINITY	FRESH	282	281	280	279	277	276
GULF COAST AQUIFER	LIBERTY	SAN JACINTO	FRESH	1,822	1,552	1,293	1,186	1,099	1,013
GULF COAST AQUIFER	LIBERTY	TRINITY	FRESH	14,545	13,793	13,031	12,190	11,333	10,499
GULF COAST AQUIFER	LIBERTY	TRINITY-SAN JACINTO	FRESH	7,070	7,039	7,011	6,977	6,940	6,902
GULF COAST AQUIFER	MONTGOMERY	SAN JACINTO	FRESH	0	0	0	0	0	0

SOURCE WATER BALANCE (AVAILABILITY - WUG SUPPLY)

REGION H

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
GULF COAST AQUIFER	POLK	TRINITY	FRESH	18,270	17,979	17,712	17,517	17,344	17,191
GULF COAST AQUIFER	SAN JACINTO	SAN JACINTO	FRESH	8,711	8,614	8,536	8,439	8,352	8,271
GULF COAST AQUIFER	SAN JACINTO	TRINITY	FRESH	6,725	6,599	6,499	6,365	6,245	6,135
GULF COAST AQUIFER	WALKER	SAN JACINTO	FRESH	5,831	5,777	5,761	5,745	5,729	5,715
GULF COAST AQUIFER	WALKER	TRINITY	FRESH	7,055	7,079	7,022	7,032	7,030	7,026
GULF COAST AQUIFER	WALLER	BRAZOS	FRESH	3,361	2,724	2,024	1,386	871	383
GULF COAST AQUIFER	WALLER	SAN JACINTO	FRESH	8,163	7,439	6,611	5,804	4,974	4,413
GULF COAST AQUIFER | CATAHOULA FORMATION	MONTGOMERY	SAN JACINTO	BRACKISH	764	337	113	0	0	0
QUEEN CITY AQUIFER	LEON	BRAZOS	FRESH	122	120	119	112	105	100
QUEEN CITY AQUIFER	LEON	TRINITY	FRESH	0	0	0	0	0	0
QUEEN CITY AQUIFER	MADISON	BRAZOS	FRESH	1	1	1	1	1	1
QUEEN CITY AQUIFER	MADISON	TRINITY	FRESH	320	287	256	215	171	76
QUEEN CITY AQUIFER	TRINITY	TRINITY	FRESH	0	0	0	0	0	0
QUEEN CITY AQUIFER	WALKER	TRINITY	FRESH	167	167	167	167	167	167
SAN BERNARD RIVER ALLUVIUM AQUIFER	AUSTIN	BRAZOS-COLORADO	FRESH	520	520	520	520	520	520
SAN JACINTO RIVER ALLUVIUM AQUIFER	WALKER	SAN JACINTO	FRESH	1,450	1,450	1,450	1,450	1,450	1,450
SPARTA AQUIFER	LEON	BRAZOS	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	LEON	TRINITY	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	MADISON	BRAZOS	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	MADISON	TRINITY	FRESH	413	365	317	254	187	133
SPARTA AQUIFER	TRINITY	TRINITY	FRESH	302	302	302	302	302	302
SPARTA AQUIFER	WALKER	SAN JACINTO	FRESH	266	266	266	266	266	266
SPARTA AQUIFER	WALKER	TRINITY	FRESH	2,084	2,084	2,084	2,084	2,084	2,084
TRINITY RIVER ALLUVIUM AQUIFER	WALKER	TRINITY	FRESH	3,913	3,913	3,913	3,913	3,913	3,913
YEGUA-JACKSON AQUIFER	LEON	TRINITY	FRESH	4	4	4	4	4	4
YEGUA-JACKSON AQUIFER	MADISON	BRAZOS	FRESH	63	63	63	63	63	63
YEGUA-JACKSON AQUIFER	MADISON	TRINITY	FRESH	790	749	710	657	601	596
YEGUA-JACKSON AQUIFER	POLK	TRINITY	FRESH	0	0	0	0	0	0
YEGUA-JACKSON AQUIFER	TRINITY	TRINITY	FRESH	1,745	1,743	1,745	1,747	1,745	1,742
YEGUA-JACKSON AQUIFER	WALKER	SAN JACINTO	FRESH	351	351	351	351	351	351
YEGUA-JACKSON AQUIFER	WALKER	TRINITY	FRESH	2,562	2,525	2,499	2,470	2,444	2,422
GROUNDWATER TOTAL SOURCE WATER BALANCE				**153,714**	**148,638**	**144,247**	**140,608**	**137,423**	**134,449**

REGION H

REUSE	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
DIRECT REUSE	FORT BEND	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0

SOURCE WATER BALANCE (AVAILABILITY - WUG SUPPLY)

REGION H

REUSE	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
DIRECT REUSE | ALVIN	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | BACLIFF MUD	GALVESTON	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | CHIMNEY HILL MUD	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | COUNTY-OTHER	FORT BEND	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | COUNTY-OTHER	GALVESTON	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | COUNTY-OTHER	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | COUNTY-OTHER	HARRIS	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | FORT BEND COUNTY MUD #25	FORT BEND	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | FREEPORT	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | GALVESTON	GALVESTON	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | HARRIS COUNTY MUD #11	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | HOUSTON	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | LA PORTE	HARRIS	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | LAKE JACKSON	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | LEAGUE CITY	GALVESTON	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | MANUFACTURING	BRAZORIA	BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | MANUFACTURING	FORT BEND	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | MANUFACTURING	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | MANUFACTURING	LEON	TRINITY	FRESH	0	0	0	0	0	0
DIRECT REUSE | MANVEL	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | MONTGOMERY COUNTY MUD #123	MONTGOMERY	SAN JACINTO	FRESH	69	69	69	69	69	69
DIRECT REUSE | PANORAMA VILLAGE	MONTGOMERY	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | PEARLAND	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	314	1,154	1,154	1,154	1,154	1,154
DIRECT REUSE | RIVER PLANTATION MUD	MONTGOMERY	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | ROSENBERG	FORT BEND	BRAZOS	FRESH	0	0	0	0	0	0
DIRECT REUSE | SOUTH HOUSTON	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | THE WOODLANDS	MONTGOMERY	SAN JACINTO	FRESH	0	0	0	0	0	0
DIRECT REUSE | TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	NECHES-TRINITY	FRESH	0	0	0	0	0	0

SOURCE WATER BALANCE (AVAILABILITY - WUG SUPPLY)

REGION H

REUSE	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
INDIRECT REUSE | HOUSTON	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
INDIRECT REUSE | SJRA	HARRIS	SAN JACINTO	FRESH	5,108	5,108	5,108	5,108	5,108	5,108
INDIRECT REUSE | THE WOODLANDS	MONTGOMERY	SAN JACINTO	FRESH	0	0	0	0	0	0
REUSE TOTAL SOURCE WATER BALANCE				**5,491**	**6,331**	**6,331**	**6,331**	**6,331**	**6,331**

REGION H

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
BRAZOS RUN-OF-RIVER	BRAZORIA	BRAZOS	FRESH	9,743	10,341	10,939	11,537	12,135	12,735
BRAZOS RUN-OF-RIVER	FORT BEND	BRAZOS	FRESH	71,276	72,082	72,888	73,695	74,503	75,311
BRAZOS RUN-OF-RIVER	WALLER	BRAZOS	FRESH	0	0	0	0	0	0
BRAZOS-COLORADO RUN-OF-RIVER	BRAZORIA	BRAZOS-COLORADO	FRESH	0	0	0	0	0	0
CONROE LAKE/RESERVOIR	RESERVOIR	SAN JACINTO	FRESH	43,431	42,671	41,911	41,151	40,391	39,631
HOUSTON LAKE/RESERVOIR	RESERVOIR	SAN JACINTO	FRESH	38,215	35,127	32,478	31,246	30,042	28,886
LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	RESERVOIR	TRINITY	FRESH	397,848	396,185	394,202	393,059	391,669	390,135
NECHES-TRINITY RUN-OF-RIVER	CHAMBERS	NECHES-TRINITY	FRESH	2,663	2,663	2,663	2,663	2,663	2,663
SAN JACINTO RUN-OF-RIVER	HARRIS	SAN JACINTO	FRESH	0	0	0	0	0	0
SAN JACINTO RUN-OF-RIVER	MONTGOMERY	SAN JACINTO	FRESH	0	0	0	0	0	0
SAN JACINTO-BRAZOS RUN-OF-RIVER	BRAZORIA	SAN JACINTO-BRAZOS	FRESH	2,966	2,897	2,828	2,758	2,689	2,620
SAN JACINTO-BRAZOS RUN-OF-RIVER	FORT BEND	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
SAN JACINTO-BRAZOS RUN-OF-RIVER	GALVESTON	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
SAN JACINTO-BRAZOS RUN-OF-RIVER	HARRIS	SAN JACINTO-BRAZOS	FRESH	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	CHAMBERS	TRINITY	FRESH	3,199	3,199	3,199	3,199	3,199	3,199
TRINITY RUN-OF-RIVER	LEON	TRINITY	FRESH	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	LIBERTY	TRINITY	FRESH	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	MADISON	TRINITY	FRESH	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	POLK	TRINITY	FRESH	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	WALKER	TRINITY	FRESH	0	0	0	0	0	0
TRINITY-SAN JACINTO RUN-OF-RIVER	CHAMBERS	TRINITY-SAN JACINTO	SALINE	0	0	0	0	0	0
TRINITY-SAN JACINTO RUN-OF-RIVER	CHAMBERS	TRINITY-SAN JACINTO	FRESH	0	0	0	0	0	0
TRINITY-SAN JACINTO RUN-OF-RIVER	HARRIS	TRINITY-SAN JACINTO	FRESH	0	0	0	0	0	0

SOURCE WATER BALANCE (AVAILABILITY - WUG SUPPLY)

REGION H

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
TRINITY-SAN JACINTO RUN-OF-RIVER	LIBERTY	TRINITY-SAN JACINTO	FRESH	0	0	0	0	0	0
SURFACE WATER TOTAL SOURCE WATER BALANCE				**569,341**	**565,165**	**561,108**	**559,308**	**557,291**	**555,180**
REGION H TOTAL SOURCE WATER BALANCE				**728,546**	**720,134**	**711,686**	**706,247**	**701,045**	**695,960**

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Chapter 4 – Analysis of Needs

4.1 INTRODUCTION

Identification of entities with projected water needs (shortages) and quantification of those needs is a key component of the Regional Planning process, facilitating evaluation and recommendation of water management strategies of the appropriate location and magnitude. Due to its geographic extent, large population, diverse economic base, and complex water supply portfolio, projected needs in Region H occur for a broad range of locations and water use categories. Although some of these needs are associated with the development of new water supplies that produce new sources of raw water, many of the shortages identified require only the development of infrastructure to finish water to the required level of quality (water treatment) or transmission infrastructure to deliver it to the point of demand (conveyance). The process for identification of these needs and a summary of analysis results are presented in the following sections.

4.2 IDENTIFICATION OF NEEDS

4.2.1 Methodology

Projected water demands for all Water User Groups (WUGs) within Region H were assessed as part of Task 2 of the 2016 Regional Water Planning (RWP) process, as described in ***Chapter 2***. Identification and allocation of existing water supplies was performed under Task 3, with supply volumes reflecting source availability, legal and regulatory limits, and contractual arrangements. Needs or surpluses were then determined by comparing existing supplies to projected demands on a WUG-by-WUG basis, with values for each WUG further characterized by county and river basin. This calculation process was executed by Texas Water Development Board (TWDB) based on data entered into the DB17 planning database. Information from DB17 was also used to compile projected needs by Wholesale Water Provider (WWP).

4.2.2 Factors Contributing to Projected Needs

Projected shortages for a WUG or WWP may occur for a number of reasons. Reliability of existing supplies is a significant factor in determining needs, as the Regional Planning process only considers the fully reliable (firm) availability of sources to enable appropriate planning for meeting demands under drought conditions. Additionally, a WUG's access to the reliable portion of an existing supply source may be limited by water rights, regulatory constraints, contracts, or the existing infrastructure in place to extract, convey, or treat supplies. For many WUGs, needs are also impacted by projected growth in demand which exceeds current supply availability by Year 2070. In some cases needs may also be influenced by declining availability of a supply over time due to regulation (for example, regulations limiting groundwater pumpage to a certain percentage of demand) or physical factors (declining quality, reservoir sedimentation, etc.).

4.2.3 Needs Associated with Rule-Based Groundwater Disparity

A disparity between regulatory and planning groundwater supplies was identified in ***Chapter 3*** of this RWP. Due to the differing perspectives of groundwater supply, the RWP demonstrates needs in excess of actual water needs that will be encountered over the planning horizon. These excess demands are referred to as Needs Associated with Rule-Based Groundwater Disparity and are called out separately throughout the RWP wherever possible and, in particular, here in ***Chapter 4*** which addresses needs.

Additionally, water management strategies will be identified in ***Chapter 5*** to address the water needs aside from the Needs Associated with Rule-Based Groundwater Disparity as these needs will not occur under the current regulatory framework. However, it should be noted that tables output from DB17 will continue to include these artificial needs as there is no way to eliminate them from the database output. In these cases, notation will be provided to indicate that Needs Associated with Rule-Based Groundwater Disparity are included in the totals.

It is possible that a portion of the needs associated with this Rule-Based Groundwater Disparity may be eliminated within the existing guidance framework for regional water planning. Currently, Region H is cooperating with Groundwater Management Area 14 (GMA 14) in updating the Desired Future Conditions (DFCs) for the core counties in Region H which will lead to revised estimates of Modeled Available Groundwater (MAG) in those counties. The anticipated effect is that the groundwater availabilities will increase to better reflect the demand and regulatory condition identified in Region H. If this revision were incorporated into the RWP through amendment, this could eliminate as much as 122,987 acre-feet of need in 2020 and 144,215 acre-feet in 2070 within counties that currently have groundwater pumpage limited through local regulation.

4.2.4 Summary of Needs

Projected needs and surpluses for WUGs and WWPs in Region H are included in ***Appendix 4-DB*** to this chapter. Projected needs by water use type are summarized in *Table 4-1* and *Figure 4-1*, with needs by river basin summarized in

Table 4-2 and *Figure 4-2*. Note that the values shown in this table represent total needs, with any surpluses reflected as zero. Also, please note that the values for Polk and Trinity Counties only reflect the portions of those counties within Region H. The geographic location and magnitude of needs throughout the region are shown in *Figure 4-3* through *Figure 4-8*. The needs presented in these figures do not include needs associated with the identified Rule-Based Groundwater Disparity and identify the magnitude of need through the size of the map marker.

Figure 4-1 – Projected Needs by Water Use Type

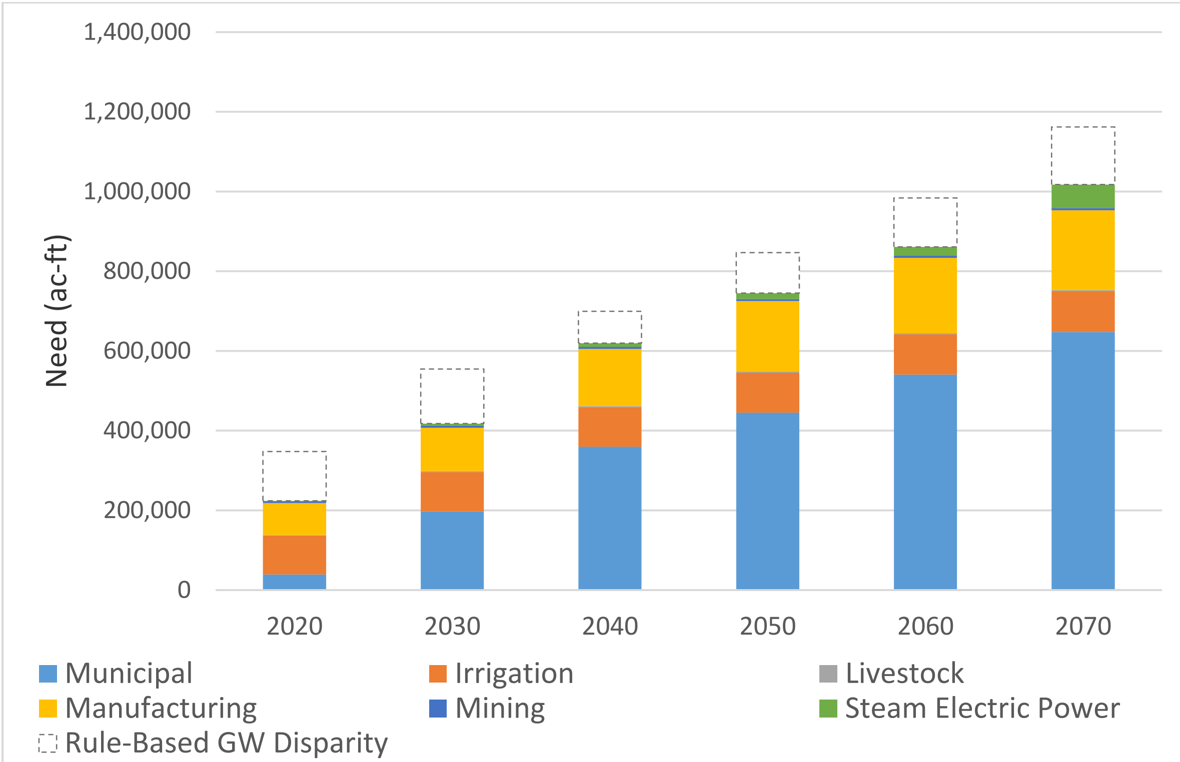


Figure 4-2 – Projected Needs by Basin

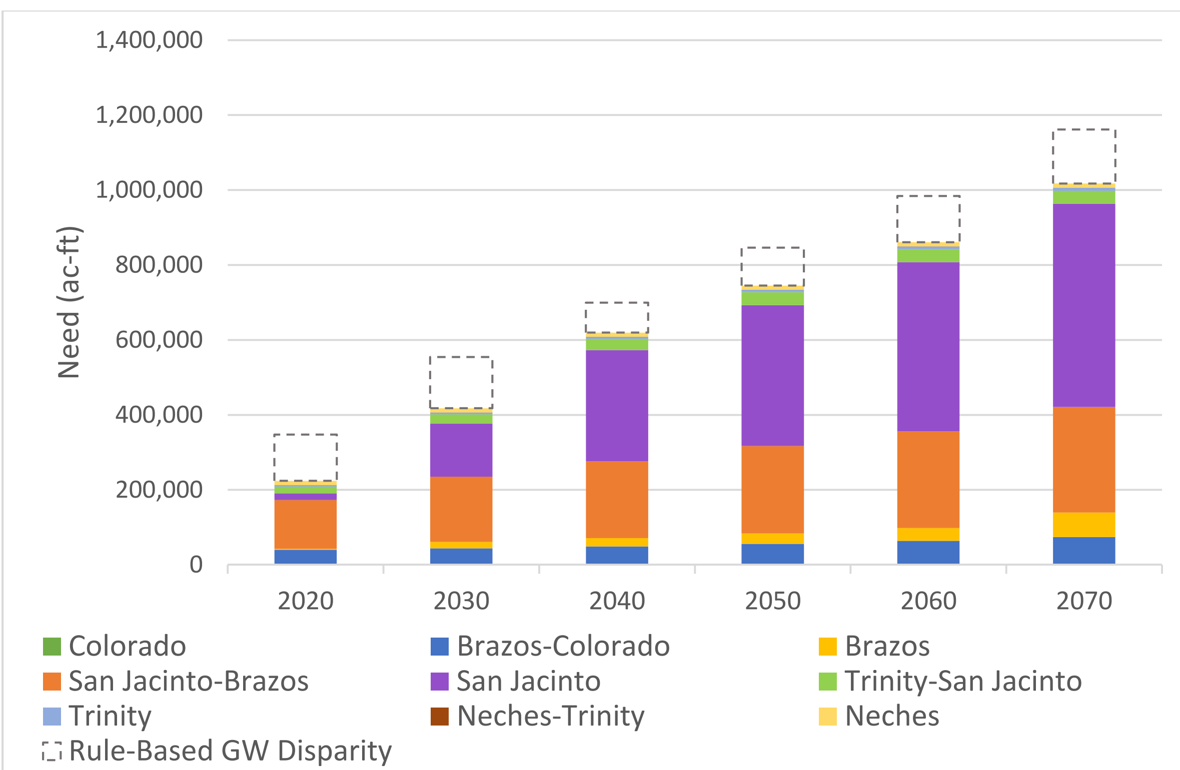


Table 4-1 – Projected Needs by County and Water Use (acre-feet per year)

	2020	2030	2040	2050	2060	2070
Austin						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	7	14	20	30	41
Mining	0	193	130	67	5	0
Municipal	23	72	182	318	802	1,496
Steam Electric Power	0	0	0	0	0	0
Total	23	272	326	405	837	1,537
Brazoria						
Irrigation	71,852	72,844	73,554	74,330	75,169	75,942
Livestock	239	340	414	493	578	658
Manufacturing	63,890	79,809	96,459	113,121	129,794	146,453
Mining	734	972	1,184	1,417	1,664	1,962
Municipal	4,873	9,423	14,082	19,241	25,721	33,219
Total	141,588	163,388	185,693	208,602	232,926	258,234
Chambers						
Irrigation	3,760	3,760	3,760	3,760	3,760	3,780
Livestock	0	0	0	0	47	86
Manufacturing	0	157	315	456	638	835
Mining	112	112	112	112	112	112
Municipal	40	107	409	1,158	1,967	2,819
Steam Electric Power	0	0	0	0	0	0
Total	3,912	4,136	4,596	5,486	6,524	7,632
Fort Bend						
Irrigation	1,941	1,941	1,941	1,941	1,941	1,941
Livestock	0	0	0	0	0	0
Manufacturing	861	3,599	3,769	3,886	3,582	3,294
Mining	4	9	7	5	4	2
Municipal	6,120	56,205	70,390	85,121	98,800	112,381
Steam Electric Power	0	0	0	0	554	26,343
GW Disparity	*33,765*	*30,982*	*45,898*	*57,889*	*68,995*	*80,556*
Total	8,926	61,754	76,107	90,953	104,881	143,961
Total + Disparity	*42,691*	*92,736*	*122,005*	*148,842*	*173,876*	*224,517*

	2020	2030	2040	2050	2060	2070
Galveston						
Irrigation	6,054	6,054	6,054	6,054	6,054	6,054
Livestock	228	228	228	228	228	228
Manufacturing	189	972	1,776	2,609	3,465	4,342
Mining	343	368	405	437	468	500
Municipal	3,731	4,403	4,596	4,820	5,086	5,348
GW Disparity	*129*	*91*	*144*	*197*	*240*	*282*
Total	10,545	12,025	13,059	14,148	15,301	16,472
Total + Disparity	*10,674*	*12,116*	*13,203*	*14,345*	*15,541*	*16,754*
Harris						
Irrigation	0	0	0	0	0	0
Livestock	634	1,053	1,333	1,333	1,333	1,333
Manufacturing	14,765	23,563	40,707	56,268	49,915	43,685
Mining	2,946	2,927	2,875	2,843	2,818	2,798
Municipal	18,301	101,249	219,576	253,021	287,271	323,109
Steam Electric Power	1,061	4,111	8,481	13,809	20,303	28,020
GW Disparity	*77,697*	*93,303*	*19,377*	*28,636*	*36,884*	*46,194*
Total	37,706	132,903	272,972	327,274	361,640	398,945
Total + Disparity	*115,403*	*226,206*	*292,349*	*355,910*	*398,524*	*445,139*
Leon						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	97	222	335	440	554
Mining	0	79	0	0	0	0
Municipal	0	0	0	0	0	0
Total	0	176	222	335	440	554
Liberty						
Irrigation	14,158	14,158	14,158	14,158	14,158	14,158
Livestock	419	419	419	419	419	419
Manufacturing	74	142	212	275	330	390
Mining	185	205	194	216	244	287
Municipal	0	0	0	188	427	660
Total	14,836	14,924	14,983	15,256	15,578	15,914

	2020	2030	2040	2050	2060	2070
Madison						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	21	42	61	85	111
Mining	0	375	157	0	0	0
Municipal	0	0	0	0	1	14
Steam Electric Power	238	278	327	387	459	546
Total	238	674	526	448	545	671
Montgomery						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	292	545	797	1,020	1,264	1,529
Mining	0	0	0	0	0	0
Municipal	5,894	26,122	50,250	80,703	119,402	166,242
Steam Electric Power	0	0	0	0	355	3,464
GW Disparity	*11,396*	*13,150*	*14,235*	*14,552*	*16,933*	*17,183*
Total	6,186	26,667	51,047	81,723	121,021	171,235
Total + Disparity	*17,582*	*39,817*	*65,282*	*96,275*	*137,954*	*188,418*
Polk						
Livestock	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Municipal	0	0	0	0	0	0
Total	0	0	0	0	0	0
San Jacinto						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	1	1	1	1
Municipal	0	0	0	0	0	0
Total	0	0	1	1	1	1
Trinity						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	5	5	5	5	5	5
Municipal	52	80	76	57	79	110
Total	57	85	81	62	84	115

	2020	2030	2040	2050	2060	2070
Walker						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Municipal	21	26	28	30	35	38
Total	21	26	28	30	35	38
Waller						
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	13	26	37	50	64
Mining	0	0	0	0	0	0
Municipal	8	23	71	385	1,040	2,175
Total	8	36	97	422	1,090	2,239
Region H Total						
Irrigation	97,765	98,757	99,467	100,243	101,082	101,875
Livestock	1,520	2,040	2,394	2,473	2,605	2,724
Manufacturing	80,071	108,925	144,339	178,088	189,593	201,298
Mining	4,329	5,245	5,070	5,103	5,321	5,667
Municipal	39,063	197,710	359,660	445,042	540,631	647,611
Steam Electric Power	1,298	4,389	8,808	14,196	22,671	58,373
GW Disparity	*112,987*	*137,526*	*79,654*	*101,274*	*123,052*	*144,215*
Total	224,046	417,066	619,738	745,145	860,903	1,017,548
Total + Disparity	*347,033*	*554,592*	*699,392*	*846,419*	*983,955*	*1,161,763*

Table 4-2 – Projected Needs by County and River Basin (acre-feet per year)

	2020	2030	2040	2050	2060	2070
Austin						
Brazos	23	208	202	203	543	1,126
Brazos-Colorado	0	59	121	200	293	411
Colorado	0	5	3	2	1	0
Total	23	272	326	405	837	1,537
Brazoria						
San Jacinto-Brazos	101,237	118,793	137,039	155,837	175,571	195,961
Brazos	290	473	610	764	930	1,210
Brazos-Colorado	40,061	44,122	48,044	52,001	56,425	61,063
Total	141,588	163,388	185,693	208,602	232,926	258,234
Chambers						
Neches-Trinity	0	0	0	0	0	0
Trinity	2,792	2,972	3,327	4,008	4,774	5,585
Trinity-San Jacinto	1,120	1,164	1,269	1,478	1,750	2,047
Total	3,912	4,136	4,596	5,486	6,524	7,632
Fort Bend						
San Jacinto	1,574	18,966	21,109	22,140	22,618	22,954
San Jacinto-Brazos	4,764	26,858	32,561	38,518	43,212	47,085
Brazos	2,588	15,930	21,241	26,615	31,726	61,262
Brazos-Colorado	0	0	1,196	3,680	7,325	12,660
GW Disparity	*33,765*	*30,982*	*45,898*	*57,889*	*68,995*	*80,556*
Total	8,926	61,754	76,107	90,953	104,881	143,961
Total + Disparity	*42,691*	*92,736*	*122,005*	*148,842*	*173,876*	*224,517*
Galveston						
Neches-Trinity	140	149	156	166	174	183
San Jacinto-Brazos	10,405	11,876	12,903	13,982	15,127	16,289
GW Disparity	*129*	*91*	*144*	*197*	*240*	*282*
Total	10,545	12,025	13,059	14,148	15,301	16,472
Total + Disparity	*10,674*	*12,116*	*13,203*	*14,345*	*15,541*	*16,754*

	2020	2030	2040	2050	2060	2070
Harris						
Trinity-San Jacinto	16,620	22,881	28,640	33,146	32,817	32,514
San Jacinto	7,577	93,293	222,347	269,254	305,373	344,131
San Jacinto-Brazos	13,509	16,729	21,985	24,874	23,450	22,300
GW Disparity	*77,697*	*93,303*	*19,377*	*28,636*	*36,884*	*46,194*
Total	37,706	132,903	272,972	327,274	361,640	398,945
Total + Disparity	*115,403*	*226,206*	*292,349*	*355,910*	*398,524*	*445,139*
Leon						
Trinity	0	153	222	335	440	554
Brazos	0	23	0	0	0	0
Total	0	176	222	335	440	554
Liberty						
Neches	11,115	11,145	11,172	11,199	11,225	11,254
Neches-Trinity	24	25	24	25	27	29
Trinity	1,128	1,161	1,176	1,209	1,242	1,286
Trinity-San Jacinto	29	30	30	31	33	35
San Jacinto	2,540	2,563	2,581	2,792	3,051	3,310
Total	14,836	14,924	14,983	15,256	15,578	15,914
Madison						
Trinity	238	599	494	448	544	657
Brazos	0	75	32	0	1	14
Total	238	674	526	448	545	671
Montgomery						
San Jacinto	6,186	26,667	51,047	81,723	121,021	171,235
GW Disparity	*11,396*	*13,150*	*14,235*	*14,552*	*16,933*	*17,183*
Total	6,186	26,667	51,047	81,723	121,021	171,235
Total + Disparity	*17,582*	*39,817*	*65,282*	*96,275*	*137,954*	*188,418*
Polk						
Neches	0	0	0	0	0	0
Trinity	0	0	0	0	0	0
Total	0	0	0	0	0	0
San Jacinto						
Trinity	0	0	1	1	1	1
San Jacinto	0	0	0	0	0	0
Total	0	0	1	1	1	1

	2020	2030	2040	2050	2060	2070
Trinity						
Neches	0	0	0	0	0	0
Trinity	57	85	81	62	84	115
Total	57	85	81	62	84	115
Walker						
Trinity	21	26	28	30	35	38
San Jacinto	0	0	0	0	0	0
Total	21	26	28	30	35	38
Waller						
San Jacinto	0	0	0	0	0	348
Brazos	8	36	97	422	1,090	1,891
Total	8	36	97	422	1,090	2,239
Region H Total						
Neches	11,115	11,145	11,172	11,199	11,225	11,254
Neches-Trinity	164	174	180	191	201	212
Trinity	4,236	4,996	5,329	6,093	7,120	8,236
Trinity-San Jacinto	17,769	24,075	29,939	34,655	34,600	34,596
San Jacinto	17,877	141,489	297,084	375,909	452,063	541,978
San Jacinto-Brazos	129,915	174,256	204,488	233,211	257,360	281,635
Brazos	2,909	16,745	22,182	28,004	34,290	65,503
Brazos-Colorado	40,061	44,181	49,361	55,881	64,043	74,134
Colorado	0	5	3	2	1	0
GW Disparity	*122,987*	*137,526*	*79,654*	*101,274*	*123,052*	*144,215*
Total	224,046	417,066	619,738	745,145	860,903	1,017,548
Total + Disparity	*347,033*	*554,592*	*699,392*	*846,419*	*983,955*	*1,161,763*

Figure 4-3 – Location of Identified 2020 WUG Needs

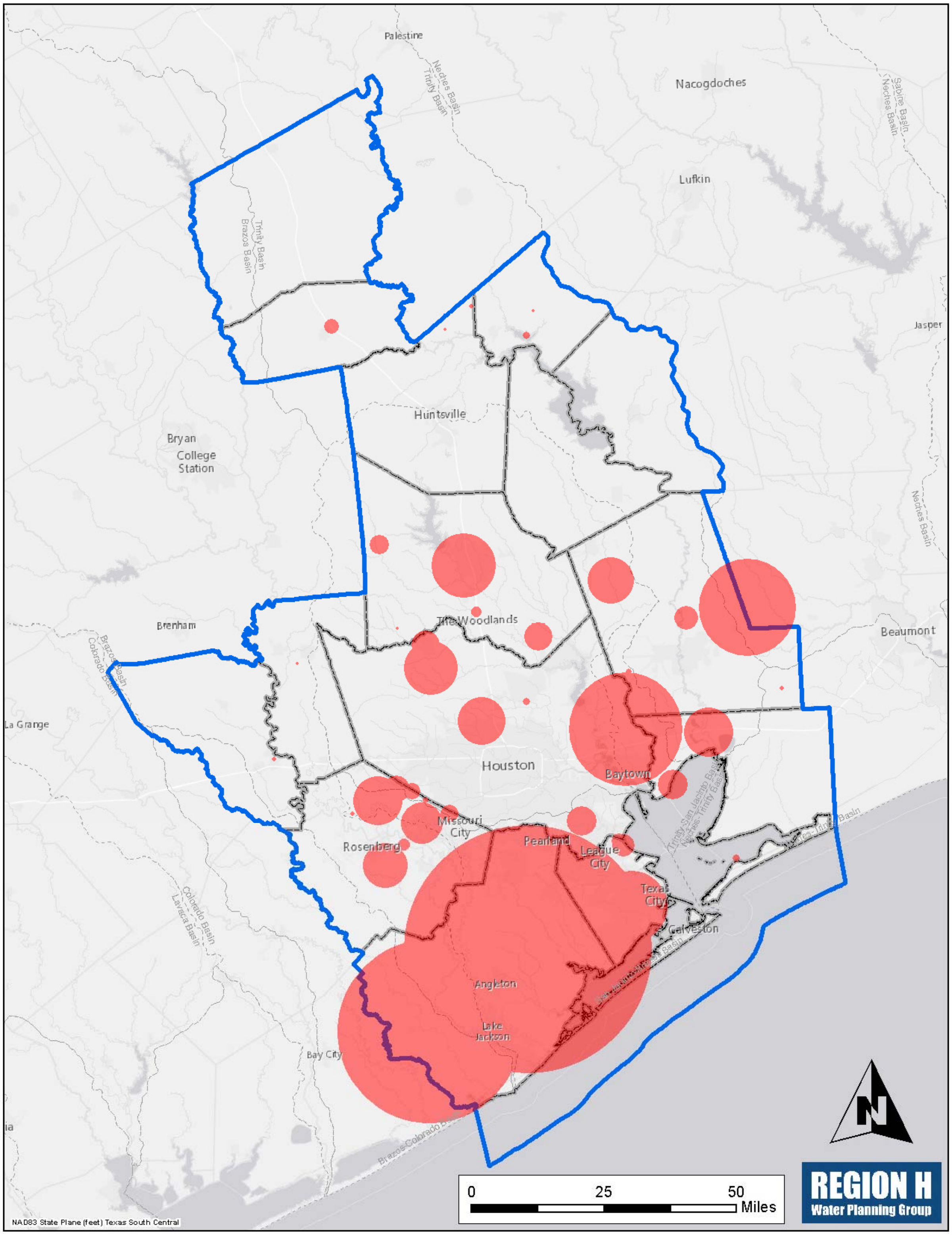


Figure 4-4 – Location of Identified 2030 WUG Needs

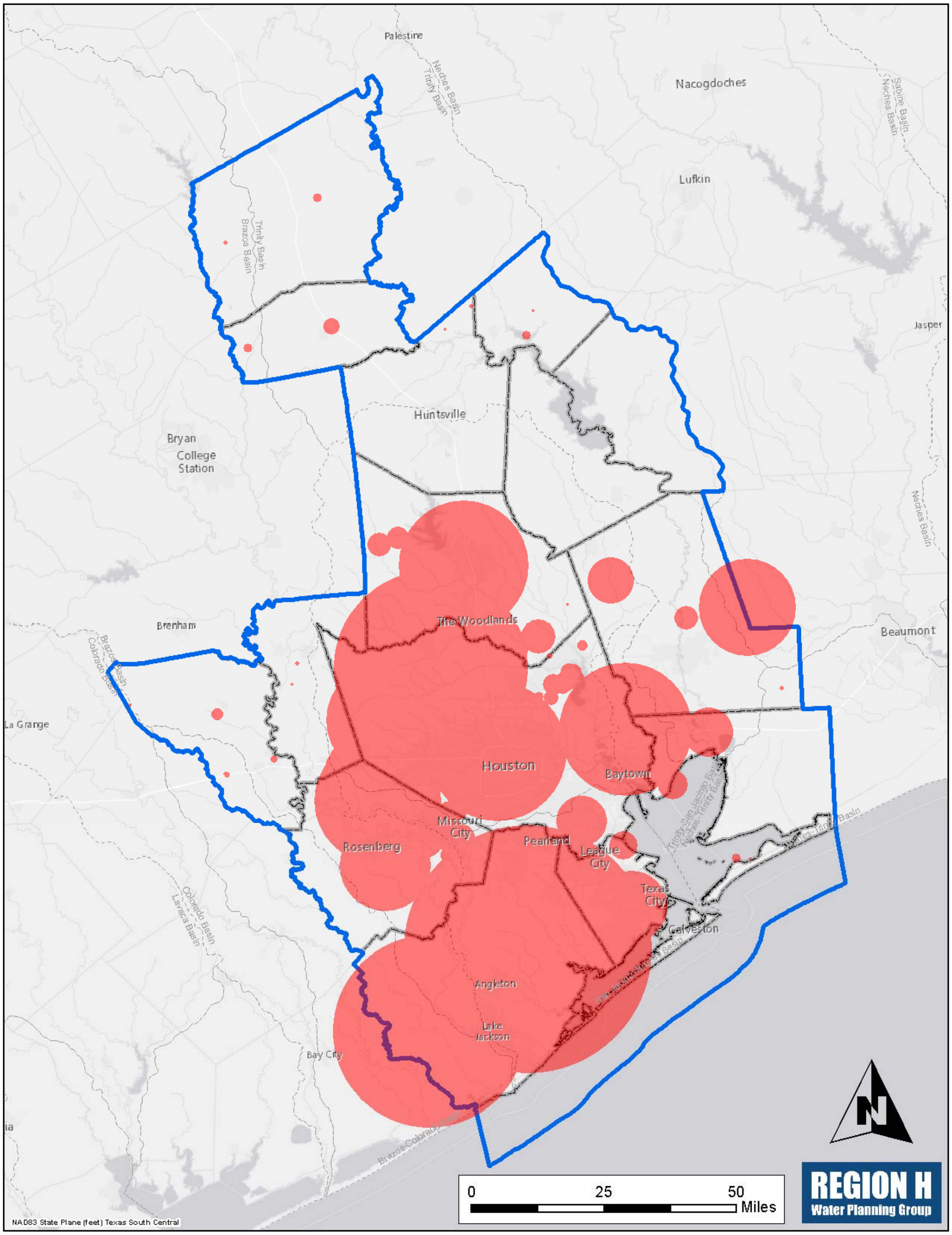


Figure 4-5 – Location of Identified 2040 WUG Needs

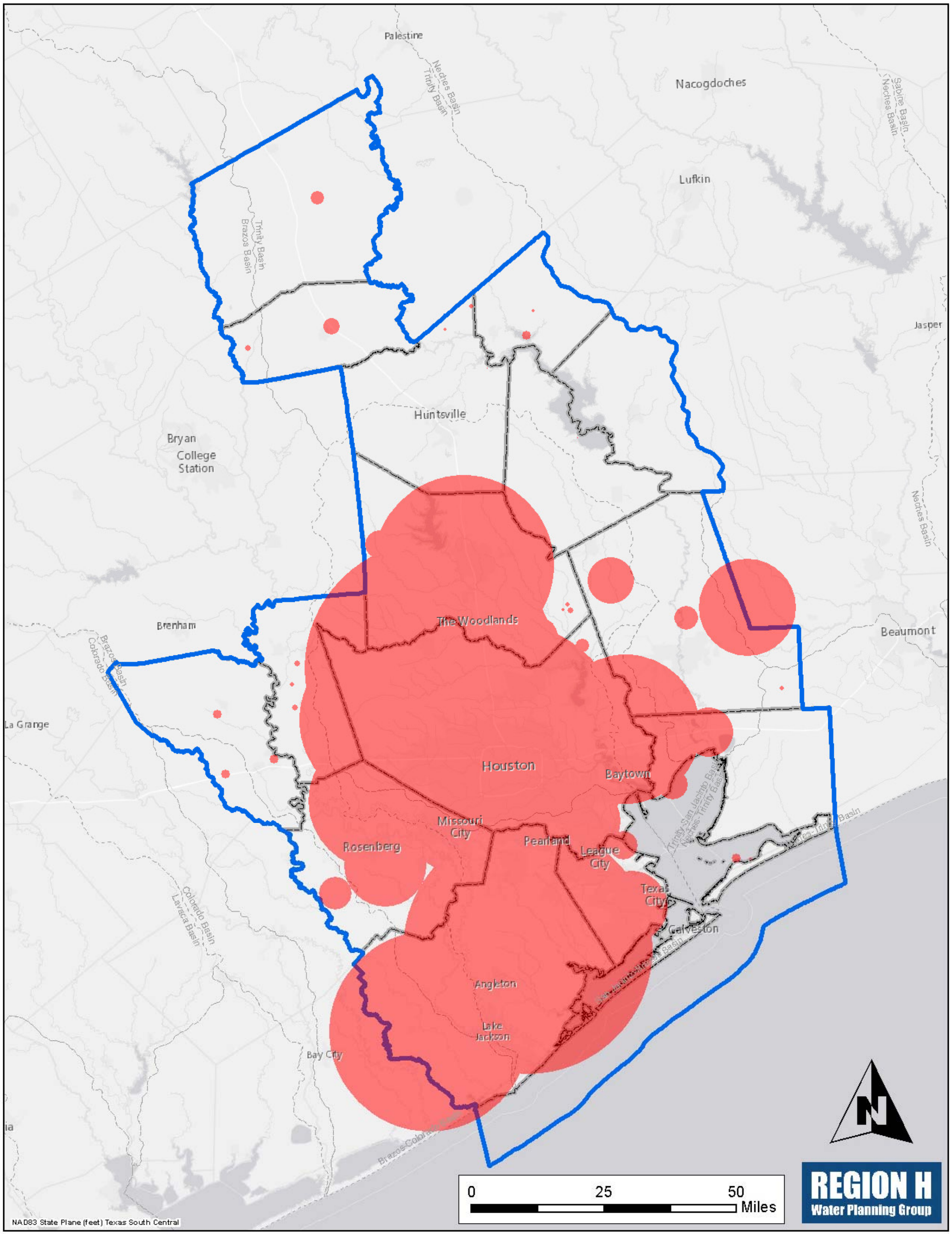


Figure 4-6 – Location of Identified 2050 WUG Needs

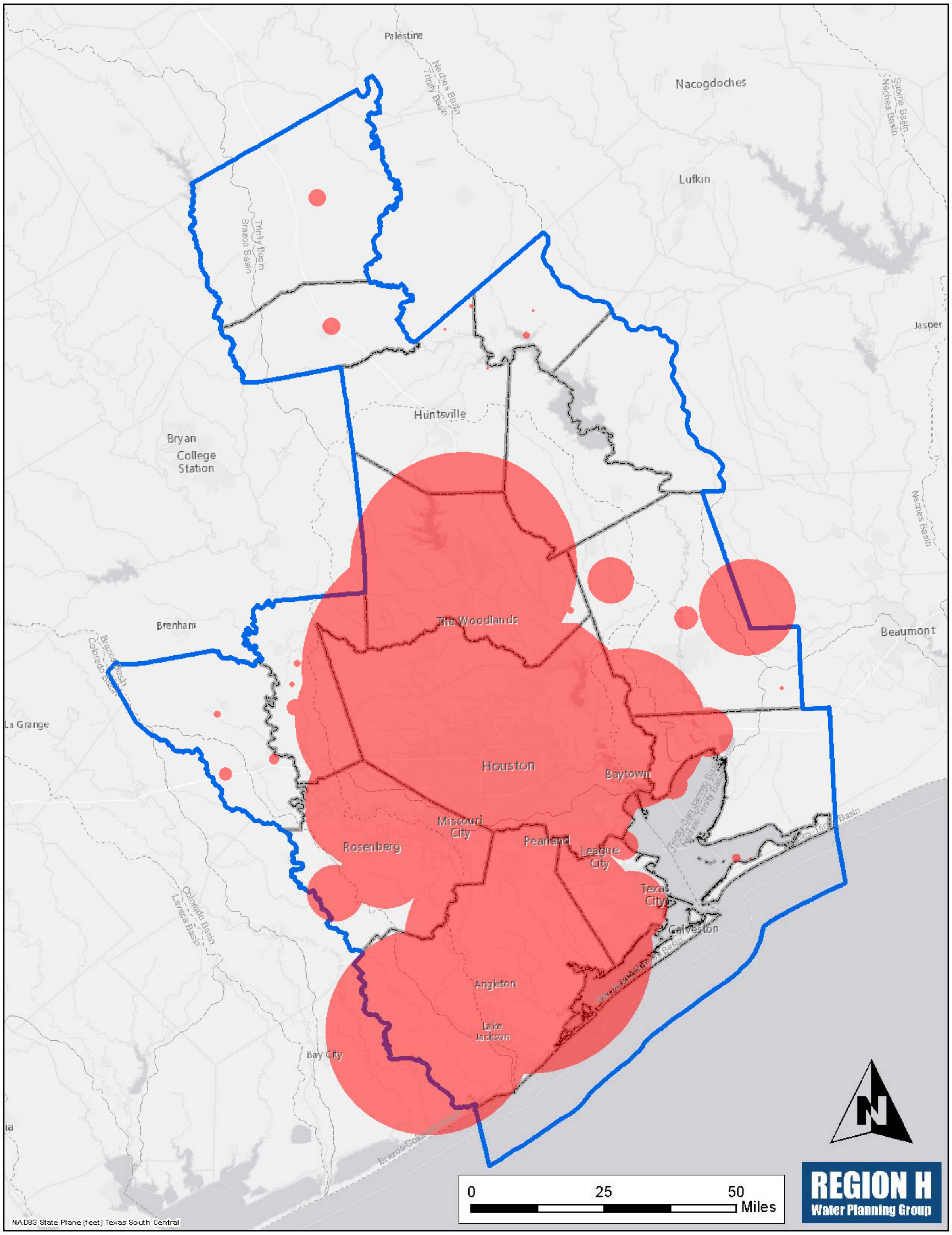


Figure 4-7 – Location of Identified 2060 WUG Needs

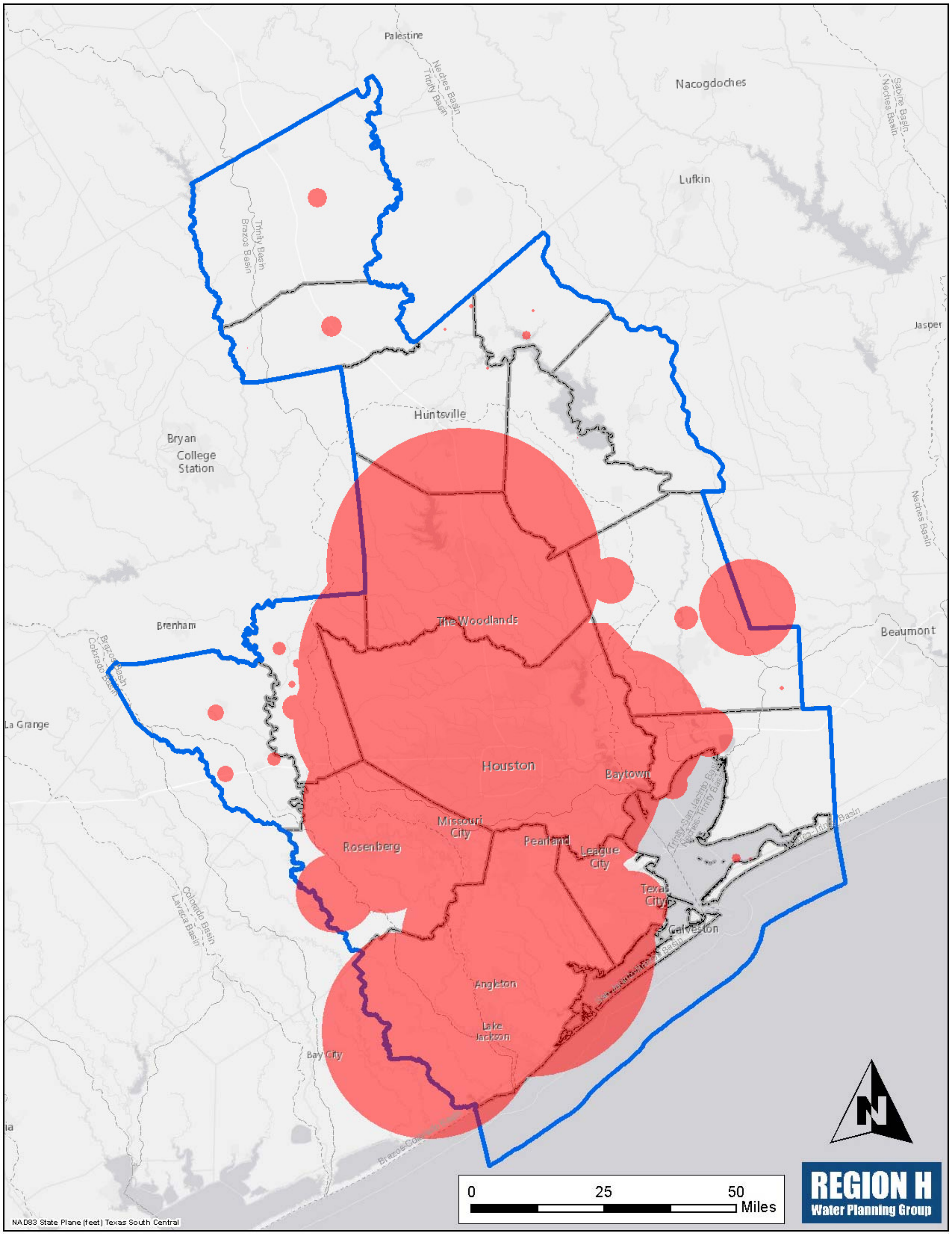
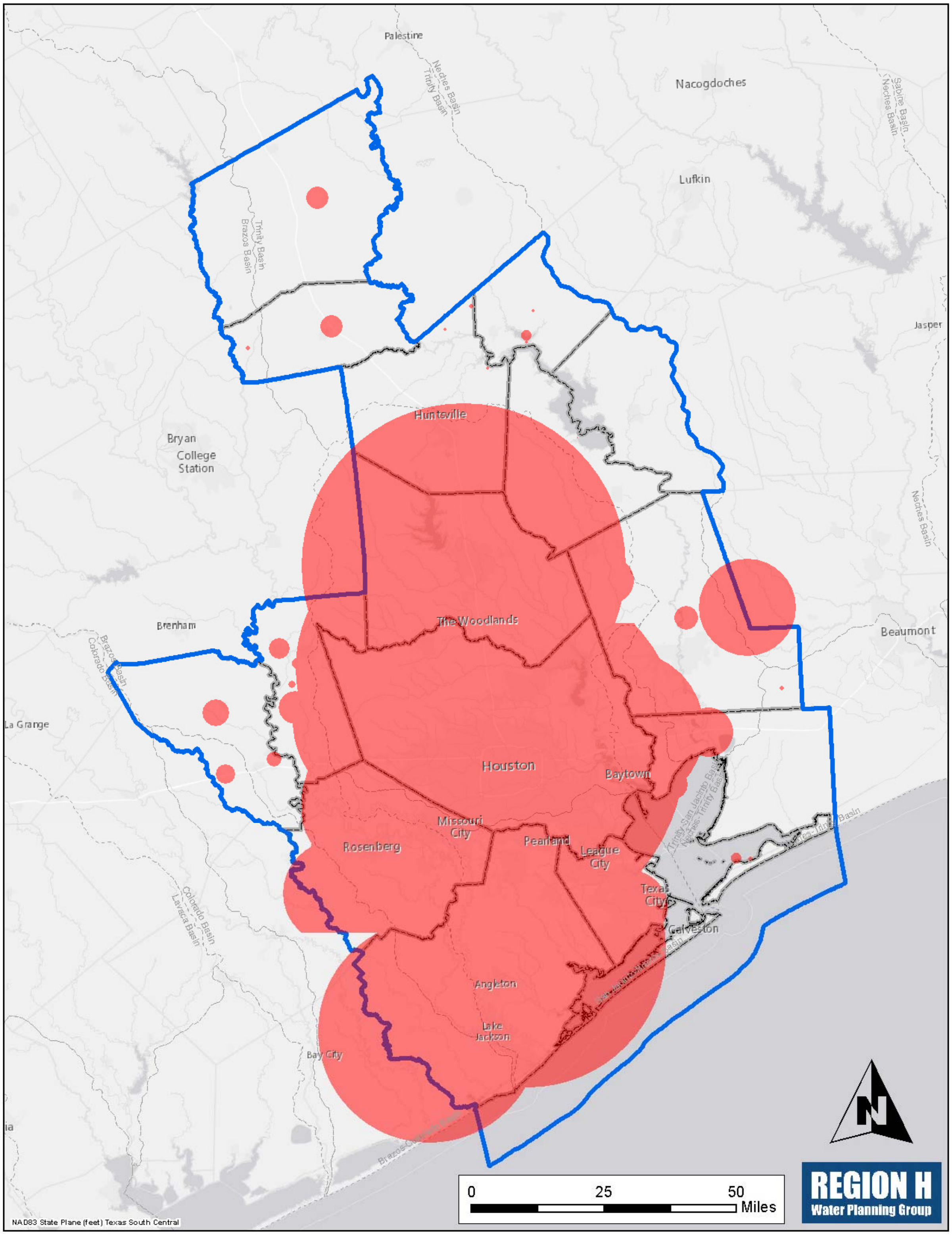


Figure 4-8 – Location of Identified 2070 WUG Needs



APPENDIX 4-DB

DB17 REPORTS

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WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
AUSTIN COUNTY						
BRAZOS BASIN						
BELLVILLE	0	0	0	0	0	0
SAN FELIPE	(23)	(55)	(90)	(133)	(181)	(235)
SEALY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	(329)	(850)
MANUFACTURING	0	(7)	(14)	(20)	(30)	(41)
MINING	0	(146)	(98)	(50)	(3)	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
BRAZOS-COLORADO BASIN						
SEALY	0	0	0	0	0	0
WALLIS	0	0	0	0	0	0
COUNTY-OTHER	0	(17)	(92)	(185)	(292)	(411)
MANUFACTURING	0	0	0	0	0	0
MINING	0	(42)	(29)	(15)	(1)	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
COLORADO BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	(5)	(3)	(2)	(1)	0
LIVESTOCK	0	0	0	0	0	0
BRAZORIA COUNTY						
BRAZOS BASIN						
BAILEY'S PRAIRIE	0	0	0	0	0	(1)
BRAZORIA	4	5	6	6	5	4
FREEPORT	83	87	90	90	87	80
LAKE JACKSON	3	1	0	(5)	(11)	(18)
VARNER CREEK UD	0	0	0	0	0	0
WEST COLUMBIA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	(114)
MANUFACTURING	13,872	12,998	12,125	11,251	10,378	9,504
MINING	(111)	(145)	(174)	(206)	(240)	(280)
LIVESTOCK	(9)	(17)	(23)	(29)	(35)	(42)
IRRIGATION	(170)	(311)	(413)	(524)	(644)	(755)
BRAZOS-COLORADO BASIN						
BRAZORIA	14	18	21	22	19	16
FREEPORT	1	1	1	1	1	1
JONES CREEK	0	0	0	0	0	0
SWEENY	0	0	0	0	0	0
WEST COLUMBIA	0	0	0	0	0	0
COUNTY-OTHER	1,743	1,198	738	201	(431)	(1,096)
MANUFACTURING	(39,316)	(42,961)	(46,571)	(50,189)	(53,815)	(57,432)
MINING	(206)	(266)	(321)	(380)	(444)	(521)
LIVESTOCK	(137)	(159)	(175)	(192)	(211)	(228)
IRRIGATION	(402)	(736)	(977)	(1,240)	(1,524)	(1,786)
SAN JACINTO-BRAZOS BASIN						
ALVIN	77	77	77	77	77	77
ANGLETON	156	227	285	310	304	225

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BRAZORIA COUNTY						
SAN JACINTO-BRAZOS BASIN						
BAILEY'S PRAIRIE	0	0	0	0	0	0
BRAZORIA COUNTY MUD #2	0	0	0	0	0	0
BRAZORIA COUNTY MUD #21	0	0	0	0	0	0
BRAZORIA COUNTY MUD #3	0	0	0	0	0	0
BRAZORIA COUNTY MUD #6	0	0	0	0	0	0
BROOKSIDE VILLAGE	0	0	0	0	0	0
CLUTE	(28)	(52)	(71)	(97)	(135)	(180)
DANBURY	0	0	0	0	0	0
FREEPORT	737	713	687	647	591	529
HILLCREST	0	0	0	0	0	0
HOLIDAY LAKES	0	0	0	0	0	0
IOWA COLONY	0	0	0	0	0	0
LAKE JACKSON	500	295	138	(49)	(277)	(518)
MANVEL	46	(566)	(1,469)	(2,496)	(3,707)	(5,207)
OYSTER CREEK	(11)	(21)	(28)	(37)	(48)	(60)
PEARLAND	3,755	3,175	2,464	1,732	735	0
RICHWOOD	(9)	(17)	(23)	(31)	(42)	(55)
COUNTY-OTHER	(4,825)	(8,767)	(12,491)	(16,526)	(21,070)	(25,970)
MANUFACTURING	(24,574)	(36,848)	(49,888)	(62,932)	(75,979)	(89,021)
MINING	(417)	(561)	(689)	(831)	(980)	(1,161)
LIVESTOCK	(93)	(164)	(216)	(272)	(332)	(388)
IRRIGATION	(71,280)	(71,797)	(72,164)	(72,566)	(73,001)	(73,401)
CHAMBERS COUNTY						
NECHES-TRINITY BASIN						
ANAHUAC	678	683	687	690	686	682
TRINITY BAY CONSERVATION DISTRICT	1,046	1,046	1,046	1,046	1,046	1,046
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	59,123	59,123	59,123	59,123	59,123	59,123
TRINITY BASIN						
ANAHUAC	160	162	163	161	162	162
BEACH CITY	(3)	(9)	(15)	(21)	(29)	(36)
COVE	0	0	0	0	0	0
MONT BELVIEU	0	0	(172)	(682)	(1,231)	(1,809)
OLD RIVER-WINFREE	(9)	(26)	(45)	(69)	(96)	(125)
TRINITY BAY CONSERVATION DISTRICT	274	274	274	274	274	274
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	(157)	(315)	(456)	(638)	(835)
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(2,780)	(2,780)	(2,780)	(2,780)	(2,780)	(2,780)
TRINITY-SAN JACINTO BASIN						
BAYTOWN	143	170	192	202	196	182
BEACH CITY	(28)	(72)	(121)	(176)	(236)	(301)
MONT BELVIEU	0	0	(56)	(210)	(375)	(548)
COUNTY-OTHER	1,231	1,231	1,231	1,231	1,231	1,231

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CHAMBERS COUNTY						
TRINITY-SAN JACINTO BASIN						
MANUFACTURING	22,021	21,302	20,587	19,943	19,111	18,218
MINING	(112)	(112)	(112)	(112)	(112)	(112)
STEAM ELECTRIC POWER	27,584	26,986	26,257	25,369	24,286	23,547
LIVESTOCK	0	0	0	0	(47)	(86)
IRRIGATION	(980)	(980)	(980)	(980)	(980)	(1,000)
FORT BEND COUNTY						
BRAZOS BASIN						
BEASLEY	(2)	(3)	(5)	(8)	(12)	(18)
FAIRCHILDS	(30)	(29)	(40)	(53)	(69)	(93)
FORT BEND COUNTY MUD #116	(304)	(464)	(566)	(648)	(730)	(815)
FORT BEND COUNTY MUD #121	138	43	(24)	(93)	(161)	(233)
FORT BEND COUNTY MUD #129	1	(323)	(546)	(738)	(881)	(905)
FORT BEND COUNTY MUD #25	(29)	(56)	(58)	(61)	(64)	(66)
FULSHEAR	(30)	(101)	(149)	(193)	(231)	(268)
GREATWOOD	(470)	(739)	(803)	(852)	(896)	(939)
MISSOURI CITY	(83)	(491)	(743)	(979)	(1,149)	(1,258)
NEEDVILLE	(43)	(36)	(45)	(51)	(58)	(66)
NORTH FORT BEND WATER AUTHORITY	(493)	(1,769)	(9,404)	(14,205)	(16,501)	(17,292)
PECAN GROVE MUD #1	4,939	4,614	4,600	4,570	4,547	4,526
PLANTATION MUD	(133)	(192)	(203)	(211)	(222)	(232)
PLEAK	(82)	(127)	(138)	(149)	(161)	(175)
RICHMOND	903	480	352	197	32	(133)
ROSENBERG	1,389	349	49	(263)	(626)	(1,046)
SIENNA PLANTATION	339	(109)	(496)	(846)	(1,180)	(1,521)
SIMONTON	(34)	(33)	(52)	(70)	(87)	(103)
SUGAR LAND	(447)	(4,140)	(5,379)	(6,633)	(7,780)	(8,669)
WESTON LAKES	(530)	(484)	(658)	(812)	(956)	(1,105)
COUNTY-OTHER	(6,685)	(13,583)	(13,683)	(16,855)	(22,226)	(29,289)
MANUFACTURING	(399)	(904)	(1,034)	(1,130)	(1,075)	(1,017)
MINING	452	435	418	401	386	373
STEAM ELECTRIC POWER	61,869	50,609	36,836	20,006	(554)	(26,343)
LIVESTOCK	(185)	(160)	(201)	(231)	(254)	(276)
IRRIGATION	(3,199)	(2,736)	(3,480)	(4,018)	(4,440)	(4,825)
BRAZOS-COLORADO BASIN						
BEASLEY	(23)	(19)	(27)	(35)	(46)	(61)
NEEDVILLE	(52)	(44)	(55)	(64)	(72)	(83)
ROSENBERG	1	0	1	0	(3)	(7)
COUNTY-OTHER	(479)	(675)	(2,220)	(4,856)	(8,621)	(14,065)
MINING	(5)	(5)	(5)	(4)	(3)	(2)
LIVESTOCK	(66)	(56)	(71)	(82)	(90)	(97)
IRRIGATION	(6,184)	(5,325)	(6,703)	(7,699)	(8,481)	(9,194)
SAN JACINTO BASIN						
HOUSTON	0	0	0	0	0	0
KATY	(532)	(2,336)	(2,478)	(2,585)	(2,674)	(2,755)
MEADOWS PLACE	(24)	(128)	(184)	(228)	(271)	(313)
MISSOURI CITY	1,168	681	437	265	149	38
NORTH FORT BEND WATER AUTHORITY	(6,076)	(17,967)	(21,183)	(22,960)	(24,165)	(25,190)

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
FORT BEND COUNTY						
SAN JACINTO BASIN						
STAFFORD	(491)	(767)	(795)	(839)	(894)	(965)
SUGAR LAND	9	(241)	(300)	(347)	(386)	(416)
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	(459)	(769)	(804)	(839)	(856)	(873)
COUNTY-OTHER	(69)	(115)	(140)	(155)	(164)	(174)
MANUFACTURING	(1,504)	(2,115)	(2,263)	(2,370)	(2,291)	(2,210)
LIVESTOCK	(22)	(19)	(24)	(27)	(30)	(33)
IRRIGATION	(182)	(157)	(197)	(226)	(249)	(270)
SAN JACINTO-BRAZOS BASIN						
ARCOLA	(82)	(195)	(281)	(365)	(436)	(509)
FORT BEND COUNTY MUD #23	(421)	(699)	(797)	(877)	(950)	(1,022)
FORT BEND COUNTY MUD #25	(201)	(391)	(423)	(452)	(483)	(517)
FULSHEAR	(411)	(700)	(821)	(916)	(997)	(1,069)
HOUSTON	0	0	0	0	0	0
MEADOWS PLACE	1	(8)	(12)	(16)	(19)	(21)
MISSOURI CITY	390	(2,577)	(4,168)	(5,680)	(6,757)	(7,508)
NORTH FORT BEND WATER AUTHORITY	(7,595)	(22,549)	(27,302)	(30,673)	(33,230)	(35,313)
PEARLAND	42	6	0	0	0	(33)
PECAN GROVE MUD #1	39	37	37	37	36	36
SIENNA PLANTATION	921	(293)	(1,540)	(2,863)	(4,233)	(5,521)
STAFFORD	(379)	(958)	(1,080)	(1,195)	(1,319)	(1,450)
SUGAR LAND	65	(2,823)	(3,583)	(4,214)	(4,713)	(5,118)
COUNTY-OTHER	(651)	(34)	(2,166)	(4,226)	(6,178)	(8,099)
MANUFACTURING	(802)	(1,604)	(1,800)	(1,939)	(1,835)	(1,729)
MINING	(8)	(11)	(9)	(7)	(5)	(3)
LIVESTOCK	(63)	(55)	(69)	(79)	(87)	(94)
IRRIGATION	(2,732)	(2,622)	(2,798)	(2,925)	(3,025)	(3,116)
GALVESTON COUNTY						
NECHES-TRINITY BASIN						
BOLIVAR PENINSULA SUD	5,802	5,766	5,723	5,672	5,612	5,540
COUNTY-OTHER	(4)	(7)	(7)	(10)	(12)	(14)
MINING	(71)	(77)	(84)	(92)	(98)	(106)
LIVESTOCK	(52)	(52)	(52)	(52)	(52)	(52)
IRRIGATION	(15)	(15)	(15)	(15)	(15)	(15)
SAN JACINTO-BRAZOS BASIN						
BACLIFF MUD	617	647	664	662	662	662
BAYOU VISTA	157	166	172	175	177	180
CLEAR LAKE SHORES	(229)	(241)	(234)	(232)	(229)	(227)
DICKINSON	386	380	323	248	154	56
FRIENDSWOOD	4,936	4,409	3,998	3,557	3,096	2,588
GALVESTON	3,956	3,432	2,675	1,828	1,028	167
HITCHCOCK	446	324	255	196	144	100
JAMAICA BEACH	0	0	0	0	0	0
KEMAH	(601)	(917)	(967)	(1,009)	(1,045)	(1,074)
LA MARQUE	(340)	(492)	(505)	(527)	(563)	(594)
LEAGUE CITY	8,343	7,098	5,984	5,021	4,427	3,990
SAN LEON MUD	1,251	1,225	1,207	1,191	1,174	1,157
SANTA FE	(641)	(627)	(649)	(686)	(737)	(793)

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
GALVESTON COUNTY						
SAN JACINTO-BRAZOS BASIN						
TEXAS CITY	2,632	2,320	1,999	1,679	1,345	1,033
TIKI ISLAND	84	88	90	92	94	95
COUNTY-OTHER	(2,036)	(2,203)	(2,368)	(2,539)	(2,724)	(2,908)
MANUFACTURING	(189)	(972)	(1,776)	(2,609)	(3,465)	(4,342)
MINING	(277)	(295)	(327)	(354)	(381)	(408)
LIVESTOCK	(180)	(179)	(180)	(181)	(181)	(182)
IRRIGATION	(6,039)	(6,039)	(6,039)	(6,039)	(6,039)	(6,039)
HARRIS COUNTY						
SAN JACINTO BASIN						
BAYTOWN	117	121	130	123	111	99
BELLAIRE	(305)	(275)	(82)	(124)	(167)	(217)
BLUE BELL MANOR UTILITY COMPANY	(259)	(355)	(382)	(423)	(466)	(505)
BUNKER HILL VILLAGE	(130)	(118)	(35)	(53)	(71)	(92)
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	(407)	(1,366)	(1,956)	(2,179)	(2,405)	(2,661)
CHIMNEY HILL MUD	(159)	(73)	(6)	(10)	(14)	(18)
CROSBY MUD	713	713	724	717	711	705
DEER PARK	(54)	(46)	(13)	(18)	(22)	(27)
EL DORADO UD	(104)	(138)	(139)	(148)	(155)	(159)
FOUNTAINVIEW SUBDIVISION	(102)	(124)	(131)	(132)	(134)	(136)
GALENA PARK	120	159	204	205	188	172
GREEN TRAILS MUD	(222)	(294)	(298)	(311)	(322)	(333)
GREENWOOD UD	(29)	(27)	(7)	(11)	(13)	(16)
HARRIS COUNTY MUD #106	(521)	(710)	(765)	(819)	(861)	(900)
HARRIS COUNTY MUD #11	(128)	(172)	(177)	(188)	(204)	(220)
HARRIS COUNTY MUD #119	(202)	(262)	(260)	(274)	(290)	(307)
HARRIS COUNTY MUD #132	(360)	(474)	(471)	(491)	(506)	(524)
HARRIS COUNTY MUD #148 - KINGSLAKE	(22)	(19)	(5)	(7)	(9)	(11)
HARRIS COUNTY MUD #151	(406)	(540)	(546)	(565)	(582)	(602)
HARRIS COUNTY MUD #152	(444)	(601)	(633)	(673)	(708)	(739)
HARRIS COUNTY MUD #153	(481)	(635)	(638)	(658)	(676)	(696)
HARRIS COUNTY MUD #154	(299)	(393)	(401)	(424)	(452)	(483)
HARRIS COUNTY MUD #158	(150)	(70)	(10)	(13)	(16)	(20)
HARRIS COUNTY MUD #180	(206)	(293)	(313)	(321)	(328)	(336)
HARRIS COUNTY MUD #189	(143)	(196)	(210)	(228)	(246)	(264)
HARRIS COUNTY MUD #221	(160)	(236)	(254)	(273)	(290)	(310)
HARRIS COUNTY MUD #278	(388)	(742)	(773)	(792)	(808)	(825)
HARRIS COUNTY MUD #290	(244)	(343)	(373)	(401)	(424)	(443)
HARRIS COUNTY MUD #345	(315)	(419)	(424)	(439)	(454)	(468)
HARRIS COUNTY MUD #400 - WEST	(315)	(462)	(512)	(561)	(592)	(614)
HARRIS COUNTY MUD #46	(266)	(348)	(344)	(351)	(361)	(371)
HARRIS COUNTY MUD #49	(41)	(110)	(22)	(31)	(39)	(46)
HARRIS COUNTY MUD #5	(143)	(69)	(10)	(15)	(19)	(24)
HARRIS COUNTY MUD #50	401	366	343	339	337	335
HARRIS COUNTY MUD #8	(39)	(31)	(8)	(12)	(15)	(17)
HARRIS COUNTY MUD #96	(163)	(81)	(12)	(18)	(23)	(29)
HARRIS COUNTY UD #14	(82)	(124)	(143)	(167)	(194)	(234)
HARRIS COUNTY UD #15	(209)	(303)	(351)	(405)	(465)	(515)

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY						
SAN JACINTO BASIN						
HARRIS COUNTY WCID #1	421	341	291	271	251	229
HARRIS COUNTY WCID #133	(264)	(342)	(352)	(397)	(450)	(510)
HARRIS COUNTY WCID #74	(315)	(428)	(450)	(480)	(511)	(545)
HARRIS COUNTY WCID #96	(545)	(289)	(40)	(56)	(70)	(84)
HEDWIG VILLAGE	(118)	(107)	(32)	(48)	(63)	(81)
HILSHIRE VILLAGE	(55)	(28)	(4)	(6)	(9)	(11)
HOUSTON	(4,202)	(52,477)	(79,751)	(108,389)	(140,147)	(174,111)
HUMBLE	(754)	(429)	(66)	(100)	(131)	(162)
HUNTERS CREEK VILLAGE	(189)	(171)	(51)	(77)	(103)	(133)
JACINTO CITY	208	240	271	247	224	199
JERSEY VILLAGE	(185)	(236)	(33)	(47)	(59)	(73)
KATY	(1,288)	(1,808)	(1,932)	(2,076)	(2,208)	(2,339)
KINGS MANOR MUD	(34)	(50)	(65)	(71)	(78)	(84)
LA PORTE	165	174	188	188	187	184
LONGHORN TOWN UD	(115)	(155)	(159)	(165)	(171)	(176)
MASON CREEK UD	(508)	(656)	(648)	(669)	(687)	(707)
MISSOURI CITY	0	(243)	(424)	(525)	(616)	(705)
MOUNT HOUSTON ROAD MUD	(199)	(342)	(419)	(476)	(521)	(558)
NEWPORT MUD	348	192	104	84	61	34
NORTH BELT UD	(137)	(179)	(184)	(195)	(208)	(222)
NORTH CHANNEL WATER AUTHORITY	(100)	31	507	325	74	(167)
NORTH FORT BEND WATER AUTHORITY	(467)	(941)	(1,188)	(1,243)	(1,277)	(1,304)
NORTH GREEN MUD	(191)	(250)	(249)	(258)	(270)	(283)
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	(38,096)	(61,780)	(76,780)	(81,777)	(86,599)	(91,282)
NORTHWEST PARK MUD	(1,235)	(1,711)	(1,831)	(1,991)	(2,158)	(2,340)
PARKWAY UD	(42)	(36)	(10)	(14)	(17)	(21)
PASADENA	12,993	13,147	13,559	13,301	12,876	12,394
PINEY POINT VILLAGE	(140)	(129)	(39)	(61)	(83)	(109)
SOUTH HOUSTON	2,456	2,491	2,585	2,546	2,483	2,413
SOUTHSIDE PLACE	(21)	(19)	(5)	(8)	(11)	(14)
SPRING VALLEY	(420)	(615)	(691)	(780)	(877)	(984)
STAFFORD	(13)	(26)	(34)	(37)	(39)	(41)
SUNBELT FWSD	(193)	(403)	(80)	(115)	(145)	(178)
THE COMMONS WATER SUPPLY INC	(144)	(203)	(218)	(232)	(244)	(255)
THE WOODLANDS	(904)	(1,709)	(2,357)	(2,623)	(2,831)	(3,001)
TOMBALL	(1,864)	(2,462)	(2,845)	(2,972)	(3,094)	(3,212)
TRAIL OF THE LAKES MUD	(418)	(578)	(590)	(611)	(632)	(653)
WALLER	(24)	(12)	(2)	(2)	(3)	(4)
WEST HARRIS COUNTY MUD #6	(131)	(188)	(200)	(213)	(224)	(235)
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	(11,795)	(24,572)	(34,708)	(38,871)	(40,601)	(42,266)
WEST UNIVERSITY PLACE	(231)	(206)	(61)	(91)	(121)	(156)
WINDFERN FOREST UD	(237)	(113)	(16)	(22)	(27)	(32)
WOODCREEK MUD	(115)	(151)	(149)	(154)	(159)	(167)
COUNTY-OTHER	37,959	31,266	29,106	28,247	24,930	21,678
MANUFACTURING	5,754	(5,924)	(10,683)	(20,363)	(16,971)	(13,635)
MINING	(2,739)	(2,703)	(2,586)	(2,568)	(2,554)	(2,546)
STEAM ELECTRIC POWER	(362)	(3,761)	(7,315)	(12,570)	(18,967)	(26,599)

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY						
SAN JACINTO BASIN						
LIVESTOCK	(914)	(1,129)	(1,240)	(1,251)	(1,260)	(1,270)
IRRIGATION	504	902	2,503	2,252	2,045	1,835
SAN JACINTO-BRAZOS BASIN						
CLEAR BROOK CITY MUD	1,349	1,339	1,348	1,261	1,170	1,077
DEER PARK	(118)	(102)	(29)	(42)	(54)	(67)
EL LAGO	28	33	41	38	33	27
FRIENDSWOOD	2,194	2,241	2,276	2,121	1,921	1,687
HARRIS COUNTY MUD #55	3,041	2,802	2,666	2,607	2,490	2,346
HOUSTON	(13,989)	(13,989)	(13,989)	(13,989)	(13,989)	(13,989)
KIRKMONT MUD	39	23	23	(3)	(36)	(72)
LA PORTE	2,366	2,472	2,626	2,612	2,555	2,487
LEAGUE CITY	291	257	237	208	191	179
NASSAU BAY	1,183	1,194	1,223	1,212	1,197	1,181
PASADENA	5,584	5,597	5,685	5,576	5,423	5,256
PEARLAND	414	354	315	89	0	(386)
SAGEMEADOW UD	178	171	179	136	86	31
SEABROOK	163	196	253	234	207	174
SHOREACRES	51	58	66	64	58	53
TAYLOR LAKE VILLAGE	1,113	1,122	1,145	1,143	1,137	1,129
WEBSTER	5,292	5,088	5,006	4,842	4,704	4,588
COUNTY-OTHER	1,248	974	872	654	414	163
MANUFACTURING	(1,988)	(6,039)	(7,776)	(11,098)	(9,917)	(8,755)
MINING	(184)	(182)	(175)	(174)	(172)	(172)
STEAM ELECTRIC POWER	(1,107)	(1,286)	(1,473)	(1,750)	(2,087)	(2,487)
TRINITY-SAN JACINTO BASIN						
BAYTOWN	2,529	2,618	2,802	2,635	2,376	2,091
HARRIS COUNTY WCID #1	17	14	13	11	10	9
HOUSTON	0	0	0	0	0	0
COUNTY-OTHER	(2,016)	(2,376)	(2,625)	(3,000)	(3,356)	(3,720)
MANUFACTURING	(18,511)	(23,938)	(26,820)	(31,445)	(31,115)	(30,804)
MINING	(154)	(152)	(145)	(143)	(144)	(142)
LIVESTOCK	(134)	(132)	(126)	(127)	(127)	(128)
IRRIGATION	1,914	1,957	2,131	2,104	2,081	2,058
LEON COUNTY						
BRAZOS BASIN						
CONCORD-ROBBINS WSC	0	0	0	0	0	0
JEWETT	0	0	0	0	0	0
NORMANGEE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	(23)	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
BUFFALO	0	0	0	0	0	0
CENTERVILLE	0	0	0	0	0	0
CONCORD-ROBBINS WSC	0	0	0	0	0	0
FLO COMMUNITY WSC	0	0	0	0	0	0

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LEON COUNTY						
TRINITY BASIN						
JEWETT	0	0	0	0	0	0
NORMANGEE	0	0	0	0	0	0
OAKWOOD	0	0	0	0	0	0
COUNTY-OTHER	76	76	76	76	76	76
MANUFACTURING	0	(97)	(222)	(335)	(440)	(554)
MINING	0	(56)	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
LIBERTY COUNTY						
NECHES BASIN						
DAISETTA	0	0	0	0	0	0
HARDIN WSC	0	0	0	0	0	0
WEST HARDIN WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	(27)	(55)	(80)	(102)	(126)
MINING	(21)	(24)	(23)	(25)	(29)	(34)
LIVESTOCK	(41)	(41)	(41)	(41)	(41)	(41)
IRRIGATION	(11,053)	(11,053)	(11,053)	(11,053)	(11,053)	(11,053)
NECHES-TRINITY BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	(1)	0	(1)	(3)	(5)
LIVESTOCK	(24)	(24)	(24)	(24)	(24)	(24)
IRRIGATION	7,429	7,429	7,429	7,429	7,429	7,429
SAN JACINTO BASIN						
CLEVELAND	0	0	0	0	0	0
PLUM GROVE	0	0	0	0	0	0
TARKINGTON SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	(188)	(427)	(660)
MANUFACTURING	0	(20)	(40)	(58)	(74)	(92)
MINING	0	(3)	(1)	(6)	(10)	(18)
LIVESTOCK	(73)	(73)	(73)	(73)	(73)	(73)
IRRIGATION	(2,467)	(2,467)	(2,467)	(2,467)	(2,467)	(2,467)
TRINITY BASIN						
AMES	0	0	0	0	0	0
DAISETTA	0	0	0	0	0	0
DAYTON	0	0	0	0	0	0
HARDIN	0	0	0	0	0	0
HARDIN WSC	0	0	0	0	0	0
KENEFICK	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	97	114	128	141	153	163
LIBERTY	0	0	0	0	0	0
OLD RIVER-WINFREE	0	0	0	0	0	0
TARKINGTON SUD	0	0	0	0	0	0
WOODLAND HILLS WATER COMPANY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	(74)	(95)	(117)	(137)	(154)	(172)
MINING	(164)	(176)	(169)	(182)	(198)	(224)

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LIBERTY COUNTY						
TRINITY BASIN						
LIVESTOCK	(252)	(252)	(252)	(252)	(252)	(252)
IRRIGATION	(638)	(638)	(638)	(638)	(638)	(638)
TRINITY-SAN JACINTO BASIN						
DAYTON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	(1)	(1)	(2)	(4)	(6)
LIVESTOCK	(29)	(29)	(29)	(29)	(29)	(29)
IRRIGATION	0	0	0	0	0	0
MADISON COUNTY						
BRAZOS BASIN						
COUNTY-OTHER	0	0	0	0	(1)	(14)
MINING	0	(75)	(32)	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
MADISONVILLE	0	0	0	0	0	0
NORMANGEE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	(21)	(42)	(61)	(85)	(111)
MINING	0	(300)	(125)	0	0	0
STEAM ELECTRIC POWER	(238)	(278)	(327)	(387)	(459)	(546)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	169	169	169	169	169	169
MONTGOMERY COUNTY						
SAN JACINTO BASIN						
BENDERS LANDING WATER SYSTEM	(516)	(1,784)	(3,090)	(4,398)	(5,701)	(5,700)
CLEVELAND	18	16	14	10	6	1
CONROE	(604)	(2,973)	(5,131)	(7,167)	(9,412)	(11,832)
CUT AND SHOOT	64	60	46	22	(10)	(55)
DOBBIN-PLANTERSVILLE WSC	(216)	(414)	(691)	(1,059)	(1,546)	(2,188)
EAST PLANTATION UD	(31)	(32)	(63)	(97)	(139)	(150)
HOUSTON	117	0	0	0	0	0
INDIGO LAKE WATER SYSTEM	(267)	(682)	(1,346)	(2,290)	(3,625)	(5,805)
KINGS MANOR MUD	0	0	0	0	0	0
LAKE WINDCREST WATER SYSTEM	(216)	(326)	(598)	(981)	(1,519)	(2,272)
MAGNOLIA	(65)	(194)	(368)	(627)	(1,008)	(1,601)
MONTGOMERY	(149)	(682)	(960)	(1,240)	(1,526)	(1,977)
MONTGOMERY COUNTY MUD #15	(117)	(145)	(218)	(319)	(470)	(685)
MONTGOMERY COUNTY MUD #18	541	385	168	(51)	(273)	(813)
MONTGOMERY COUNTY MUD #19	98	106	112	114	112	110
MONTGOMERY COUNTY MUD #8	440	423	379	331	278	157
MONTGOMERY COUNTY MUD #83	48	40	31	22	13	6
MONTGOMERY COUNTY MUD #89	252	250	246	221	185	172
MONTGOMERY COUNTY MUD #9	329	316	252	185	116	(26)
MONTGOMERY COUNTY MUD #94	(140)	(143)	(205)	(268)	(331)	(330)
MONTGOMERY COUNTY UD #2	92	96	92	81	67	47
MONTGOMERY COUNTY UD #3	245	227	266	244	151	(72)

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MONTGOMERY COUNTY						
SAN JACINTO BASIN						
MONTGOMERY COUNTY UD #4	246	212	293	247	50	(107)
MONTGOMERY COUNTY WCID #1	(3)	(10)	(22)	(47)	(76)	(109)
NEW CANEY MUD	(113)	(145)	(189)	(260)	(363)	(491)
OAK RIDGE NORTH	(22)	(32)	(58)	(72)	(79)	(81)
PANORAMA VILLAGE	(24)	(25)	(56)	(102)	(169)	(258)
PATTON VILLAGE	(36)	(44)	(62)	(84)	(112)	(148)
POINT AQUARIUS MUD	(46)	(43)	(62)	(90)	(131)	(185)
PORTER SUD	(1,074)	(1,497)	(1,924)	(2,344)	(2,764)	(3,112)
RAYFORD ROAD MUD	(48)	(69)	(134)	(213)	(303)	(336)
RIVER PLANTATION MUD	177	154	37	(79)	(207)	(256)
ROMAN FOREST	(76)	(73)	(104)	(147)	(205)	(280)
SHENANDOAH	(404)	(779)	(932)	(1,035)	(1,158)	(1,315)
SOUTHERN MONTGOMERY COUNTY MUD	(9)	(13)	(13)	(18)	(28)	(42)
SPLENDORA	311	301	269	226	169	97
SPRING CREEK UD	(152)	(196)	(222)	(280)	(358)	(384)
STAGECOACH	(13)	(20)	(47)	(86)	(148)	(255)
STANLEY LAKE MUD	248	294	224	36	(282)	(682)
THE WOODLANDS	166	(979)	(2,173)	(3,667)	(5,945)	(8,743)
WESTWOOD NORTH WSC	(83)	(101)	(142)	(183)	(224)	(283)
WILLIS	(193)	(202)	(250)	(327)	(444)	(608)
WOODBRANCH	(21)	(22)	(38)	(64)	(98)	(141)
COUNTY-OTHER	(11,751)	(26,836)	(44,829)	(67,102)	(95,162)	(129,584)
MANUFACTURING	(727)	(980)	(1,232)	(1,455)	(1,699)	(1,964)
MINING	(343)	(253)	33	189	304	382
STEAM ELECTRIC POWER	5,649	4,205	2,445	300	(2,316)	(5,425)
LIVESTOCK	(123)	(123)	(123)	(123)	(123)	(123)
IRRIGATION	912	912	912	912	912	912
POLK COUNTY						
TRINITY BASIN						
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	528	519	512	505	497	488
LIVINGSTON	3,043	2,777	2,568	2,384	2,226	2,098
ONALASKA	0	0	0	0	0	0
COUNTY-OTHER	30	30	30	30	30	30
MINING	0	26	32	32	32	32
LIVESTOCK	0	0	0	0	0	0
SAN JACINTO COUNTY						
SAN JACINTO BASIN						
COLDSPRING	0	0	0	0	0	0
SAN JACINTO SUD	80	79	79	80	80	80
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
COLDSPRING	0	0	0	0	0	0

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SAN JACINTO COUNTY						
TRINITY BASIN						
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	134	130	127	127	125	124
POINT BLANK	0	0	0	0	0	0
RIVERSIDE WSC	8	8	8	8	8	8
SAN JACINTO SUD	200	201	201	200	200	200
SHEPHERD	0	0	0	0	0	0
COUNTY-OTHER	336	336	336	336	336	336
MINING	0	0	(1)	(1)	(1)	(1)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	56	56	56	56	56	56
TRINITY COUNTY						
TRINITY BASIN						
GROVETON	307	308	307	307	307	303
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	23	13	8	7	0	(5)
TRINITY	859	847	855	870	856	841
TRINITY RURAL WSC	(52)	(80)	(76)	(57)	(79)	(105)
COUNTY-OTHER	191	187	186	192	183	172
MINING	(5)	(5)	(5)	(5)	(5)	(5)
LIVESTOCK	0	0	0	0	0	0
WALKER COUNTY						
SAN JACINTO BASIN						
HUNTSVILLE	9,547	9,386	9,284	9,145	9,000	8,874
NEW WAVERLY	0	0	0	0	0	0
WALKER COUNTY SUD	0	0	0	0	0	0
COUNTY-OTHER	1,603	1,640	1,650	1,643	1,628	1,613
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
HUNTSVILLE	1,956	1,923	1,902	1,873	1,844	1,819
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	14	12	12	11	10	10
RIVERSIDE	0	(2)	(3)	(5)	(7)	(8)
RIVERSIDE WSC	67	67	67	67	67	67
THE CONSOLIDATED WSC	(7)	(8)	(8)	(8)	(9)	(9)
TRINITY RURAL WSC	(14)	(16)	(17)	(17)	(19)	(21)
WALKER COUNTY SUD	0	0	0	0	0	0
COUNTY-OTHER	1,397	1,360	1,334	1,309	1,291	1,277
MANUFACTURING	337	337	337	337	337	337
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
WALLER COUNTY						
BRAZOS BASIN						
BROOKSHIRE	0	0	0	0	0	0
G & W WSC	0	0	0	0	0	0

WUG (NEEDS)/SURPLUS

REGION H	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
WALLER COUNTY						
BRAZOS BASIN						
HEMPSTEAD	0	0	0	0	(207)	(507)
PINE ISLAND	(8)	(23)	(40)	(61)	(86)	(112)
PRAIRIE VIEW	0	0	0	0	0	0
COUNTY-OTHER	0	0	(31)	(324)	(747)	(1,208)
MANUFACTURING	0	(13)	(26)	(37)	(50)	(64)
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SAN JACINTO BASIN						
G & W WSC	0	0	0	0	0	0
KATY	0	0	0	0	0	0
PRAIRIE VIEW	0	0	0	0	0	0
WALLER	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	(348)
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0

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Chapter 5 – Water Management Strategies

5.1 INTRODUCTION

As a growing region with expanding populations and increased economic development, Region H projects substantial needs over the planning horizon through the 2070 decade. However, through the application of Water Management Strategies (WMS), critical needs can be met through the development of infrastructure and operational approaches to ensure a safe, reliable water supply for decades to come.

This chapter examines approaches to meeting the needs identified in ***Chapter 4*** of this Regional Water Plan (RWP). The WMS evaluated in this chapter are applied on a Water User Group (WUG)-level basis in order to collectively meet the needs of the region. This undertaking is intended to first, compile the individual planning efforts for near-term projects being implemented by Wholesale Water Providers (WWPs) and WUGs and verify their consistency with regional goals. Second, this analysis aims to evaluate options for meeting long-term needs that that are outside of the near-term focus of regional providers.

In this effort, the Region H Water Planning Group (RHWPG) was assisted by the members of the Region H Water Management Strategy Committee. Members of this committee are listed below in *Table 5-1*.

Table 5-1 – Region H Water Management Strategy Committee Members

Water Management Strategy Committee	
Member	**Organization**
Judge Robert Hebert (Chair)	Fort Bend County
John Bartos (Vice-Chair)	Galveston Bay Foundation
Robert Bruner	Walker County
Jun Chang	City of Houston
John Hofmann David Collinsworth	Brazos River Authority
Jace Houston	San Jacinto River Authority
Gená Leathers Glenn Lord	Dow Chemical
Ron Neighbors	Neighbors and Associates
Jimmie Schindewolf	North Harris County Regional Water Authority
Kevin Ward	Trinity River Authority

Also, to provide consistency and facilitate the compilation of the different regional plans, the Texas Water Development Board (TWDB) required the incorporation of this data into a standardized online database referred to as DB17. The results of the analyses described below can be found in detail within DB17 and attached to this document in ***Appendix 5-DB***. Note that these values differ from the results of analysis by the RHWPG due to the Rule-Based Groundwater Disparity discussed in *Section 5.5.1*. For this reason, critical information with appropriate modification has been included in ***Appendix 5-A*** to address this issue. The following sections describe procedures for evaluation of WMS, potentially feasible WMS, and recommended and alternative WMS applied to WUG needs in Region H.

5.2 REQUIREMENTS

Regional Water Planning Groups (RWPGs) shall identify and evaluate potentially feasible WMSs for each WUG and WWP where future water supply needs exist (as required by statute and administrative rules 31 TAC §357.34; 357.35). A need for water is identified when existing water supplies are less than projected water demands for that same WUG within any planning decade. If no potentially feasible WMSs are identified or recommended the RWP shall document the reason.

As required by Texas Water Code 16.053(d)(5), the regional water plans shall consider, but not be limited to, the following potentially feasible water management strategies for all identified water needs:

- improved conservation;
- reuse;
- management of existing water supplies;
- conjunctive use;
- acquisition of available existing water supplies;
- development of new water supplies;
- developing regional water supply facilities or providing regional management of water supply facilities;
- voluntary transfer of water within the region using, but not limited to, regional water banks, sales, leases, options, subordination agreements, and financing agreements; and
- emergency transfer of water under Section 11.139.

The RWP shall include:

- the documented process used by the RWPG to identify potentially feasible WMS; and,
- the list of all identified WMS that were considered potentially feasible for meeting a need in the region per 31 TAC 357.12(b). Potentially feasible WMSs shall include those listed above and may also include, but is not limited to, those listed in 31 TAC 357.34(c).

All potentially feasible WMSs must be evaluated in accordance with 31 TAC 357.34.

This information shall be included in Chapter 5 of the RWP along with additional narrative description and other relevant materials and documentation associated with the RWPG's identification of potentially feasible WMSs considered for the region.

As necessary, RWPGs shall update or redevelop any previous WMS evaluations (e.g., developed for other RWPs) to: meet current rule and guidance requirements; reflect changed physical or socioeconomic conditions that have since occurred; reflect changes in water project configurations or conditions; consider newly identified WUGs or WWPs; or to accommodate changes in identified water needs.

Since the development of the planning rules and guidance, the concept of a "project" has been used to describe specific infrastructure used to increase or manage water supplies. Projects may be associated with one or more WMS and, similarly, a WMS may consist of one or more projects. The methodologies discussed below for the evaluation of WMS is equally applicable to projects and has been used as such.

5.3 STRATEGY EVALUATION METHODOLOGY

Evaluation of WMS and associated projects for inclusion in the Region H RWP requires consideration of a wide range of data from a number of sources. Depending on the information available, Region H may adapt information directly from detailed studies developed by project sponsors or develop a high-level analysis of a concept for inclusion in the RWP. In other cases, Region H has performed more in-depth planning studies to evaluate the potential of projects that may yield great regional benefits to water supply. Each of these approaches requires adherence to applicable standards set forth in guidance for regional planning.

5.3.1 Supply Quantity and Reliability

Water supply volumes should take into account the supply conditions set forth in the guidance for RWP development. For groundwater sources, this includes the use of estimates of Modeled Available Groundwater (MAGs) for appropriate formations that have been assigned a Desired Future Condition (DFC) through the Groundwater Management Area (GMA) process.

Surface water resources are evaluated using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM) Run 3 for each basin. These versions of the WAMs assume maximum permitted diversions and no return flows. Where applicable, the models are to include environmental flow provisions in the determination of firm yield supplies.

Supplies are required to be firm under drought of record conditions. Therefore, interruptible supplies and local supplies that are not firm during drought are not available for use in meeting needs.

It is required that supply volumes associated with strategies be exclusive and that multiple projects do not rely on the same volume of water. Water losses should be factored into supplies. In many cases, these losses are considered in the per capita demands for some WUGs with water supplies that originate directly from raw water sources although they must be considered separately in other cases.

5.3.2 Cost Development Methodology

Project costs include the capital costs, debt service, and annual costs associated with implementing and operating a project. Guidance for the 2016 round of regional planning specify that all costs be adjusted to September 2013 values using approved indices such as the Engineering News Record (ENR) Construction Cost Index (CCI).

Project costs are often provided by project sponsors as a result of their own specific studies. In these cases, the costs may be adapted for the RWP by adjusting with cost indices to reach representative September 2013 values.

For development of project costs based on general criteria, TWDB sponsored the development of a Unified Costing Model (UCM) that provides capital, finance, and annual costs for a wide range of project types. Region H adapted this tool for use in development of the 2016 RWP and the documentation for this tool serves as the basis for Region H cost estimates. The resulting Region H tool uses the same unit costs and methodologies as the UCM but presents the information in a manner consistent with the values presented in previous RWPs. These tables can be found for the evaluated projects in ***Appendix 5-B*** of this chapter.

In many cases the information provided by a project sponsor may be incomplete but may account for some aspects of project cost. In these cases, appropriate regional planning assumptions and methods are applied to fill in any remaining information.

For each project, costs have been adapted or developed for the following categories:

- Capital Costs
  - Construction costs
  - Interest during construction
  - Engineering and feasibility studies, legal assistance, financing, bond counsel, and contingencies
  - Permitting and mitigation
  - Land purchase and easement costs
  - Purchase of water supplies
- Debt Service
  - Based on a rate of 5.5 percent for 20 years or 40 years for reservoir projects
- Annual Operating and Maintenance Costs
  - Annual costs
  - Energy costs
- Unit Costs of Water
  - Developed based on project yield and total annual project costs

5.3.3 Strategy Impacts

In evaluating strategies and their associated projects, planning groups are directed to provide a quantitative report of how cultural and environmental resources may be affected. This includes environmental water needs, wildlife habitats, cultural resources, and the effects of upstream development on the bays, estuaries, and arms of the Gulf of Mexico. Information from project sponsors is used, where possible, to identify these concerns. For other projects that lack this level of study at this point, assumptions are used based on the type, scope, and location of a project or strategy.

5.3.4 Region H Strategy Selection Process

Pursuant to TAC 357.5(e)(4), the RHWPG is required to prepare a summary of its process for identifying and selecting WMS for development of the 2016 RWP. This process shall be presented to the public for comment at a public meeting. The methodology described below was presented in a regular, public meeting of the RHWPG on June 6, 2012 and adopted by the group in that same meeting. Subsequently, the term “project” has been used to describe specific infrastructure used to increase or manage water supplies. Therefore, this methodology has since been adapted to the evaluation of Projects as they are presented in DB17. It is recognized that WMS may include one or more projects that can each be scored individually in the selection process.

Potential WMS will be defined based on a determination of needs developed from a comparison of projected demands and existing supplies. These strategies are to be analyzed at the WWP- or WUG-levels. A detailed technical memorandum will be prepared for each of the management strategies selected.

The regional water planning process begins with identifying current and projected future water demands. After water demands are identified for all WUGs, water supplies available to Region H are identified and allocated to WUGs and WWPs based on current usage and contracts. By matching the supplies and the demands, projected surpluses and shortages are determined. WWP supplies and contracts will be reviewed to determine their respective surplus or need during the planning period.

The selection of WMS begins with the identification of certain “general WMS” that are readily available. Such alternatives can provide simple, cost-effective solutions to shortage without the development of new, major water projects. These strategies include the use of groundwater where available, the expansion or extension of existing contracts for water supplies between WUGs and WWPs, and the reduction of demand through water conservation.

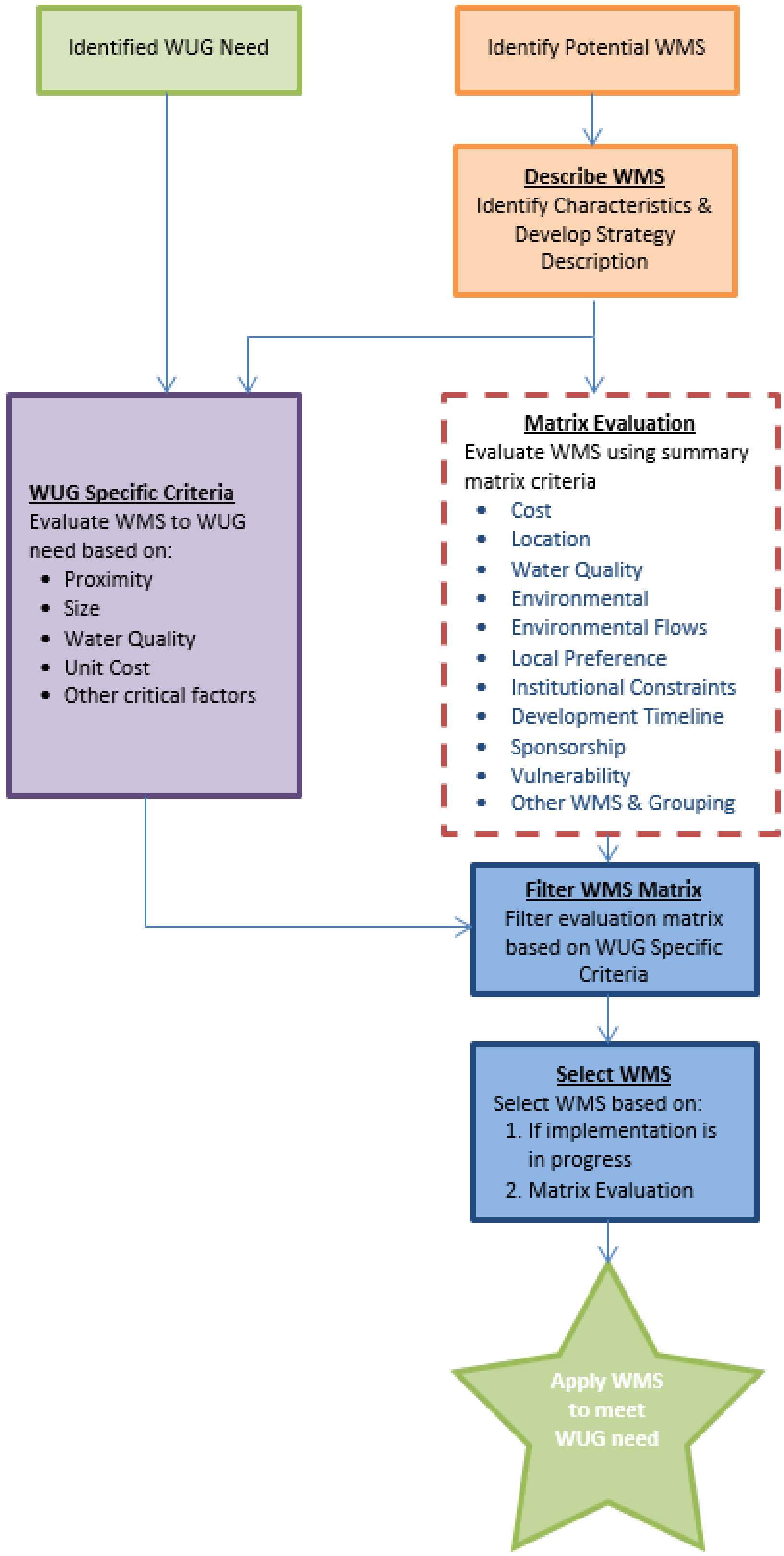
In evaluating the general WMS, the RHWPG will make three assumptions. First, WUGs would continue to develop groundwater until it is fully utilized. This is based upon the observed pattern of development in the region, where the Gulf Coast aquifer is available in all of the southern counties. The supply of groundwater will not be allocated in excess of regulation set forth by subsidence or groundwater conservation districts, or other entities that have regulatory power over the consumption of groundwater.

Second, those WUGs currently receiving water from WWPs would be able to increase their contract amounts until the WWP supplies were fully allocated. This assumes the use of existing supplies conveyed through existing infrastructure wherever possible.

Finally, the RHWPG will assume that every municipal WUG with a projected shortage would, where feasible, utilize conservation before seeking out or increasing a WWP contract. This is pursuant to the language of TAC 357.7(a)(7).

For the development of the 2016 RWP, a dual-phased WMS selection process was proposed. Inputs into the dual-phase process include the identified WUG needs (after the application of General WMS) and the potential WMS. The output is the application of WMS(s) to meet a WUG need. *Figure 5-1* presents a flow chart of the proposed WMS selection process.

Figure 5-1 – Region H WMS Selection Methodology Process



Prior to the dual-phases, the proposed strategies will be described in detail. Within the dual-phases, the first phase (the WUG Specific Criteria phase) focuses on the WUG, as it aims to evaluate the WMS for a specific WUG need. During this phase, questions such as the following must be addressed for a given WMS to be considered acceptable to apply to meet a WUG need:

- Is the strategy within reasonable proximity to location of water need?
- Is the strategy right-sized or easily paired with another WMS?
- Is the expected water quality produced by the strategy significantly different from existing water quality at the WUG?
- Is the unit cost (and capital if no WWP is present) supportable by the target WUG?
- Has any other flaw relating to the WMS and WUG been identified?

The second phase (the Matrix Evaluation phase) focuses on the evaluation of the WMS. In this phase, each WMS will be evaluated based on the matrix criteria presented in *Table 5-2*. Each WMS will be given a score from one to five for each analysis criterion, and the phase will ultimately develop a matrix of rated WMS. The analysis criteria include the following:

- Cost – Evaluates the unit cost of the water produced by the strategy.
- Location – Evaluates the degree of Interbasin transfer or conveyance required to move the water to significant demand centers within Region H.
- Water Quality – Evaluates the strategy's impact on water quality.
- Environmental Land & Habitat – Evaluates the degree of environmental land impacts and the degree of public opposition expected by the strategy.
- Environmental Flows – Evaluates the degree of impact to environmental flows to bays and estuaries.
- Local Preference – Evaluates the local preference and likelihood for public support or opposition created by the strategy.
- Institutional Constraints/Risk of Implementability – Evaluates the potential for factors such as permitting and land acquisition to affect the strategy.
- Development Timeline – Evaluates the amount of time necessary to implement the strategy.
- Sponsorship – Evaluates if a sponsor is identifiable and committed to implementing the strategy.
- Vulnerability – Evaluates the risk to the strategy's ability to deliver water from natural or man-made disasters such as hurricanes, climate change, or terrorism.
- Other WMS/Grouping Potential – Evaluates the likelihood of the strategy to impact other WMS and the potential for the strategy to be grouped with other WMS.

After the dual phase description, the emphasis of the methodology shifts to the identification and selection of Water Management Strategies to meet the particular WUG need of interest. To accomplish this process, the evaluation matrix is filtered for each WUG need, such that all WMS that meet the WUG Specific Criteria are available for selection.

Selection of the WMS will first occur by selecting any strategies that are already in progress. This is intended to make the planning process parallel with ongoing developments within Region H while still allowing for thorough quantitative evaluation of each strategy under consideration. Subsequent selections of WMS will be made, as needed, based on the filtered Matrix Evaluation. After WMS selection, the selected WMS are applied to meet WUG needs.

Table 5-2 – Region H WMS Rating Criteria

Category	Rating Criteria				
	1	2	3	4	5
Cost	>$1000/ac-ft	$750 to $1000/ac-ft	$500 to $750/ac-ft	$250 to $500/ac-ft	<$250/ac-ft
Location	IBT required, long distance or outside Region H.	IBT & Conveyance required for use to meet significant needs.	IBT required for some need centers. Conveyance required.	Some conveyance required to need centers.	No IBT required. Relatively near centers of high demand.
Water Quality	Quality of supply is reduced significantly.	Quality of supply is reduced.	No known water quality issues.	Quality of supply is improved.	Existing water quality problems are reduced.
Environmental Land & Habitat	Significant environmental issues and opposition.	Some environmental issues and opposition.	Environmental impacts can be mitigated. Limited concerns.	Minimal mitigation of impacts needed. Minimal concerns.	Limited or no known impacts.
Impacts on Environmental Flows	Significantly reduces instream or B&E flows.	Reduces instream or B&E flows.	No impact.	Increases instream or B&E flows.	Significantly increases instream or B&E flows.
Local Preference	No local support. Significant opposition.	Minimal local support. Some opposition.	Some local support. Limited opposition.	Local support. Minimal opposition.	Widespread local support. Multi-use benefits likely.
Institutional Constraints / Risk of Implementability	Permits opposed. Significant property required.	Some permit opposition. Some property acquisition necessary.	Permits expected with minimal problems. Property available.	Permit application in progress. Property acquired or under acquisition.	Permits issued. Facilities or land owned. Water available.
Development Timeline	>35 years	25-35 years	15-25 years	5-15 years	0-5 years
Sponsorship	No sponsor readily identifiable.	Sponsor identifiable, but uncommitted.	Sponsor(s) identified, commitment level uncertain.	Sponsor(s) are identified and committed to strategy.	Sponsors identified and strategy is in development.
Vulnerability	Significant risk from natural and man-made disasters.	Substantial risk from natural and man-made disasters.	Moderate risk from natural and man-made disasters.	Slight risk from natural and man-made disasters.	Minimal risk from natural and man-made disasters.
Impacts on Other Management Strategies	Significant negative impacts.	Some negative impacts and/or little chance of grouping.	No impact.	Some positive impacts, potential synergistic effects.	Significant positive impacts, synergy achieved.

5.4 POTENTIAL WATER MANAGEMENT STRATEGIES AND PROJECTS

Potentially feasible WMS were identified in three ways. First, strategies recommended in the 2011 Region H Water Plan for either implementation or additional study were considered potentially feasible. Next, new strategies were solicited during the scope development period for the 2016 Water Plan. Finally, sponsoring agencies that conducted independent strategy studies could bring their reports to the planning group and request they be considered in the plan. As examples, the Brazos River Authority System Operations supply was revised during the planning cycle, and several new GRPs were brought to the RHWPG during the planning cycle.

A summary of identified WUG needs and considered and potential WMS types is included in ***Table 5-A1*** of ***Appendix 5-A***.

It should also be noted that an alternative to WMS implementation that is always an available option is the choice to not meet identified needs. Although not a WMS or a project in the traditional sense, this does serve as an alternative for addressing needs in Region H. This option is another potential course of action for consideration.

5.4.1 Studies by the RHWPG and Others

Potential WMS were defined based on the above determination of needs. Strategies were updated and configured to address the specific types and nature of identified shortages. Several key projects were identified and either studies or summarized as part of this process. A list of the potentially feasible WMS and projects considered by the RHWPG are shown in *Table 5-3*.

Table 5-3 – Region H Potentially Feasible WMS and Projects

Conservation
Industrial Conservation
Irrigation Conservation
Municipal Conservation
Contractual Transfer
TRA to COH Transfer
Conveyance
CHCRWA Transmission and Distribution Expansion
COH/NHCRWA/CHCRWA Second Source Pipeline
East Texas Transfer
GCWA Treated Water from LNVA
Lake Livingston to SJRA Transfer
Luce Bayou Transfer
NFBWA Distribution Expansion
NHCRWA Distribution Expansion
NHCRWA Transmission Line
Old Galveston Road Transmission Improvements
WHCRWA Distribution Expansion
WHCRWA/NFBWA Transmission Line
Groundwater Development
Aquifer Storage and Recovery
Brackish Groundwater Supplies
BWA Brackish Groundwater
Conroe Brackish Reverse Osmosis
Expanded Use of Groundwater
Forestar Houston County Project
Forestar Liberty County Project
Groveton Groundwater Expansion
SJRA Catahoula Aquifer Supplies

Groundwater Reduction Plans
CHCRWA GRP
City of Houston GRP
City of Missouri City GRP
City of Richmond GRP
City of Rosenberg GRP
City of Sugar Land GRP
Fort Bend County MUD 25 GRP
Fort Bend County WCID 2 GRP
NFBWA GRP
NHCRWA GRP
Panorama Village and Shenandoah GRP
Porter SUD GRP
River Plantation MUD GRP
SJRA GRP
WHCRWA GRP
Reuse
City of Conroe Reuse
City of Houston Reuse
City of Pearland Reuse
GCWA Reclaimed Water from COH
Grand Lakes Reclaimed Water System
Montgomery County MUDs #8 and #9 Reuse
Regional Return Flows
SJRA Conroe Reuse Project
Wastewater Reclamation for Industry
Wastewater Reclamation for Municipal Irrigation
Surface Water Development
Allens Creek Reservoir
BRA System Operation Permit
Dow Expansion to Harris Reservoir
Freeport Seawater Desalination
Lake Somerville Augmentation
Little River Off-Channel Reservoir
Lone Star Lake
Treatment
BWA Water Treatment Plant Expansion
City of Houston Treatment Expansion
CLCND West Chambers System
COH Northeast Water Purification Plant Expansion
Pearland Surface Water Treatment Plant
Other Infrastructure
Brazos Saltwater Barrier

For each of these projects, a detailed technical memorandum is provided in ***Appendix 5-B***. Not all of the strategies evaluated are based on developing additional water. For instance, several projects consist of water transfer facilities only (e.g., Luce Bayou, Authority Transmission strategies). Expanded use of groundwater addresses the requirements to fully develop existing groundwater supplies, with consideration given to the regulatory guidelines set by groundwater conservation districts. Other strategies only involve the contractual exchange of water supplies between various water suppliers (e.g., the TRA to City of Houston water transfer). These strategies recognize the need to transfer supplies from areas of excess to the specific areas of need, mainly within the western and lower portions of the region. In many cases, there are aspects of a particular project that cross categories. The major categories these projects are listed under are meant to represent the general nature of each project only.

5.4.2 Drought Management

The Regional Water Planning Guidelines require that drought management strategies be considered for each identified need. If drought management is not selected as a strategy, current TWDB policy for regional water supply planning requires that reasons for its exclusion must be documented. Drought management strategies may include water demand management.

The supply and demand values used for this plan are based on estimated drought of record conditions. Under non-drought conditions, the region will have an overall surplus of supply. This surplus does not coexist with the growing demand areas. The majority of available supply is in Lake Livingston which is in the Trinity Basin. However, the majority of the growth is occurring in Brazoria, Fort Bend, Harris, and Montgomery Counties which are in the Brazos and San Jacinto Basins. To meet the demands where they occur, supply from the Trinity must be transferred into the San Jacinto Basin. Once that infrastructure is constructed, it is not “drought-susceptible”, because the permitted yield of the underlying water rights does not exceed the drought yield. Similarly, surface supplies are replacing groundwater due to subsidence regulations, and that supply is also firm.

According to the February 2009 report titled Region H Water Planning Group Drought Management Study, the implementation of a drought contingency plan could minimize the drawdown of Region H reservoirs and shorten the duration of impacts on lake levels during a repeat of drought-of-record conditions. However, the analysis indicated that these drought contingency measures are relatively insignificant in terms of an annual increased supply. The results of this study indicate that while drought contingency planning is a critical component of water supply management and may provide short-term benefits during severe drought conditions, drought management alone will not replace any recommended long term water management strategies and benefits are variable and may not be realized when needed in case of a drought emergency. These results were developed based on information from the 2006 RWP.

This does not preclude some WUGs from electing to use drought management in lieu of a recommended strategy. The best example of this is for irrigation. Region H recommends irrigation conservation as a management strategy in those counties with projected irrigation shortages. However, portions of those irrigation demands are met today through the use of water rights which are not fully reliable, backed up by one-year contracts for reliable supply as needed. Irrigators holding interruptible water rights may choose not to implement conservation (at an annual cost), but instead choose to reduce their irrigated acreage during a drought year (for a discrete cost), or enter into long-term contracts for reliable surface water from a wholesale supplier (which will be available in the eastern counties). That is an individual economic decision and the Region H plan recognizes the flexibility of these irrigators to exercise that option.

Municipalities and water providers throughout the region have published drought contingency plans. In general, these plans are designed to address short-term periods of limited water availability through public notice and outdoor water use restrictions. While these methods are effective over a limited period of time, they are unlikely to overcome the drought of record, which extended through a period of approximately five years. Only the development of reliable supplies to meet projected growth will protect the region from the economic impacts of a prolonged drought.

5.4.3 Interruptible Supplies

TWDB guidelines require use of "firm" water supplies for regional water supply planning for allocation to meet future needs for all types of water uses. Firm water supplies are those supplies predicted to be 100% reliable during the drought of record conditions. While this planning criteria represents a sound and conservative approach for water users that require supplies with a high degree of reliability such as municipal and manufacturing demands, some types of water uses such as irrigated agriculture, may be able to utilize surface water supplies that are less than fully dependable during a drought of record by suspending irrigation in favor of dry-land crops during these periods. These less than 100 percent reliable supplies are called "interruptible" supplies. These supplies were utilized with great success in the Region H 2011 RWP. Although these supplies are vital to providing supply to agriculture, they are not allowed under the current guidance for RWP development and, therefore, have not been included as potential strategies in the 2016 RWP.

5.4.4 Socio-Economic Impacts of Not Meeting Identified Needs

By definition, one alternative for addressing needs identified in the RWP is the choice to not meet the shortages. However, this alternative is associated with costs due to lost economic revenue, population growth, and expansion of the tax base. An analysis of these factors will be conducted by TWDB following the final entry of supplies into DB17 and will be included as ***Appendix 5-C***.

5.5 RECOMMENDED WATER MANAGEMENT STRATEGIES

5.5.1 Needs Related to Rule-Based Groundwater Disparity

As discussed within ***Chapter 4***, there are significant needs identified within Region H that will not occur under even drought of record conditions brought about between the disparity between regulated groundwater availability permitted by groundwater-regulating entities within Region H and the estimates of Modeled Available Groundwater (MAG) required for use in the development of the 2016 RWP. Properly addressing these needs was a priority of the WMS Committee and resulted in in-depth conversations with the Texas Water Development Board (TWDB) concerning the most appropriate way to deal with these needs.

As a result of these conversations, the Region H WMS Committee recommended an approach to assume that these needs would be met through the regulatory groundwater availability permitted by groundwater-regulating entities. That is, these needs did not require the application of WMS in order to satisfy their associated needs. Although this water supply could not be shown in the RWP due to applicable planning rules, the committee recognized that these needs would not actually develop due to the actual, real-world availability of this groundwater supply. This approach accomplishes the following:

- Recognizes that needs caused by the disparity in definitions of groundwater availability are not real-world limitations on existing and future water supplies, and
- Prevents the application of unneeded WMS that would inappropriately demonstrate non-existent needs for projects, infrastructure, and associated funding to meet water needs.

Therefore, throughout this chapter, the WMS applied to needs will be WMS that are assigned to meet needs in excess of this Rule-Based Groundwater Disparity. Needs associated with artificial groundwater limitations were not considered during WMS selection.

It is recognized by the RHWPG that, during the drought and demand conditions represented in the RWP, water users with regulatory access to groundwater, including municipalities, will utilize these supplies that are beyond the MAG but within the regulatory availability of their appropriate jurisdictions. Therefore, this approach does not endanger the public health, safety, and welfare of the affected WUGs. This is particularly true for “drought” conditions that are implied by the RWP as occurring due to demand increase rather than supply limitations, as development of these additional water supplies beyond the MAG will continue in order to provide for average demands in addition to peak water needs.

Although it is foreseeable that this discrepancy may be reduced somewhat through drought contingency measures, the RHWPG prefers to not imply that these are potential needs that may be covered through drought contingency. Drought contingency has an important role in meeting short-term needs during extreme climate and demand conditions. However, the needs brought about by this identified Rule-Based Groundwater Disparity will not occur in reality due to the groundwater development options available to WUGs. Applying WMS, including drought management, to these unrealistic needs is an inaccurate representation of what these needs represent and indicates the need for a project where one is not appropriate.

5.5.2 New and Increased Supply Availability

The development of WMS and associated projects have the potential to either optimize the use of existing water sources, increase the availability from existing sources, or provide water from new sources. In total, the WMS recommended in the 2016 RWP increase water supplies or provide for newly developed water to as much as 1,055,390 acre-feet per year by 2070. These increases in overall supply for the region are detailed in ***Table 5-A2*** in ***Appendix 5-A***.

5.5.3 Project Scoring

The RHWPG conducted a scoring process for the key projects identified in planning process. This followed the methodology described in *Section 5.3.4*. The results of this scoring is included in each technical memorandum included in ***Appendix 5-B*** along with an explanation of how the scores for each criterion was selected. Finally, ***Table 5-A3*** in ***Appendix 5-A*** summarizes the scores for all key projects for easy comparison.

5.5.4 Selected WMS and Projects

A number of WMS and projects were selected for meeting the needs identified in within Region H. As noted previously, WMS represent general approaches to water supply that are accomplished through a number of projects. *Table 5-4* below represents the relationship between applied WMS and the key projects assigned in the planning process. A complete list of projects associated with WMS is included as ***Table 5-A4*** in ***Appendix 5-A***.

Table 5-4 – WMS and Key Project Relationships

Water Management Strategy	WMS Project Name
Additional Supply From BRA	Allens Creek Reservoir
Additional Supply From GCWA	Allens Creek Reservoir
	GCWA Reclaimed Water from COH
Brackish Groundwater Supplies	WUG Infrastructure Expansion (WUG-level projects)
Brazos Saltwater Barrier	Brazos Saltwater Barrier
CHCRWA GRP	CHCRWA GRP
	CHCRWA Transmission and Distribution Expansion
	COH Northeast Water Purification Plant Expansion
	COH/NHCRWA/CHCRWA Second Source Pipeline
	Luce Bayou Transfer
	Regional Return Flows
City Of Houston GRP	City of Houston GRP
	City of Houston Treatment Expansion
	COH Northeast Water Purification Plant Expansion
	COH/NHCRWA/CHCRWA Second Source Pipeline
	Luce Bayou Transfer
	Regional Return Flows
	TRA to COH Transfer
City Of Pearland Reuse	City of Pearland Reuse
COH Reuse	City of Houston Reuse
	City of Houston Treatment Expansion
	COH Northeast Water Purification Plant Expansion
Conroe Brackish Groundwater Desalination	Conroe Brackish Reverse Osmosis
Dow Reservoir Expansion	BWA Water Treatment Plant Expansion
	Dow Expansion to Harris Reservoir
East Texas Transfer	City of Houston Treatment Expansion
	East Texas Transfer
Expanded Use Of Groundwater	Expanded Use of Groundwater
Fort Bend MUD 25 GRP	Fort Bend County MUD 25 GRP
Fort Bend WCID 2 GRP	Fort Bend County WCID 2 GRP
Freeport Seawater Desalination	Freeport Seawater Desalination
Groveton Groundwater Expansion	Groveton Groundwater Expansion

Water Management Strategy	WMS Project Name
Industrial Conservation	Industrial Conservation
Irrigation Conservation	Irrigation Conservation
Missouri City GRP	City of Missouri City GRP
Montgomery County MUDs #8 and #9 Reuse	Montgomery County MUDs #8 and #9 Reuse
Municipal Conservation	Municipal Conservation (incl. Water Loss Reduction)
New / Expanded Contract With BRA	Allens Creek Reservoir
	BRA System Operation Permit
New / Expanded Contract With BWA	BWA Water Treatment Plant Expansion
New / Expanded Contract With BWA - Brackish Groundwater	BWA Brackish Groundwater
New / Expanded Contract With CLCND	CLCND West Chambers System
New / Expanded Contract With COH	City of Houston GRP
	City of Houston Treatment Expansion
	COH Northeast Water Purification Plant Expansion
	Luce Bayou Transfer
	Regional Return Flows
	TRA to COH Transfer
New / Expanded Contract With GCWA	GCWA Reclaimed Water from COH
New / Expanded Contract With LNVA	Transfer to Region H (Region I project)
New / Expanded Contract With SJRA	Lake Livingston to SJRA Transfer
	Regional Return Flows
	SJRA GRP
NFBWA Grand Lakes Reuse	Grand Lakes Reclaimed Water System
NFBWA GRP	City of Houston Reuse
	COH Northeast Water Purification Plant Expansion
	Luce Bayou Transfer
	NFBWA GRP
	NFBWA Distribution Expansion
	Regional Return Flows
	TRA to COH Transfer
	WHCRWA/NFBWA Transmission Line
NHCRWA GRP	City of Houston Reuse
	COH Northeast Water Purification Plant Expansion
	COH/NHCRWA/CHCRWA Second Source Pipeline
	Luce Bayou Transfer
	NHCRWA Distribution Expansion
	NHCRWA GRP
	NHCRWA Transmission Line
	Regional Return Flows
	TRA to COH Transfer
Old Galveston Road Transmission Improvements	Old Galveston Road Transmission Improvements

Water Management Strategy	WMS Project Name
Panorama And Shenandoah Joint GRP	Panorama Village and Shenandoah GRP
Pearland SWTP	Allens Creek Reservoir
	GCWA Reclaimed Water from COH
	Pearland Surface Water Treatment Plant
Porter SUD Joint GRP	City of Conroe Reuse
	Porter SUD GRP
Reallocate Existing Supply	WUG Infrastructure Expansion (WUG-level projects)
Richmond GRP	City of Richmond GRP
River Plantation And East Plantation Joint GRP	River Plantation MUD GRP
Rosenberg GRP	BWA Water Treatment Plant Expansion
	City of Rosenberg GRP
SJRA Catahoula Aquifer Supplies	SJRA Catahoula Aquifer Supplies
SJRA GRP	SJRA GRP
SJRA Reuse Supplies For Manufacturing	Regional Return Flows
	SJRA Conroe Reuse
Sugar Land GRP	City of Sugar Land GRP
Wastewater Reclamation For Municipal Irrigation	Wastewater Reclamation for Municipal Irrigation
Water Loss Reduction	Municipal Conservation (incl. Water Loss Reduction)
WHCRWA GRP	City of Houston Reuse
	COH Northeast Water Purification Plant Expansion
	Luce Bayou Transfer
	Regional Return Flows
	TRA to COH Transfer
	WHCRWA GRP
	WHCRWA Distribution Expansion
	WHCRWA/NFBWA Transmission Line

For many WUGs within the Region, conservation and direct reuse projects are considered first-tier options for addressing projected needs; an assessment of need remaining after applying these project types but before applying other projects or WMS is included in ***Table 5-A5*** in ***Appendix 5-A.*** The compilation of all recommended projects results in as much as 1,795,358 acre-feet per year for Region H. These allocations are detailed in ***Table 5-A6*** in ***Appendix 5-A***. A summary of water source supply balance after allocation of WMS supplies is shown in ***Table 5-A7*** in ***Appendix 5-A.*** *Table 5-5* below summarizes the key projects selected as part of recommended WMS along with their total potential yield, capital cost, and decade of implementation.

Table 5-5 – Key Project Overview

Project	Potential Volume[1] (ac-ft)	Capital Cost ($)	Unit Cost ($/ac-ft)		Start Decade
			Start Decade	2070	
Conservation					
Industrial Conservation[2]	65,261	$0	$0	$0	2020
Irrigation Conservation	86,123	$1,155,709	$113	$112	2020
Municipal Conservation (incl. Loss Reduction)	150,655	$1,699,918,210	$726	$726	2020
Contractual Transfer					
TRA to COH Transfer	150,000	$0	$5	$5	2020
Conveyance					
CHCRWA Transmission and Distribution Expansion	4,682	$23,207,659	$409	$44	2020
COH/NHCRWA/CHCRWA Second Source Pipeline	148,042	$150,325,381	$83	$9	2020
East Texas Transfer	250,000	$388,064,210	$145	$15	2040
Lake Livingston to SJRA Transfer	50,000	$166,710,892	$311	$32	2050
Luce Bayou Transfer	450,000	$360,004,806	$143	$23	2020
NFBWA Distribution Expansion	62,496	$65,450,062	$95	$7	2020
NHCRWA Distribution Expansion	143,360	$922,549,086	$307	$50	2020
NHCRWA Transmission Line	143,360	$155,993,406	$86	$6	2020
Old Galveston Road Transmission Improvements	24,300	$99,886,253	$322	$25	2020
WHCRWA Distribution Expansion	91,896	$293,290,000	$299	$32	2020
WHCRWA/NFBWA Transmission Line	154,392	$642,986,052	$340	$34	2020
Groundwater Development					
Brackish Groundwater Supplies[3]	Varies	Varies by project	Varies	Varies	2020
BWA Brackish Groundwater	3,136	$34,016,950	$600	$346	2020
Conroe Brackish Reverse Osmosis	5,600	$40,691,342	$857	$323	2020
Expanded Use of Groundwater[3]	30,000+	Varies by WUG	Varies by WUG	Varies by WUG	2020
Groveton Groundwater Expansion	161	$2,195,000	$1,277	$136	2020
SJRA Catahoula Aquifer Supplies	7,840	$10,980,367	$213	$96	2020
Groundwater Reduction Plans					
CHCRWA GRP[4]	4,682	$0	$0	$0	2020
City of Houston GRP[4]	130,544	$0	$0	$0	2020
City of Missouri City GRP	12,656	$50,959,636	$329	$33	2020
City of Richmond GRP	1,465	$32,167,109	$1,761	$146	2020
City of Rosenberg GRP	826	$12,469,012	$1,242	$131	2020
City of Sugar Land GRP	20,160	$148,650,964	$900	$283	2020
Fort Bend County MUD 25 GRP	744	$2,148,043	$282	$40	2030
Fort Bend County WCID 2 GRP	6,720	$36,668,844	$800	$343	2020
NFBWA GRP[4]	62,496	$0	$0	$0	2020
NHCRWA GRP[4]	143,360	$0	$0	$0	2020
Panorama Village and Shenandoah GRP	472	$1,619,114	$469	$132	2040

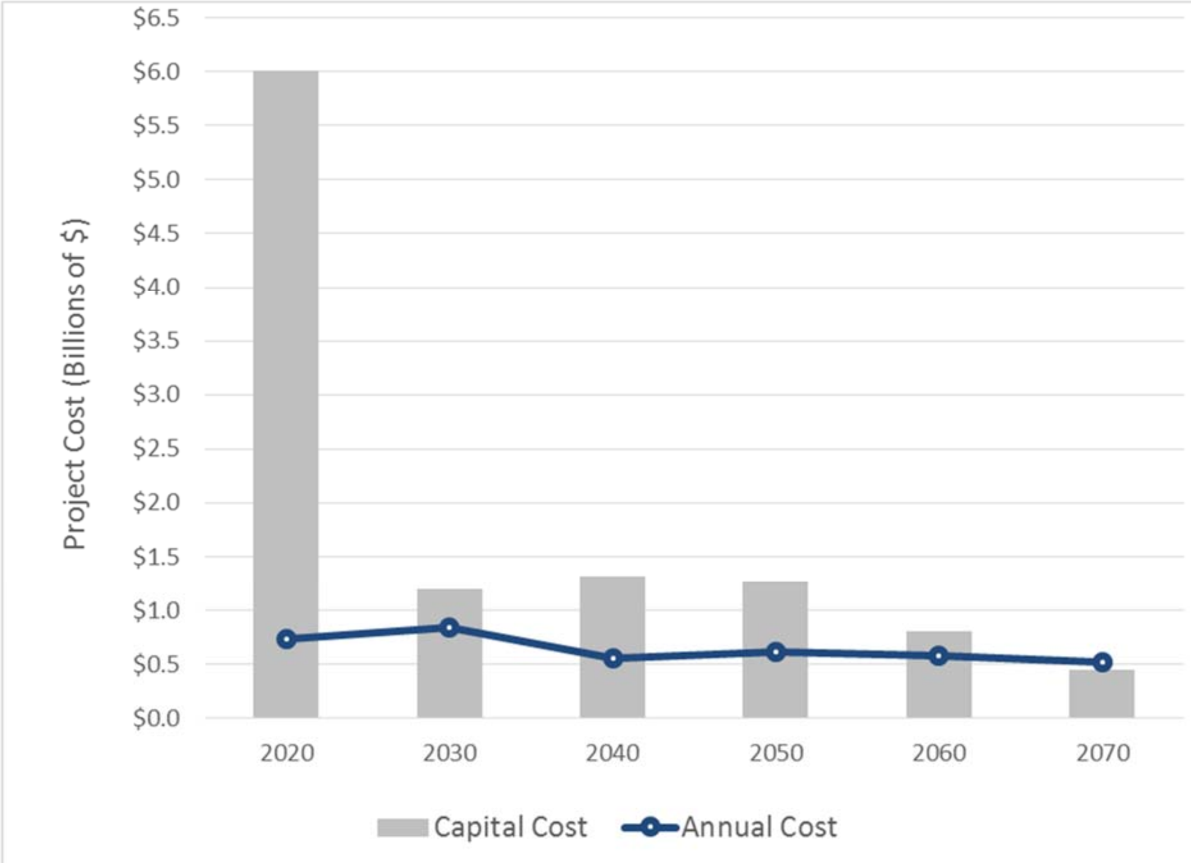
Project	Potential Volume[1] (ac-ft)	Capital Cost ($)	Unit Cost ($/ac-ft)		Start Decade
			Start Decade	2070	
Porter SUD GRP	2,240	$22,061,536	$1,250	$426	2020
River Plantation MUD GRP[5]	92	$0	$0	$0	2030
SJRA GRP	100,000	$834,931,018	$245	$81	2020
WHCRWA GRP[4]	91,896	$0	$0	$0	2020
Reuse					
City of Conroe Reuse[4]	3,694	$0	$0	$0	2020
City of Houston Reuse	197,467	$78,121,149	$56	$12	2040
City of Pearland Reuse	1,154	$5,895,808	$517	$90	2020
GCWA Reclaimed Water from COH	33,712	$56,379,232	$187	$47	2020
Grand Lakes Reclaimed Water System	661	$13,148,843	$2,276	$612	2020
Montgomery County MUDs #8 and #9 Reuse	1,680	$15,351,774	$1,360	$595	2020
Regional Return Flows[4]	150,994	$0	$0	$0	2020
SJRA Conroe Reuse Project[4]	6,807	$0	$0	$0	2020
Wastewater Reclamation for Municipal Irrigation	38,940	$103,454,114	$290	$161	2030
Surface Water Development					
Allens Creek Reservoir	99,650	$316,226,894	$321	$33	2020
BRA System Operation Permit[4]	25,350	$0	$0	$0	2020
Dow Expansion to Harris Reservoir	80,000	$255,865,694	$303	$36	2020
Freeport Seawater Desalination	11,200	$132,937,747	$2,454	$1,461	2040
Treatment					
BWA Water Treatment Plant Expansion	8,400	$15,951,976	$353	$194	2020
City of Houston Treatment Expansion	116,258	$288,529,429	$386	$183	2040
CLCND West Chambers System	2,800	$24,657,839	$1,354	$617	2020
COH Northeast Water Purification Plant Expansion	358,400	$1,263,612,418	$784	$489	2020
Pearland Surface Water Treatment Plant	22,400	$112,947,347	$839	$230	2020
Other Infrastructure					
Brazos Saltwater Barrier	72,396	$55,771,408	$69	$5	2020

1. Volumes listed in this table represent the maximum anticipated volume associated with the projects rather than new increments of yield. Volumes shown in this table may overlap and are not necessarily additive.
2. Insufficient information to determine cost.
3. Includes brackish groundwater projects implemented under Expanded Use of Groundwater. Costs vary by WUG.
4. Costs included under associated infrastructure projects.
5. Supply generated through expanded use of existing infrastructure. Cost estimated to be minimal.

5.5.5 Selected WMS and Project Costs

The total capital costs identified for the 2016 Region H RWP total $11,036,482,139. These costs are distributed over the planning period as shown in *Figure 5-2*. *Figure 5-2* also includes the annual costs anticipated over each decade of the plan. Detailed costs by project are shown in ***Table 5-A8*** and ***Table 5-A9*** in ***Appendix 5-A***.

Figure 5-2 – Region H Capital and Annual Costs



5.5.6 Contractual Relationships

Contracts for raw or treated water represent a major consideration for water supply in Region H and other regions that rely on a large number of WWPs in order to facilitate the transfer of developed water to demands. In addition to meeting demands, WWPs are obligated to provide water under the terms of their contracts to customers. These needs are often far in excess of actual demands as water providers aim to plan for long-term demands when they acquire new water supplies. These contractual commitments and expansions are detailed in ***Table 5-A10*** of ***Appendix 5-A***.

5.5.7 Management Supply Factor

Guidance for development of the 2016 RWPs includes a requirement for consideration of a Management Supply Factor. This factor represents the quantity to which a WUG is over- or under-supplied based on a multiple of 1. A WUG with all of its needs met with no additional surplus would represent a factor of 1.0. WUGs with supplies exceeding or below their demand level would receive a factor above or below 1.0, respectively. The Management Supply Factors for Region H WUGs as a result of applying identified WMS are shown in ***Table 5-A11*** of ***Appendix 5A***. Note that these values differ from the values presented in DB17 and ***Appendix 5-DB*** due to the identified Rule-Based Groundwater Disparity.

5.6 ALTERNATIVE WATER MANAGEMENT STRATEGIES AND PROJECTS

The RHWPG has not elected to recommend any projects as Alternative Water Management Strategies.

5.7 REMAINING UNMET NEEDS

Following the development of WMS for the 2016 RWP, certain needs identified in Chapter 4 of the RWP remain unmet. That is, no WMS was found suitable to apply to these needs or that the application of actual supplies are not allowable under the guidance for RWP development.

The needs associated with the Rule-Based Groundwater Disparity were recognized early in the process as demands that could not be met under the provided guidance. As groundwater availability is set by the MAG availability and regulatory availability of groundwater often exceeds this level, these needs were assumed to go unmet for the purpose of plan development. However, it is the perspective of the RHWPG that these needs will be easily met with minimal infrastructure that is currently in place of capture the full, regulatory availability of the aquifers in Region H. The contents of ***Appendix 5-DB*** indicate that these needs remain unmet. However, the RHWPG feels that the projects contained and described in ***Appendix 5-A*** are adequate to meet the needs for all foreseeable needs in the planning horizon.

One exception to this are the needs identified for Irrigation and Livestock in many counties of Region H. It was recognized in the planning process that the nature of some projects, particularly related to cost, make them unlikely solutions to the needs of some WUGs. Agriculture operates on a very narrow margin in terms of cost. Rather than invest in firm water supplies, the characteristics of agricultural production require investment in lower-cost, short-term sources of water. As a result, many of these supplies may be interrupted during times of drought. Therefore, it is not reasonable to assign a WMS for agricultural use that will deviate from this existing cost model.

The RHWPG recognized irrigation conservation as one affordable strategy that could limit the needs experienced by agriculture. However, during times of exceptional drought, conservation measures alone are not enough to alleviate potential needs as no reduction in water demand is capable of providing the baseline supply of water in absence of a reliable water source from either groundwater or surface water.

In addition to conservation, the RHWPG recognizes the following potential solutions for agriculture during drought that are not compatible with the guidance for inclusion in a RWP:

- Use of interruptible supplies: The predominant source of surface water for use in Irrigation in Region H comes from regional providers who provide water for a number of uses in addition to agriculture. During drought when supplies are limited, firm water supplies are first set aside for firm municipal and industrial uses. This practice is common and provides a cost-effective supply for agriculture in most years. Similarly, Livestock water supplies are often supplied by on-site ponds that receive water from runoff and supplemented with shallow groundwater production. During drought these supplies may be cut off but they remain vital supplies during most climate conditions. The guidance pertaining to RWP development prevent the application of any of these supplies to meet identified needs due to their lack of firm yield availability.
- Refraining from production during drought of record: Often, when interruptible supplies are depended upon for agricultural production, it is essential to limit demands in order to

eliminate water needs that cannot be met through the production cycle. The RHWPG encourages the efforts of local WWPs to work with irrigators to responsibly project the availability of water supplies during the growing season in order to provide reliable outlooks regarding the long-term availability of water for agriculture and to prevent the unnecessary investment in crops that may ultimately fail due to limited resources. This option is more difficult to implement for Livestock which requires water for maintenance of herds. In these situations, herd reduction may be the only viable option when water supplies are not available.

- Conjunctive use: Finally, the RHWPG recommends that agricultural water users seek options for conjunctive use of resources to meet needs. Increasingly, users have access to both surface and groundwater supplies and this presents an opportunity for conjunctive use. Although surface water supplies are less expensive to use, the security of groundwater availability has promoted the development of wells in many areas. Furthermore, many groundwater-regulating entities do not limit the production of water for agricultural purposes. There is potential to produce groundwater and surface water in order to capitalize on the drought-resistant natures of groundwater while extending the sustainability of this resource through surface water use. Although the guidance for RWP development does not provide for the inclusion of this sort of conjunctive use in the RWPs, it remains a viable, real-world solution to the issue of agricultural water availability. It should be noted that the RHWPG respects the opportunity for water users to responsibly use groundwater and surface water resources in a responsible manner; it does not support the use of groundwater in a way that would exceed regulatory plans or the long-term sustainability of the aquifer.

Remaining unmet needs in the 2016 RWP following application of identified WMS and projects are shown below in *Table 5-6*.

Table 5-6 – Remaining Unmet Needs

WUG Name	County	Basin	Unmet Needs (ac-ft)					
			2020	2030	2040	2050	2060	2070
IRRIGATION	BRAZORIA	B-C	0	0	0	0	-217	-479
		SJ-B	-49,022	-49,539	-49,906	-50,308	-50,743	-51,143
	FORT BEND	SJ-B	-1,186	-1,186	-1,186	-1,186	-1,186	-1,186
	GALVESTON	N-T	-11	-11	-11	-11	-11	-11
		SJ-B	-4,300	-4,300	-4,300	-4,300	-4,300	-4,300
LIVESTOCK	BRAZORIA	B	-9	-17	-23	-29	-35	-42
		B-C	-137	-159	-175	-192	-211	-228
		SJ-B	-93	-164	-216	-272	-332	-388
	GALVESTON	N-T	-51	-51	-51	-51	-51	-51
		SJ-B	-177	-177	-177	-177	-177	-177
	HARRIS	SJ	-522	-939	-1,213	-1,214	-1,214	-1,215
		T-SJ	-112	-114	-120	-119	-119	-118

N-T = Neches-Trinity, T-SJ = Trinity-San Jacinto, SJ = San Jacinto, SJ-B = San Jacinto-Brazos, B = Brazos, B-C = Brazos-Colorado

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APPENDIX 5-A

WATER MANAGEMENT STRATEGY TABLES

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Table 5-A1 – Considered and Potential WMS Type by WUG

WUG Name	Max. Need (Ac-Ft/Yr)	Conservation	Drought Management	Reuse	Reallocation/ Management of Existing Supplies	Conjunctive Use	Development of New Supplies	Development of Regional Water Supply	Voluntary Transfer of Water	Emergency Transfers
○ = Considered but determined "not potentially feasible"					● = Considered "potentially feasible" and evaluated					
ARCOLA	354	●	○	●	○	○	○	○	○	○
BAILEY'S PRAIRIE	1	●	○	○	○	○	○	○	○	○
BEACH CITY	337	○	○	○	●	○	●	○	○	○
BEASLEY	1	●	○	○	○	○	○	○	○	○
BENDERS LANDING WATER SYSTEM	5,184	●	○	○	●	○	○	●	●	○
BLUE BELL MANOR UTILITY COMPANY	436	●	○	○	●	○	○	●	○	○
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	2,424	●	○	●	●	○	○	●	○	○
CLEAR LAKE SHORES	241	●	○	●	○	○	○	○	○	○
CLUTE	180	●	○	○	●	○	●	○	○	○
CONROE	10,563	●	○	○	●	○	○	●	○	○
COUNTY-OTHER, AUSTIN	1,261	●	○	○	●	○	●	○	○	○
COUNTY-OTHER, BRAZORIA	27,180	●	○	●	●	○	●	○	○	○
COUNTY-OTHER, FORT BEND	29,860	●	○	●	●	○	●	●	○	○
COUNTY-OTHER, GALVESTON	2,835	●	○	●	●	○	○	○	●	○
COUNTY-OTHER, HARRIS	3,495	●	○	●	●	○	○	●	●	○
COUNTY-OTHER, LIBERTY	660	●	○	○	●	○	●	○	○	○
COUNTY-OTHER, MADISON	14	●	○	○	●	○	●	○	○	○
COUNTY-OTHER, MONTGOMERY	122,518	●	○	●	●	○	○	●	●	○
COUNTY-OTHER, WALLER	1,556	●	○	○	●	○	●	○	○	○
DOBBIN-PLANTERSVILLE WSC	2,139	●	○	○	●	○	○	○	○	○
EAST PLANTATION UD	94	●	○	○	●	○	○	●	●	○
EL DORADO UD	133	●	○	○	●	○	○	●	○	○
FORT BEND COUNTY MUD #116	619	●	○	○	●	○	○	●	○	○
FORT BEND COUNTY MUD #121	94	●	○	○	●	○	○	●	○	○
FORT BEND COUNTY MUD #129	603	●	○	○	●	○	○	●	○	○

WUG Name	Max. Need (Ac-Ft/Yr)	Conservation	Drought Management	Reuse	Reallocation/ Management of Existing Supplies	Conjunctive Use	Development of New Supplies	Development of Regional Water Supply	Voluntary Transfer of Water	Emergency Transfers
○ = Considered but determined "not potentially feasible"					**● = Considered "potentially feasible" and evaluated**					
FORT BEND COUNTY MUD #23	539	●	○	○	●	○	○	●	○	○
FORT BEND COUNTY MUD #25	345	●	○	○	●	○	○	●	○	○
FOUNTAINVIEW SUBDIVISION	130	●	○	○	●	○	○	○	●	○
FULSHEAR	767	●	○	○	●	○	○	●	○	○
GREATWOOD	454	●	○	○	●	○	○	●	○	○
GREEN TRAILS MUD	278	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #106	766	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #11	186	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #119	257	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #132	436	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #151	502	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #152	626	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #153	582	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #154	408	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #180	288	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #189	227	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #221	267	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #278	722	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #290	379	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #345	391	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #400 - WEST	530	●	○	○	●	○	○	●	○	○
HARRIS COUNTY MUD #46	313	●	○	○	●	○	○	●	○	○
HARRIS COUNTY UD #14	209	●	○	○	●	○	○	●	○	○
HARRIS COUNTY UD #15	454	●	○	○	●	○	○	●	○	○
HARRIS COUNTY WCID #133	440	●	○	○	●	○	○	●	○	○
HARRIS COUNTY WCID #74	464	●	○	○	●	○	○	●	○	○
HEMPSTEAD	507	●	○	○	●	○	●	○	○	○
HOUSTON	167,051	●	○	●	●	○	●	●	○	○
INDIGO LAKE WATER SYSTEM	5,538	○	○	○	○	○	○	○	○	○
IRRIGATION, BRAZORIA	75,942	●	○		○	○	○		○	○

WUG Name	Max. Need (Ac-Ft/Yr)	Conservation	Drought Management	Reuse	Reallocation/ Management of Existing Supplies	Conjunctive Use	Development of New Supplies	Development of Regional Water Supply	Voluntary Transfer of Water	Emergency Transfers
○ = Considered but determined "not potentially feasible"					● = Considered "potentially feasible" and evaluated					
IRRIGATION, CHAMBERS	3,780	●	○		●	○	●		○	○
IRRIGATION, FORT BEND	1,941	●	○		●	○	○		○	○
IRRIGATION, GALVESTON	6,054	●	○		○	○	○		○	○
IRRIGATION, LIBERTY	14,158	●	○		●	○	●		○	○
KATY	3,795	●	○	○	●	○	○	●	○	○
KEMAH	1,032	●	○	●	○	○	○	○	○	○
KINGS MANOR MUD	80	●	○	○	●	○	○	●	○	○
KIRKMONT MUD	51	●	○	○	●	○	○	○	●	○
LA MARQUE	508	●	○	●	○	○	○	○	○	○
LAKE JACKSON	536	●	○	○	●	○	●	○	○	○
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	5	●	○	○	○	○	○	○	○	○
LAKE WINDCREST WATER SYSTEM	2,056	●	○	○	●	○	○	●	○	○
LIVESTOCK, BRAZORIA	658		○		○	○	○		○	○
LIVESTOCK, CHAMBERS	86		○		●	○	●		○	○
LIVESTOCK, GALVESTON	228		○		○	○	○		○	○
LIVESTOCK, HARRIS	1,333		○		○	○	○		○	○
LIVESTOCK, LIBERTY	419		○		●	○	●		○	○
LONGHORN TOWN UD	148	●	○	○	●	○	○	●	○	○
MAGNOLIA	1,407	●	○	○	●	○	○	●	○	○
MANUFACTURING, AUSTIN	41	●	○	○	●	○	●		○	○
MANUFACTURING, BRAZORIA	146,453	●	○	○	●	○	●		○	○
MANUFACTURING, CHAMBERS	835	●	○	○	●	○	●		○	○
MANUFACTURING, FORT BEND	3,886	●	○	●	○	○	○		○	○
MANUFACTURING, GALVESTON	4,342	●	○	●	●	○	●		○	○
MANUFACTURING, HARRIS	56,268	●	○	●	●	○	○		●	○
MANUFACTURING, LEON	554	●	○	○	●	○	●		○	○
MANUFACTURING, LIBERTY	390	●	○	○	●	○	●		○	○
MANUFACTURING, MADISON	111	●	○	○	●	○	●		○	○

WUG Name	Max. Need (Ac-Ft/Yr)	Conservation	Drought Management	Reuse	Reallocation/ Management of Existing Supplies	Conjunctive Use	Development of New Supplies	Development of Regional Water Supply	Voluntary Transfer of Water	Emergency Transfers
○ = Considered but determined "not potentially feasible"					● = Considered "potentially feasible" and evaluated					
MANUFACTURING, MONTGOMERY	1,529	●	○	○	●	○	○		●	○
MANUFACTURING, WALLER	64	●	○	○	●	○	●		○	○
MANVEL	5,207	●	○	●	○	○	○	○	○	○
MASON CREEK UD	589	●	○	○	●	○	○	●	○	○
MINING, AUSTIN	193		○	○	●	○	●		○	○
MINING, BRAZORIA	1,962		○	●	○	○	●		○	○
MINING, CHAMBERS	112		○	○	●	○	●		○	○
MINING, FORT BEND	9		○	○	○	○	●		○	○
MINING, GALVESTON	500		○	●	●	○	○		●	○
MINING, HARRIS	2,946		○	○	●	○	○		●	○
MINING, LEON	79		○	○	●	○	●		○	○
MINING, LIBERTY	287		○	○	●	○	●		○	○
MINING, MADISON	375		○	○	●	○	●		○	○
MINING, SAN JACINTO	1		○	○	●	○	●		○	○
MISSOURI CITY	6,146	●	○	●	●	○	○	●	●	○
MONT BELVIEU	2,357	●	○	○	●	○	●	○	○	○
MONTGOMERY	1,828	●	○	○	●	○	○	○	●	○
MONTGOMERY COUNTY MUD #15	568	●	○	○	●	○	○	●	○	○
MONTGOMERY COUNTY MUD #18	517	●	○	○	●	○	○	○	●	○
MONTGOMERY COUNTY MUD #94	191	●	○	○	●	○	○	●	○	○
MONTGOMERY COUNTY UD #4	37	●	○	○	○	○	○	○	○	○
MONTGOMERY COUNTY WCID #1	92	●	○	○	●	○	○	●	○	○
MOUNT HOUSTON ROAD MUD	497	●	○	○	●	○	○	●	○	○
NEW CANEY MUD	297	●	○	○	●	○	○	●	○	○
NORTH BELT UD	188	●	○	○	●	○	○	●	○	○
NORTH FORT BEND WATER AUTHORITY	57,531	●	○	●	●	○	○	●	○	○
NORTH GREEN MUD	236	●	○	○	●	○	○	●	○	○

WUG Name	Max. Need (Ac-Ft/Yr)	Conservation	Drought Management	Reuse	Reallocation/ Management of Existing Supplies	Conjunctive Use	Development of New Supplies	Development of Regional Water Supply	Voluntary Transfer of Water	Emergency Transfers
○ = Considered but determined "not potentially feasible"					● = Considered "potentially feasible" and evaluated					
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	85,414	●	○	●	●	○	○	●	○	○
NORTHWEST PARK MUD	2,013	●	○	○	●	○	○	●	○	○
OAK RIDGE NORTH	31	●	○	○	●	○	○	●	○	○
OLD RIVER-WINFREE	125	●	○	○	●	○	●	○	○	○
OYSTER CREEK	60	●	○	○	●	○	●	○	○	○
PANORAMA VILLAGE	258	●	○	○	●	○	○	○	●	○
PATTON VILLAGE	112	●	○	○	●	○	○	●	○	○
PEARLAND	272	●	○	●	●	○	●	○	○	○
PINE ISLAND	112	●	○	○	●	○	●	○	○	○
PLANTATION MUD	114	●	○	○	●	○	○	●	○	○
PLEAK	133	●	○	○	○	○	●	○	○	○
POINT AQUARIUS MUD	94	●	○	○	●	○	○	●	○	○
PORTER SUD	2,921	●	○	○	○	○	○	●	○	○
RAYFORD ROAD MUD	242	●	○	○	●	○	○	●	○	○
RICHWOOD	55	●	○	○	●	○	●	○	○	○
RIVER PLANTATION MUD	116	●	○	○	●	○	○	●	●	○
RIVERSIDE	8	●	○	○	○	○	○	○	○	○
ROMAN FOREST	204	●	○	○	●	○	○	●	○	○
ROSENBERG	109	●	○	○	●	○	●	○	○	○
SAN FELIPE	235	●	○	○	●	○	●	○	○	○
SANTA FE	746	●	○	●	○	○	○	○	○	○
SHENANDOAH	1,040	●	○	○	●	○	○	●	●	○
SIENNA PLANTATION	4,491	●	○	●	●	○	○	●	●	○
SPRING CREEK UD	232	●	○	○	●	○	○	●	○	○
SPRING VALLEY	864	●	○	○	●	○	○	●	○	○
STAFFORD	1,794	●	○	○	●	○	●	●	○	○
STAGECOACH	248	●	○	○	●	○	○	○	●	○
STANLEY LAKE MUD	566	●	○	○	●	○	○	○	●	○
STEAM ELECTRIC POWER, FORT BEND	26,343		○	○	●	○	●		○	○

WUG Name	Max. Need (Ac-Ft/Yr)	Conservation	Drought Management	Reuse	Reallocation/ Management of Existing Supplies	Conjunctive Use	Development of New Supplies	Development of Regional Water Supply	Voluntary Transfer of Water	Emergency Transfers
○ = Considered but determined "not potentially feasible"					● = Considered "potentially feasible" and evaluated					
STEAM ELECTRIC POWER, HARRIS	28,020		○	●	●	○	○		●	○
STEAM ELECTRIC POWER, MONTGOMERY	3,464		○	○	●	○	○		○	○
SUGAR LAND	7,704	●	○	○	●	○	●	●	○	○
THE COMMONS WATER SUPPLY INC	218	●	○	○	●	○	○	●	○	○
THE WOODLANDS	9,218	●	○	○	●	○	○	●	○	○
TOMBALL	3,061	●	○	○	●	○	○	●	○	○
TRAIL OF THE LAKES MUD	549	●	○	○	●	○	○	●	○	○
TRINITY RURAL WSC	126	●	○	○	●	○	●	○	○	○
WEST HARRIS COUNTY MUD #6	201	●	○	○	●	○	○	●	○	○
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	40,367	●	○	●	●	○	○	●	○	○
WESTWOOD NORTH WSC	200	●	○	○	●	○	○	●	○	○
WILLIS	415	●	○	○	●	○	○	●	○	○
WOODBRANCH	115	●	○	○	●	○	○	●	○	○
WOODCREEK MUD	139	●	○	○	●	○	○	●	○	○

Table 5-A2 – Region H Supply Source Increases

Source	Yield Type	New or Increased Source Supply (ac-ft)					
		2020	2030	2040	2050	2060	2070
Conservation							
INDUSTRIAL CONSERVATION	New	9,281	19,597	30,828	42,709	53,881	65,261
IRRIGATION CONSERVATION	New	86,123	86,123	86,123	86,123	86,123	86,123
MUNICIPAL CONSERVATION	New	9,052	27,156	45,258	65,000	83,102	101,203
WATER LOSS REDUCTION	New	11,312	22,481	33,184	42,062	45,914	49,457
Groundwater							
GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	Increased	13,440	13,440	14,369	14,802	18,871	25,842
Surface Water							
ALLENS CREEK LAKE/RESERVOIR	New	99,650	99,650	99,650	99,650	99,650	99,650
BRA SYSTEM OPERATION PERMIT	New	25,350	25,350	25,350	25,350	25,350	25,350
BRAZOS RUN-OF-RIVER, BRAZORIA	Increased	152,396	152,396	152,396	152,396	150,989	148,576
FREEPORT DESALINATION	New	0	0	11,200	11,200	11,200	11,200
Reuse							
COH REUSE	New	33,712	33,712	191,939	204,181	217,224	231,179
CONROE REUSE PERMIT	New	2,496	2,763	2,994	3,205	3,432	3,694
DIRECT REUSE, CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	New	0	236	424	612	762	918
DIRECT REUSE, FORT BEND COUNTY MUD #25	Increased	0	184	184	184	184	184
DIRECT REUSE, MASTER PLANNED COMMUNITIES, BRAZORIA	New	0	349	703	1,063	1,449	1,874
DIRECT REUSE, MASTER PLANNED COMMUNITIES, FORT BEND	New	0	1,922	2,867	4,560	6,300	8,212
DIRECT REUSE, MASTER PLANNED COMMUNITIES, HARRIS	New	0	868	1,476	1,993	2,520	3,002
DIRECT REUSE, MASTER PLANNED COMMUNITIES, MONTGOMERY	New	0	2,684	5,827	9,680	14,492	20,387
DIRECT REUSE, MISSOURI CITY	New	639	639	639	639	639	639
DIRECT REUSE, NORTH FORT BEND WATER AUTHORITY	New	661	1,821	2,657	3,076	3,547	4,093
DIRECT REUSE, NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	New	0	99	189	274	341	404
DIRECT REUSE, PEARLAND	Increased	314	1,154	1,154	1,154	1,154	1,154
DIRECT REUSE, RIVER PLANTATION MUD	Increased	0	92	92	92	92	92
DIRECT REUSE, SUGAR LAND	New	5,600	5,600	5,600	5,600	5,600	5,600
DIRECT REUSE, WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	New	0	154	319	500	602	711
HUNTSVILLE EFFLUENT	New	2,240	2,240	2,240	2,240	2,240	2,240
MONTGOMERY MUDS 8 AN 9 REUSE PERMIT	New	326	336	373	412	454	544
REGIONAL RETURN FLOWS	New	78,933	89,763	101,457	114,898	131,489	150,994
SJRA REUSE PERMIT	New	3,205	3,951	4,642	5,302	6,035	6,807

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Table 5-A3 – Scoring for Key Projects

WMS Project		Cost	Location	Water Quality	Environmental Land & Habitat	Impacts on Environmental Flows	Local Preference	Institutional Constraints / Risk of Implementability	Development Timeline	Sponsorship	Vulnerability	Impacts on Other WMS
Conservation												
CNSV-001	Industrial Conservation	5	5	3	5	3	4	5	5	3	5	3
CNSV-002	Irrigation Conservation	5	5	3	4	3	3	5	5	3	5	3
CNSV-003	Municipal Conservation	4	5	3	5	3	4	5	5	3	5	2
Contractual Transfer												
CNTR-001	TRA to COH Transfer	5	2	3	5	2	3	3	5	5	4	4
Conveyance												
CONV-001	CHCRWA Transmission and Distribution Expansion	4	4	3	3	3	4	3	4	5	5	3
CONV-002	COH/NHCRWA/CHCRWA Second Source Pipeline	5	4	3	3	3	4	3	4	5	5	3
CONV-003	East Texas Transfer	5	1	3	2	2	3	1	3	3	2	4
CONV-004	GCWA Treated Water from LNVA	1	1	3	2	3	2	2	4	2	2	3
CONV-005	Lake Livingston to SJRA Transfer	4	2	3	2	2	4	2	4	4	4	4
CONV-006	Luce Bayou Transfer	5	2	3	3	2	4	5	5	5	4	5
CONV-007	NFBWA Distribution Expansion	5	4	3	3	3	4	3	4	5	5	3
CONV-008	NHCRWA Distribution Expansion	3	4	3	3	3	4	3	4	5	5	3
CONV-009	NHCRWA Transmission Line	5	4	3	3	3	4	3	4	5	5	3
CONV-010	Old Galveston Road Transmission Improvements	4	5	3	5	3	5	3	5	5	5	5
CONV-011	WHCRWA Distribution Expansion	4	4	3	3	3	4	3	4	5	5	3
CONV-012	WHCRWA/NFBWA Transmission Line	5	4	3	3	3	4	3	4	5	5	3
Groundwater Development												
GWDV-001	Aquifer Storage and Recovery	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GWDV-002	Brackish Groundwater Supplies	3	5	3	4	4	3	3	5	3	4	4
GWDV-003	BWA Brackish Groundwater	3	3	3	3	4	4	4	5	5	4	5
GWDV-004	Conroe Brackish Reverse Osmosis	2	5	3	4	4	4	3	5	4	4	4
GWDV-005	Expanded Use of Groundwater	1	5	3	4	4	4	3	5	3	5	3
GWDV-006	Forestar Houston County Project	3	2	3	2	4	3	2	5	2	3	3

WMS Project		Cost	Location	Water Quality	Environmental Land & Habitat	Impacts on Environmental Flows	Local Preference	Institutional Constraints / Risk of Implementability	Development Timeline	Sponsorship	Vulnerability	Impacts on Other WMS
GWDV-007	Forestar Liberty County Project	1	2	3	2	4	3	2	4	2	3	3
GWDV-008	Groveton Groundwater Expansion	1	5	3	5	3	4	5	5	5	5	3
GWDV-009	SJRA Catahoula Aquifer Supplies	5	5	2	5	4	3	3	5	3	3	4
Groundwater Reduction Plans												
GWRP-001	CHCRWA GRP	5	3	3	3	3	4	3	4	5	5	3
GWRP-002	City of Houston GRP	5	3	5	3	3	5	3	5	5	5	3
GWRP-003	City of Missouri City GRP	4	4	3	4	2	4	3	5	5	5	3
GWRP-004	City of Richmond GRP	1	4	3	4	2	4	3	5	5	5	3
GWRP-005	City of Rosenberg GRP	2	4	3	3	2	4	3	5	5	5	3
GWRP-006	City of Sugar Land GRP	2	4	3	4	2	4	3	5	5	5	3
GWRP-007	Fort Bend County MUD No. 25 GRP	4	4	3	5	2	4	3	5	4	5	3
GWRP-008	Fort Bend County WCID 2 GRP	2	5	3	4	2	4	3	5	5	5	3
GWRP-009	NFBWA GRP	5	3	3	3	3	4	3	4	5	5	3
GWRP-010	NHCRWA GRP	5	3	3	3	3	4	3	4	5	5	3
GWRP-011	Panorama Village and Shenandoah GRP	4	5	3	5	4	4	3	5	4	5	3
GWRP-012	Porter SUD GRP	1	4	3	4	2	4	3	5	5	5	3
GWRP-013	River Plantation MUD GRP	5	5	3	5	2	4	3	5	4	5	3
GWRP-014	SJRA GRP	3	4	3	4	2	4	3	5	5	5	3
GWRP-015	WHCRWA GRP	5	3	3	3	3	4	3	4	5	5	3
Reuse												
REUS-001	City of Conroe Reuse	5	4	3	5	2	3	4	5	5	5	3
REUS-002	City of Houston Reuse	5	4	3	4	2	4	3	4	4	4	2
REUS-003	City of Pearland Reuse	3	4	3	4	2	4	5	5	4	5	3
REUS-004	GCWA Reclaimed Water from COH	5	4	3	4	2	4	4	5	5	4	2
REUS-005	Grand Lakes Reclaimed Water System	1	4	3	4	2	3	3	5	4	5	3
REUS-006	Montgomery County MUDs #8 and #9 Reuse	1	4	3	4	2	3	4	5	4	5	3
REUS-007	Regional Return Flows	5	4	3	5	2	3	3	5	3	5	3
REUS-008	SJRA Conroe Reuse Project	5	4	3	5	2	3	4	5	5	5	3
REUS-009	Wastewater Reclamation for Industry	2	4	4	4	2	3	3	4	3	4	2

WMS Project		Cost	Location	Water Quality	Environmental Land & Habitat	Impacts on Environmental Flows	Local Preference	Institutional Constraints / Risk of Implementability	Development Timeline	Sponsorship	Vulnerability	Impacts on Other WMS
REUS-010	Wastewater Reclamation for Municipal Irrigation	4	5	3	5	2	3	3	5	3	5	3
Surface Water Development												
SWDV-001	Allens Creek Reservoir	5	5	3	4	3	4	4	4	4	2	5
SWDV-002	BRA System Operation Permit	5	4	3	3	2	2	2	5	5	5	3
SWDV-003	Dow Expansion to Harris Reservoir	4	5	4	4	2	5	4	5	5	3	4
SWDV-004	Freeport Seawater Desalination	1	3	3	3	3	3	3	5	2	3	3
SWDV-005	Lake Somerville Augmentation	3	4	3	3	2	3	3	4	3	4	4
SWDV-006	Little River Off-Channel Reservoir	4	4	3	3	2	2	3	3	3	2	4
SWDV-007	Lone Star Lake	1	5	4	1	2	3	2	2	2	2	3
Treatment												
TRET-001	BWA Water Treatment Plant Expansion	4	3	3	5	3	4	3	5	5	4	5
TRET-002	City of Houston Treatment Expansion	4	3	3	4	3	3	3	5	3	4	5
TRET-003	CLCND West Chambers System	1	3	4	3	2	4	3	5	4	4	3
TRET-004	COH Northeast Water Purification Plant Expansion	2	3	3	4	3	5	4	4	5	4	5
TRET-005	Pearland Surface Water Treatment Plant	2	5	3	4	2	4	3	5	4	5	3
Other Infrastructure												
OTHR-001	Brazos Saltwater Barrier	5	5	5	2	2	4	2	4	3	3	5

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Table 5-A4 – Water Management Strategy and Project Relationships

Project	Project Type	Associated WMS
ALLENS CREEK RESERVOIR	WMS	ADDITIONAL SUPPLY FROM BRA
		ADDITIONAL SUPPLY FROM GCWA
		NEW / EXPANDED CONTRACT WITH BRA
		PEARLAND SWTP
BRA SYSTEM OPERATION PERMIT	WMS	NEW / EXPANDED CONTRACT WITH BRA
BRAZOS SALTWATER BARRIER	WMS	BRAZOS SALTWATER BARRIER
BWA BRACKISH GROUNDWATER DEVELOPMENT	WMS	NEW / EXPANDED CONTRACT WITH BWA - BRACKISH GROUNDWATER
BWA CONVENTIONAL TREATMENT EXPANSION	WMS	DOW RESERVOIR EXPANSION
		NEW / EXPANDED CONTRACT WITH BWA
		ROSENBERG GRP
CHCRWA GRP	WMS	CHCRWA GRP
CHCRWA TRANSMISSION AND INTERNAL DISTRIBUTION	WMS	CHCRWA GRP
CITY OF CONROE REUSE PROJECT	WMS	PORTER SUD JOINT GRP
CITY OF HOUSTON GRP	WMS	CITY OF HOUSTON GRP
		NEW / EXPANDED CONTRACT WITH COH
CITY OF HOUSTON REUSE	WMS	COH REUSE
		NFBWA GRP
		NHCRWA GRP
		WHCRWA GRP
CITY OF HOUSTON TREATMENT EXPANSION - PHASE 1	WMS	CITY OF HOUSTON GRP
		COH REUSE
		EAST TEXAS TRANSFER
		NEW / EXPANDED CONTRACT WITH COH

Project	Project Type	Associated WMS
CITY OF HOUSTON TREATMENT EXPANSION - PHASE 2	WMS	CITY OF HOUSTON GRP
		COH REUSE
		EAST TEXAS TRANSFER
		NEW / EXPANDED CONTRACT WITH COH
CLCND WEST CHAMBERS SYSTEM	WMS	NEW / EXPANDED CONTRACT WITH CLCND
COH NORTHEAST WATER PURIFICATION PLANT EXPANSION	WMS	CHCRWA GRP
		CITY OF HOUSTON GRP
		COH REUSE
		NEW / EXPANDED CONTRACT WITH COH
		NFBWA GRP
		NHCRWA GRP
		WHCRWA GRP
COH, NHCRWA, AND CHCRWA SHARED TRANSMISSION	WMS	CHCRWA GRP
		CITY OF HOUSTON GRP
		NHCRWA GRP
CONROE BRACKISH GROUNDWATER DESALINATION	WMS	CONROE BRACKISH GROUNDWATER DESALINATION
DOW RESERVOIR AND PUMP STATION EXPANSION PROJECT	WMS	DOW RESERVOIR EXPANSION
EAST TEXAS TRANSFER	WMS	EAST TEXAS TRANSFER
FORT BEND MUD 25 GRP	WMS	FORT BEND MUD 25 GRP
FORT BEND WCID 2 GRP INFRASTRUCTURE	WMS	FORT BEND WCID 2 GRP
FREEPORT SEAWATER DESALINATION	WMS	FREEPORT SEAWATER DESALINATION
GCWA REUSE FROM COH	WMS	ADDITIONAL SUPPLY FROM GCWA
		NEW / EXPANDED CONTRACT WITH GCWA
		PEARLAND SWTP
GRAND LAKES RECLAIMED WATER SYSTEM	WMS	NFBWA GRAND LAKES REUSE
GROVETON WELL DEVELOPMENT	WMS	GROVETON GROUNDWATER EXPANSION
INDUSTRIAL CONSERVATION, AUSTIN COUNTY	WUG	INDUSTRIAL CONSERVATION

Project	Project Type	Associated WMS
INDUSTRIAL CONSERVATION, BRAZORIA COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, CHAMBERS COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, FORT BEND COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, GALVESTON COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, HARRIS COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, LBERTY COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, LEON COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, MADISON COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, MONTGOMERY COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, SAN JACINTO COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, WALKER COUNTY	WUG	INDUSTRIAL CONSERVATION
INDUSTRIAL CONSERVATION, WALLER COUNTY	WUG	INDUSTRIAL CONSERVATION
IRRIGATION CONSERVATION, AUSTIN COUNTY	WUG	IRRIGATION CONSERVATION
IRRIGATION CONSERVATION, BRAZORIA COUNTY	WUG	IRRIGATION CONSERVATION
IRRIGATION CONSERVATION, CHAMBERS COUNTY	WUG	IRRIGATION CONSERVATION
IRRIGATION CONSERVATION, FORT BEND COUNTY	WUG	IRRIGATION CONSERVATION
IRRIGATION CONSERVATION, GALVESTON COUNTY	WUG	IRRIGATION CONSERVATION
IRRIGATION CONSERVATION, HARRIS COUNTY	WUG	IRRIGATION CONSERVATION
IRRIGATION CONSERVATION, LIBERTY COUNTY	WUG	IRRIGATION CONSERVATION
IRRIGATION CONSERVATION, WALLER COUNTY	WUG	IRRIGATION CONSERVATION
LAKE LIVINGSTON TO SJRA TRANSFER	WMS	NEW / EXPANDED CONTRACT WITH SJRA
LUCE BAYOU TRANSFER	WMS	CHCRWA GRP
		CITY OF HOUSTON GRP
		NEW / EXPANDED CONTRACT WITH COH
		NFBWA GRP
		NHCRWA GRP
		WHCRWA GRP

Project	Project Type	Associated WMS
MISSOURI CITY GRP INFRASTRUCTURE	WMS	MISSOURI CITY GRP
MONTGOMERY COUNTY MUDS #8 AND #9 REUSE	WMS	MONTGOMERY COUNTY MUDS #8 AND #9 REUSE
MUNICIPAL CONSERVATION, ALVIN	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, ANGLETON	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, ARCOLA	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, BACLIFF MUD	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, BAILEY'S PRAIRIE	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, BAYOU VISTA	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, BAYTOWN	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, BEASLEY	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, BELLAIRE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, BELLVILLE	WUG	MUNICIPAL CONSERVATION, AUSTIN
MUNICIPAL CONSERVATION, BENDERS LANDING WATER SYSTEM	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, BLUE BELL MANOR UTILITY COMPANY	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, BOLIVAR PENINSULA SUD	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, BRAZORIA	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #2	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #21	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #3	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #6	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, BROOKSHIRE	WUG	MUNICIPAL CONSERVATION, WALLER
MUNICIPAL CONSERVATION, BROOKSIDE VILLAGE	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, BUFFALO	WUG	MUNICIPAL CONSERVATION, LEON
MUNICIPAL CONSERVATION, BUNKER HILL VILLAGE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, CENTERVILLE	WUG	MUNICIPAL CONSERVATION, LEON
MUNICIPAL CONSERVATION, CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, CHIMNEY HILL MUD	WUG	MUNICIPAL CONSERVATION, HARRIS

Project	Project Type	Associated WMS
MUNICIPAL CONSERVATION, CLEAR BROOK CITY MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, CLEAR LAKE SHORES	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, CLEVELAND	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, CLUTE	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, CONCORD-ROBBINS WSC	WUG	MUNICIPAL CONSERVATION, LEON
MUNICIPAL CONSERVATION, CONROE	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, COUNTY-OTHER - AUSTIN COUNTY	WUG	MUNICIPAL CONSERVATION, AUSTIN
MUNICIPAL CONSERVATION, COUNTY-OTHER - BRAZORIA COUNTY	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, COUNTY-OTHER - CHAMBERS COUNTY	WUG	MUNICIPAL CONSERVATION, CHAMBERS
MUNICIPAL CONSERVATION, COUNTY-OTHER - FORT BEND COUNTY	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, COUNTY-OTHER - GALVESTON COUNTY	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, COUNTY-OTHER - HARRIS COUNTY	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, COUNTY-OTHER - LEON COUNTY	WUG	MUNICIPAL CONSERVATION, LEON
MUNICIPAL CONSERVATION, COUNTY-OTHER - MONTGOMERY COUNTY	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, COUNTY-OTHER - WALLER COUNTY	WUG	MUNICIPAL CONSERVATION, WALLER
MUNICIPAL CONSERVATION, CROSBY MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, CUT AND SHOOT	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, DANBURY	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, DEER PARK	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, DICKINSON	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, DOBBIN-PLANTERSVILLE WSC	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, EAST PLANTATION UD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, EL DORADO UD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, EL LAGO	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, FAIRCHILDS	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, FLO COMMUNITY WSC	WUG	MUNICIPAL CONSERVATION, LEON
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #116	WUG	MUNICIPAL CONSERVATION, FORT BEND

Project	Project Type	Associated WMS
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #121	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #129	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #23	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #25	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, FOUNTAINVIEW SUBDIVISION	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, FREEPORT	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, FRIENDSWOOD	WUG	MUNICIPAL CONSERVATION, GALVESTON
		MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, FULSHEAR	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, G & W WSC	WUG	MUNICIPAL CONSERVATION, WALLER
MUNICIPAL CONSERVATION, GALENA PARK	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, GALVESTON	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, GREATWOOD	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, GREEN TRAILS MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, GREENWOOD UD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #106	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #11	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #119	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #132	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #148 - KINGSLAKE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #151	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #152	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #153	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #154	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #158	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #180	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #189	WUG	MUNICIPAL CONSERVATION, HARRIS

Project	Project Type	Associated WMS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #221	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #278	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #290	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #345	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #400 - WEST	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #46	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #49	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #5	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #50	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #55	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #8	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #96	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY UD #14	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY UD #15	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #1	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #133	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #74	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #96	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HEDWIG VILLAGE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HEMPSTEAD	WUG	MUNICIPAL CONSERVATION, WALLER
MUNICIPAL CONSERVATION, HILLCREST	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, HILSHIRE VILLAGE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HITCHCOCK	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, HOLIDAY LAKES	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, HOUSTON	WUG	MUNICIPAL CONSERVATION, FORT BEND
		MUNICIPAL CONSERVATION, HARRIS
		MUNICIPAL CONSERVATION, MONTGOMERY

Project	Project Type	Associated WMS
MUNICIPAL CONSERVATION, HUMBLE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, HUNTERS CREEK VILLAGE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, INDIGO LAKE WATER SYSTEM	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, IOWA COLONY	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, JACINTO CITY	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, JAMAICA BEACH	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, JERSEY VILLAGE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, JEWETT	WUG	MUNICIPAL CONSERVATION, LEON
MUNICIPAL CONSERVATION, JONES CREEK	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, KATY	WUG	MUNICIPAL CONSERVATION, FORT BEND
		MUNICIPAL CONSERVATION, HARRIS
		MUNICIPAL CONSERVATION, WALLER
MUNICIPAL CONSERVATION, KEMAH	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, KINGS MANOR MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
		MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, KIRKMONT MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, LA MARQUE	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, LA PORTE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, LAKE JACKSON	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, LAKE WINDCREST WATER SYSTEM	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, LEAGUE CITY	WUG	MUNICIPAL CONSERVATION, GALVESTON
		MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, LONGHORN TOWN UD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, MAGNOLIA	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MANVEL	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, MASON CREEK UD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, MEADOWS PLACE	WUG	MUNICIPAL CONSERVATION, FORT BEND

Project	Project Type	Associated WMS
MUNICIPAL CONSERVATION, MISSOURI CITY	WUG	MUNICIPAL CONSERVATION, FORT BEND
		MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, MONT BELVIEU	WUG	MUNICIPAL CONSERVATION, CHAMBERS
MUNICIPAL CONSERVATION, MONTGOMERY	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #15	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #18	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #19	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #8	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #83	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #89	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #9	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #94	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #2	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #3	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #4	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY WCID #1	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, MOUNT HOUSTON ROAD MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, NASSAU BAY	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, NEEDVILLE	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, NEW CANEY MUD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, NEWPORT MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, NHCRWA	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, NORMANGEE	WUG	MUNICIPAL CONSERVATION, LEON
MUNICIPAL CONSERVATION, NORTH BELT UD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, NORTH CHANNEL WATER AUTHORITY	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, NORTH FORT BEND WATER AUTHORITY	WUG	MUNICIPAL CONSERVATION, FORT BEND
		MUNICIPAL CONSERVATION, HARRIS

Project	Project Type	Associated WMS
MUNICIPAL CONSERVATION, NORTH GREEN MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, NORTHWEST PARK MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, OAK RIDGE NORTH	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, OAKWOOD	WUG	MUNICIPAL CONSERVATION, LEON
MUNICIPAL CONSERVATION, OYSTER CREEK	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, PANORAMA VILLAGE	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, PARKWAY UD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, PASADENA	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, PATTON VILLAGE	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, PEARLAND	WUG	MUNICIPAL CONSERVATION, BRAZORIA
		MUNICIPAL CONSERVATION, FORT BEND
		MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, PECAN GROVE MUD #1	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, PINE ISLAND	WUG	MUNICIPAL CONSERVATION, WALLER
MUNICIPAL CONSERVATION, PINEY POINT VILLAGE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, PLANTATION MUD	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, PLEAK	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, POINT AQUARIUS MUD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, PORTER SUD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, PRAIRIE VIEW	WUG	MUNICIPAL CONSERVATION, WALLER
MUNICIPAL CONSERVATION, RAYFORD ROAD MUD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, RICHMOND	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, RICHWOOD	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, RIVER PLANTATION MUD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, ROMAN FOREST	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, ROSENBERG	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, SAGEMEADOW UD	WUG	MUNICIPAL CONSERVATION, HARRIS

Project	Project Type	Associated WMS
MUNICIPAL CONSERVATION, SAN FELIPE	WUG	MUNICIPAL CONSERVATION, AUSTIN
MUNICIPAL CONSERVATION, SAN LEON MUD	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, SANTA FE	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, SEABROOK	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, SEALY	WUG	MUNICIPAL CONSERVATION, AUSTIN
MUNICIPAL CONSERVATION, SHENANDOAH	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, SHOREACRES	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, SIENNA PLANTATION	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, SIMONTON	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, SOUTH HOUSTON	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, SOUTHERN MONTGOMERY COUNTY MUD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, SOUTHSIDE PLACE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, SPLENDORA	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, SPRING CREEK UD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, SPRING VALLEY	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, STAFFORD	WUG	MUNICIPAL CONSERVATION, FORT BEND
		MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, STAGECOACH	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, STANLEY LAKE MUD	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, SUGAR LAND	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, SUNBELT FWSD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, SWEENY	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, TAYLOR LAKE VILLAGE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, TEXAS CITY	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, THE COMMONS WATER SUPPLY INC	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, THE WOODLANDS	WUG	MUNICIPAL CONSERVATION, HARRIS
		MUNICIPAL CONSERVATION, MONTGOMERY

Project	Project Type	Associated WMS
MUNICIPAL CONSERVATION, TIKI ISLAND	WUG	MUNICIPAL CONSERVATION, GALVESTON
MUNICIPAL CONSERVATION, TOMBALL	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, TRAIL OF THE LAKES MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, TRINITY BAY CONSERVATION DISTRICT	WUG	MUNICIPAL CONSERVATION, CHAMBERS
MUNICIPAL CONSERVATION, VARNER CREEK UD	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, WALLER	WUG	MUNICIPAL CONSERVATION, HARRIS
		MUNICIPAL CONSERVATION, WALLER
MUNICIPAL CONSERVATION, WALLIS	WUG	MUNICIPAL CONSERVATION, AUSTIN
MUNICIPAL CONSERVATION, WEBSTER	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, WEST COLUMBIA	WUG	MUNICIPAL CONSERVATION, BRAZORIA
MUNICIPAL CONSERVATION, WEST HARRIS COUNTY MUD #6	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, WEST UNIVERSITY PLACE	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, WESTON LAKES	WUG	MUNICIPAL CONSERVATION, FORT BEND
MUNICIPAL CONSERVATION, WESTWOOD NORTH WSC	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, WHCRWA	WUG	MUNICIPAL CONSERVATION, FORT BEND
		MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, WILLIS	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, WINDFERN FOREST UD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL CONSERVATION, WOODBRANCH	WUG	MUNICIPAL CONSERVATION, MONTGOMERY
MUNICIPAL CONSERVATION, WOODCREEK MUD	WUG	MUNICIPAL CONSERVATION, HARRIS
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, BRAZORIA COUNTY	WUG	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, CHCRWA	WUG	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, FORT BEND COUNTY	WUG	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, HARRIS COUNTY	WUG	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, MONTGOMERY COUNTY	WUG	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, NFBWA	WUG	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, NHCRWA	WUG	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION

Project	Project Type	Associated WMS
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, WHCRWA	WUG	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION
NEW / EXPANDED CONTRACT WITH BRA - COUNTY-OTHER, BRAZORIA COUNTY (BC)	WUG	NEW / EXPANDED CONTRACT WITH BRA
NEW / EXPANDED CONTRACT WITH BRA - MANUFACTURING, BRAZORIA COUNTY (BC)	WUG	NEW / EXPANDED CONTRACT WITH BRA
NEW / EXPANDED CONTRACT WITH BRA - MINING, BRAZORIA COUNTY (B)	WUG	NEW / EXPANDED CONTRACT WITH BRA
NEW / EXPANDED CONTRACT WITH BRA - MINING, BRAZORIA COUNTY (BC)	WUG	NEW / EXPANDED CONTRACT WITH BRA
NEW / EXPANDED CONTRACT WITH BRA - STEAM ELECTRIC POWER, FORT BEND COUNTY (B)	WUG	NEW / EXPANDED CONTRACT WITH BRA
NEW / EXPANDED CONTRACT WITH BWA - ANGLETON	WUG	DOW RESERVOIR EXPANSION
NEW / EXPANDED CONTRACT WITH BWA - BRAZORIA	WUG	DOW RESERVOIR EXPANSION
NEW / EXPANDED CONTRACT WITH BWA - CLUTE	WUG	DOW RESERVOIR EXPANSION
NEW / EXPANDED CONTRACT WITH BWA - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB)	WUG	DOW RESERVOIR EXPANSION
		NEW / EXPANDED CONTRACT WITH BWA
		NEW / EXPANDED CONTRACT WITH BWA - BRACKISH GROUNDWATER
NEW / EXPANDED CONTRACT WITH BWA - FREEPORT	WUG	DOW RESERVOIR EXPANSION
NEW / EXPANDED CONTRACT WITH BWA - LAKE JACKSON	WUG	DOW RESERVOIR EXPANSION
NEW / EXPANDED CONTRACT WITH BWA - MANUFACTURING, BRAZORIA COUNTY (SJB)	WUG	DOW RESERVOIR EXPANSION
NEW / EXPANDED CONTRACT WITH BWA - OYSTER CREEK	WUG	DOW RESERVOIR EXPANSION
NEW / EXPANDED CONTRACT WITH BWA - RICHWOOD	WUG	DOW RESERVOIR EXPANSION
NEW / EXPANDED CONTRACT WITH CLCND - COUNTY-OTHER, CHAMBERS COUNTY (TSJ)	WUG	NEW / EXPANDED CONTRACT WITH CLCND
NEW / EXPANDED CONTRACT WITH COH - COUNTY-OTHER, HARRIS COUNTY (TSJ)	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - FOUNTAINVIEW SUBDIVISION	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - KIRKMONT MUD	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - MANUFACTURING, HARRIS COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - MANUFACTURING, HARRIS COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (TSJ)	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - MISSOURI CITY, HARRIS COUNTY	WUG	NEW / EXPANDED CONTRACT WITH COH

Project	Project Type	Associated WMS
NEW / EXPANDED CONTRACT WITH COH - STEAM ELECTRIC POWER, HARRIS COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH COH - STEAM ELECTRIC POWER, HARRIS COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH COH
NEW / EXPANDED CONTRACT WITH GCWA - ARCOLA	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - CLEAR LAKE SHORES	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER - COUNTY-OTHER, FORT BEND COUTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, BRAZORIA COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, FORT BEND COUTY (B)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, FORT BEND COUTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, GALVESTON COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - KEMAH	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - LA MARQUE	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (B)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MANVEL	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MINING, BRAZORIA COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MINING, GALVESTON COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - MISSOURI CITY	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - SANTA FE	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH GCWA - SIENNA PLANTATION	WUG	NEW / EXPANDED CONTRACT WITH GCWA
NEW / EXPANDED CONTRACT WITH LNVA	WUG	NEW / EXPANDED CONTRACT WITH LNVA
NEW / EXPANDED CONTRACT WITH LNVA - COUNTY-OTHER, GALVESTON COUNTY (NT)	WUG	NEW / EXPANDED CONTRACT WITH LNVA
NEW / EXPANDED CONTRACT WITH LNVA - MINING, GALVESTON COUNTY (NT)	WUG	NEW / EXPANDED CONTRACT WITH LNVA
NEW / EXPANDED CONTRACT WITH SJRA - BENDERS LANDING WATER SYSTEM	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - COUNTY-OTHER, MONTGOMERY COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA CATAHOULA AQUIFER SUPPLIES
NEW / EXPANDED CONTRACT WITH SJRA - INDIGO LAKE WATER SYSTEM	WUG	NEW / EXPANDED CONTRACT WITH SJRA

Project	Project Type	Associated WMS
NEW / EXPANDED CONTRACT WITH SJRA - MANUFACTURING, MONTGOMERY COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - MONTGOMERY	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - PANORAMA VILLAGE	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - RIVER PLANTATION MUD	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - SHENANDOAH	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - STAGECOACH	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - STANLEY LAKE MUD	WUG	NEW / EXPANDED CONTRACT WITH SJRA
NEW / EXPANDED CONTRACT WITH SJRA - STEAM ELECTRIC POWER, MONTGOMERY COUNTY (SJ)	WUG	SJRA CATAHOULA AQUIFER SUPPLIES
NEW / EXPANDED CONTRACT WITH SUGAR LAND - FORT BEND MUD 25	WUG	FORT BEND MUD 25 GRP
NFBWA GROUNDWATER REDUCTION PLAN	WMS	NFBWA GRP
NFBWA PHASE 2 DISTRIBUTION SEGMENTS	WMS	NFBWA GRP
NHCRWA DISTRIBUTION EXPANSION - 2025 PHASE	WMS	NHCRWA GRP
NHCRWA DISTRIBUTION EXPANSION - 2035 PHASE	WMS	NHCRWA GRP
NHCRWA DISTRIBUTION EXPANSION - 2045 PHASE	WMS	NHCRWA GRP
NHCRWA GROUNDWATER REDUCTION PLAN	WMS	NHCRWA GRP
NHCRWA TRANSMISSION LINES	WMS	NHCRWA GRP
OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	WMS	OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS
PANORAMA AND SHENANDOAH GRP INFRASTRUCTURE	WMS	PANORAMA AND SHENANDOAH JOINT GRP
PEARLAND REUSE INFRASTRUCTURE	WMS	CITY OF PEARLAND REUSE
PEARLAND SURFACE WATER TREATMENT PLANT DEVELOPMENT	WMS	PEARLAND SWTP
PORTER SUD GRP INFRASTRUCTURE	WMS	PORTER SUD JOINT GRP
REGIONAL RETURN FLOWS DEVELOPMENT	WMS	CHCRWA GRP
		CITY OF HOUSTON GRP
		NEW / EXPANDED CONTRACT WITH COH
		NEW / EXPANDED CONTRACT WITH SJRA
		NFBWA GRP
		NHCRWA GRP
		SJRA REUSE SUPPLIES FOR MANUFACTURING
		WHCRWA GRP

Project	Project Type	Associated WMS
RICHMOND GRP INFRASTUCTURE	WMS	RICHMOND GRP
RIVER PLANTATION REUSE EXPANSION	WMS	RIVER PLANTATION AND EAST PLANTATIONJOINT GRP
ROSENBERG GRP INFRASTUCTURE	WMS	ROSENBERG GRP
SJRA CATAHOULA AQUIFER SUPPLIES	WMS	SJRA CATAHOULA AQUIFER SUPPLIES
SJRA CONROE REUSE PROJECT	WMS	SJRA REUSE SUPPLIES FOR MANUFACTURING
SJRA GROUNDWATER REDUCTION PLAN - 2025 PHASE	WMS	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA GRP
SJRA GROUNDWATER REDUCTION PLAN - 2035 PHASE	WMS	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA GRP
SJRA GROUNDWATER REDUCTION PLAN - 2045 PHASE	WMS	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA GRP
SJRA GROUNDWATER REDUCTION PLAN - 2055 PHASE	WMS	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA GRP
SUGAR LAND GRP	WMS	SUGAR LAND GRP
SUGAR LAND GRP - REUSE INFRASTRUCTURE	WMS	SUGAR LAND GRP
SUGAR LAND SURFACE WATER TREATMENT EXPANSION	WMS	SUGAR LAND GRP
SUGAR LAND TRANSMISSION EXPANSION	WMS	SUGAR LAND GRP
TRA TO COH TRANSFER	WMS	CITY OF HOUSTON GRP
		NEW / EXPANDED CONTRACT WITH COH
		NFBWA GRP
		NHCRWA GRP
		WHCRWA GRP
TRANSFER TO REGION H (REGION I PROJECT)	WMS	NEW / EXPANDED CONTRACT WITH LNVA
WATER LOSS REDUCTION, ALVIN	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, AMES	WUG	WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, ANAHUAC	WUG	WATER LOSS REDUCTION, CHAMBERS
WATER LOSS REDUCTION, ANGLETON	WUG	WATER LOSS REDUCTION, BRAZORIA

Project	Project Type	Associated WMS
WATER LOSS REDUCTION, ARCOLA	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, BACLIFF MUD	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, BAILEY'S PRAIRIE	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, BAYTOWN	WUG	WATER LOSS REDUCTION, CHAMBERS
		WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, BEASLEY	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, BLUE BELL MANOR UTILITY COMPANY	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, BOLIVAR PENINSULA SUD	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, BRAZORIA	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #2	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #3	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #6	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, BROOKSIDE VILLAGE	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, BUNKER HILL VILLAGE	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, CLEAR BROOK CITY MUD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, CLEAR LAKE SHORES	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, CLEVELAND	WUG	WATER LOSS REDUCTION, LIBERTY
		WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, CLUTE	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, COLDSPRING	WUG	WATER LOSS REDUCTION, SAN JACINTO
WATER LOSS REDUCTION, COUNTY-OTHER - BRAZORIA COUNTY	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, COUNTY-OTHER - CHAMBERS COUNTY	WUG	WATER LOSS REDUCTION, CHAMBERS
WATER LOSS REDUCTION, COUNTY-OTHER - LIBERTY COUNTY	WUG	WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, COUNTY-OTHER - MADISON COUNTY	WUG	WATER LOSS REDUCTION, MADISON
WATER LOSS REDUCTION, COUNTY-OTHER - POLK COUNTY	WUG	WATER LOSS REDUCTION, POLK
WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY	WUG	WATER LOSS REDUCTION, TRINITY
WATER LOSS REDUCTION, COUNTY-OTHER - WALKER COUNTY	WUG	WATER LOSS REDUCTION, WALKER

Project	Project Type	Associated WMS
WATER LOSS REDUCTION, COUNTY-OTHER - WALLER COUNTY	WUG	WATER LOSS REDUCTION, WALLER
WATER LOSS REDUCTION, COVE	WUG	WATER LOSS REDUCTION, CHAMBERS
WATER LOSS REDUCTION, CROSBY MUD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, CUT AND SHOOT	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, DAISETTA	WUG	WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, DANBURY	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, DEER PARK	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, DICKINSON	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, DOBBIN-PLANTERSVILLE WSC	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, EL DORADO UD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, EL LAGO	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, FAIRCHILDS	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, FORT BEND COUNTY MUD #129	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, FOUNTAINVIEW SUBDIVISION	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, FREEPORT	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, GALENA PARK	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, GALVESTON	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, GROVETON	WUG	WATER LOSS REDUCTION, TRINITY
WATER LOSS REDUCTION, HARDIN	WUG	WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, HARDIN WSC	WUG	WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, HARRIS COUNTY MUD #106	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #11	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #154	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #180	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #290	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #345	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #400 - WEST	WUG	WATER LOSS REDUCTION, HARRIS

Project	Project Type	Associated WMS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #49	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #50	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY MUD #96	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY UD #15	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY WCID #1	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HARRIS COUNTY WCID #74	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, HEMPSTEAD	WUG	WATER LOSS REDUCTION, WALLER
WATER LOSS REDUCTION, HILLCREST	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, HITCHCOCK	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, HOUSTON	WUG	WATER LOSS REDUCTION, FORT BEND
		WATER LOSS REDUCTION, HARRIS
		WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, HUMBLE	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, INDIGO LAKE WATER SYSTEM	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, IOWA COLONY	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, KEMAH	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, KENEFICK	WUG	WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, KIRKMONT MUD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, LA MARQUE	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, LA PORTE	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, LAKE JACKSON	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WUG	WATER LOSS REDUCTION, LIBERTY
		WATER LOSS REDUCTION, POLK
		WATER LOSS REDUCTION, SAN JACINTO
		WATER LOSS REDUCTION, TRINITY
WATER LOSS REDUCTION, LAKE WINDCREST WATER SYSTEM	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, LIBERTY	WUG	WATER LOSS REDUCTION, LIBERTY

Project	Project Type	Associated WMS
WATER LOSS REDUCTION, MADISONVILLE	WUG	WATER LOSS REDUCTION, MADISON
WATER LOSS REDUCTION, MAGNOLIA	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, MASON CREEK UD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, MEADOWS PLACE	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, MONT BELVIEU	WUG	WATER LOSS REDUCTION, CHAMBERS
WATER LOSS REDUCTION, MONTGOMERY COUNTY MUD #19	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, MONTGOMERY COUNTY MUD #89	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, MONTGOMERY COUNTY WCID #1	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, NASSAU BAY	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, NEWPORT MUD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, NHCRWA	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, NORMANGEE	WUG	WATER LOSS REDUCTION, MADISON
WATER LOSS REDUCTION, NORTH GREEN MUD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, OLD RIVER-WINFREE	WUG	WATER LOSS REDUCTION, CHAMBERS
		WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, ONALASKA	WUG	WATER LOSS REDUCTION, POLK
WATER LOSS REDUCTION, OYSTER CREEK	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, PASADENA	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, PATTON VILLAGE	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, PEARLAND	WUG	WATER LOSS REDUCTION, BRAZORIA
		WATER LOSS REDUCTION, FORT BEND
		WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, PECAN GROVE MUD #1	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, PLANTATION MUD	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, PLEAK	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, PLUM GROVE	WUG	WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, POINT AQUARIUS MUD	WUG	WATER LOSS REDUCTION, MONTGOMERY

Project	Project Type	Associated WMS
WATER LOSS REDUCTION, PORTER SUD	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, RICHWOOD	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, RIVER PLANTATION MUD	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, RIVERSIDE	WUG	WATER LOSS REDUCTION, WALKER
WATER LOSS REDUCTION, ROMAN FOREST	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, SAGEMEADOW UD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, SAN JACINTO SUD	WUG	WATER LOSS REDUCTION, SAN JACINTO
WATER LOSS REDUCTION, SAN LEON MUD	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, SANTA FE	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, SEABROOK	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, SHENANDOAH	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, SHEPHERD	WUG	WATER LOSS REDUCTION, SAN JACINTO
WATER LOSS REDUCTION, SIMONTON	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, SOUTH HOUSTON	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, SOUTHSIDE PLACE	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, SPLENDORA	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, SPRING VALLEY	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, STAGECOACH	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, SUGAR LAND	WUG	WATER LOSS REDUCTION, FORT BEND
WATER LOSS REDUCTION, SUNBELT FWSD	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, SWEENY	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, TAYLOR LAKE VILLAGE	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, TEXAS CITY	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, TIKI ISLAND	WUG	WATER LOSS REDUCTION, GALVESTON
WATER LOSS REDUCTION, TOMBALL	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, TRINITY	WUG	WATER LOSS REDUCTION, TRINITY
WATER LOSS REDUCTION, TRINITY BAY CONSERVATION DISTRICT	WUG	WATER LOSS REDUCTION, CHAMBERS

Project	Project Type	Associated WMS
WATER LOSS REDUCTION, TRINITY RURAL WSC	WUG	WATER LOSS REDUCTION, TRINITY
		WATER LOSS REDUCTION, WALKER
WATER LOSS REDUCTION, VARNER CREEK UD	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, WALLER	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, WALLIS	WUG	WATER LOSS REDUCTION, AUSTIN
WATER LOSS REDUCTION, WEST COLUMBIA	WUG	WATER LOSS REDUCTION, BRAZORIA
WATER LOSS REDUCTION, WEST HARDIN WSC	WUG	WATER LOSS REDUCTION, LIBERTY
WATER LOSS REDUCTION, WEST UNIVERSITY PLACE	WUG	WATER LOSS REDUCTION, HARRIS
WATER LOSS REDUCTION, WOODBRANCH	WUG	WATER LOSS REDUCTION, MONTGOMERY
WATER LOSS REDUCTION, WOODLAND HILLS WATER COMPANY	WUG	WATER LOSS REDUCTION, LIBERTY
WEST HARRIS COUNTY GROUNDWATER REDUCTION PLAN	WMS	WHCRWA GRP
WHCRWA 2025 DISTRIBUTION EXPANSION	WMS	WHCRWA GRP
WHCRWA 2035 DISTRIBUTION EXPANSION	WMS	WHCRWA GRP
WHCRWA/NFBWA TRANSMISSION LINE	WMS	NFBWA GRP
		WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - MINING, GALVESTON COUNTY (NT)	WUG	NEW / EXPANDED CONTRACT WITH LNVA
WUG INFRASTRUCTURE EXPANSION - ANGLETON	WUG	DOW RESERVOIR EXPANSION
WUG INFRASTRUCTURE EXPANSION - ARCOLA	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - BENDERS LANDING WATER SYSTEM	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - BRAZORIA	WUG	DOW RESERVOIR EXPANSION
WUG INFRASTRUCTURE EXPANSION - CLEAR LAKE SHORES	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - CLUTE	WUG	DOW RESERVOIR EXPANSION
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 1	WUG	DOW RESERVOIR EXPANSION
		NEW / EXPANDED CONTRACT WITH BWA
		NEW / EXPANDED CONTRACT WITH BWA - BRACKISH GROUNDWATER
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 2	WUG	DOW RESERVOIR EXPANSION
		NEW / EXPANDED CONTRACT WITH BWA
		NEW / EXPANDED CONTRACT WITH BWA - BRACKISH GROUNDWATER

Project	Project Type	Associated WMS
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (FORT BEND MUD #149)	WUG	MISSOURI CITY GRP
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 1	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 2	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (B)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), GALVESTON COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RICHMOND GRP - PHASE 1)	WUG	RICHMOND GRP
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RICHMOND GRP - PHASE 2)	WUG	RICHMOND GRP
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RIVERSTONE)	WUG	SUGAR LAND GRP
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, BRAZORIA COUNTY (BC)	WUG	NEW / EXPANDED CONTRACT WITH BRA
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, CHAMBERS COUNTY (TSJ)	WUG	NEW / EXPANDED CONTRACT WITH CLCND
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, GALVESTON COUNTY (NT)	WUG	NEW / EXPANDED CONTRACT WITH LNVA
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, HARRIS COUNTY (TSJ)	WUG	NEW / EXPANDED CONTRACT WITH COH
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY - PHASE 1	WUG	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA CATAHOULA AQUIFER SUPPLIES
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY - PHASE 2	WUG	NEW / EXPANDED CONTRACT WITH SJRA
		SJRA CATAHOULA AQUIFER SUPPLIES
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY (SJRA GRP PARTICIPANTS)	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #116	WUG	RICHMOND GRP
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #129 - PHASE 1	WUG	MISSOURI CITY GRP
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #129 - PHASE 2	WUG	MISSOURI CITY GRP
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD 121	WUG	RICHMOND GRP
WUG INFRASTRUCTURE EXPANSION - FREEPORT	WUG	DOW RESERVOIR EXPANSION
WUG INFRASTRUCTURE EXPANSION - FULSHEAR	WUG	NFBWA GRP

Project	Project Type	Associated WMS
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #106	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #132	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #151	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #152	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #290	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #46	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - INDIGO LAKE WATER SYSTEM	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - IRRIGATION, FORT BEND (RICHMOND GRP)	WUG	RICHMOND GRP
WUG INFRASTRUCTURE EXPANSION - KEMAH	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - LA MARQUE	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - LAKE JACKSON	WUG	DOW RESERVOIR EXPANSION
WUG INFRASTRUCTURE EXPANSION - LAKE WINDCREST WATER SYSTEM	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (B)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, BRAZORIA COUNTY (BC)	WUG	NEW / EXPANDED CONTRACT WITH BRA
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, BRAZORIA COUNTY (SJB)	WUG	BRAZOS SALTWATER BARRIER
		DOW RESERVOIR EXPANSION
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, MONTGOMERY COUNTY	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - MANVEL - PHASE 1	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - MANVEL - PHASE 2	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (B)	WUG	NEW / EXPANDED CONTRACT WITH BRA
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (BC)	WUG	NEW / EXPANDED CONTRACT WITH BRA
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - MINING, GALVESTON COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (SJ)	WUG	NEW / EXPANDED CONTRACT WITH COH

Project	Project Type	Associated WMS
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (SJB)	WUG	NEW / EXPANDED CONTRACT WITH COH
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (TSJ)	WUG	NEW / EXPANDED CONTRACT WITH COH
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY COUNTY MUD #19	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY COUNTY MUD #89	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION - OYSTER CREEK	WUG	DOW RESERVOIR EXPANSION
WUG INFRASTRUCTURE EXPANSION - PANORAMA VILLAGE	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - RICHWOOD	WUG	DOW RESERVOIR EXPANSION
WUG INFRASTRUCTURE EXPANSION - RIVER PLANTATION MUD	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - ROSENBERG GRP PARTICIPANTS	WUG	ROSENBERG GRP
WUG INFRASTRUCTURE EXPANSION - SANTA FE	WUG	NEW / EXPANDED CONTRACT WITH GCWA
WUG INFRASTRUCTURE EXPANSION - SHENANDOAH	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (B) - PHASE 1	WUG	MISSOURI CITY GRP
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (B) - PHASE 2	WUG	MISSOURI CITY GRP
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (SJB) - PHASE 1	WUG	MISSOURI CITY GRP
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (SJB) - PHASE 2	WUG	MISSOURI CITY GRP
		NEW / EXPANDED CONTRACT WITH GCWA
		REALLOCATE EXISTING SUPPLY
WUG INFRASTRUCTURE EXPANSION - SPRING CREEK UD	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION - STAGECOACH	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - STANLEY LAKE MUD	WUG	NEW / EXPANDED CONTRACT WITH SJRA
WUG INFRASTRUCTURE EXPANSION - STEAM ELECTRIC POWER, FORT BEND COUNTY (B)	WUG	NEW / EXPANDED CONTRACT WITH BRA
WUG INFRASTRUCTURE EXPANSION - STEAM ELECTRIC POWER, MONTGOMERY COUNTY	WUG	SJRA CATAHOULA AQUIFER SUPPLIES
WUG INFRASTRUCTURE EXPANSION - THE WOODLANDS, HARRIS COUNTY	WUG	NHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - TOMBALL	WUG	NHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - TRAIL OF THE LAKES MUD	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION - WESTWOOD NORTH WSC	WUG	SJRA GRP

Project	Project Type	Associated WMS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 3	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BENDERS LANDING WATER SYSTEM	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BLUE BELL MANOR UTILITY COMPANY	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (B)	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 3	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, FORT BEND COUNTY (BC)	WUG	EXPANDED USE OF GROUNDWATER, FORT BEND
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, HARRIS COUNTY (SJ)	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, LIBERTY COUNTY (SJ)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, MADISON COUNTY (B)	WUG	EXPANDED USE OF GROUNDWATER, MADISON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, MONTGOMERY COUNTY	WUG	BRACKISH GROUNDWATER SUPPLIES
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, WALLER COUNTY (B) - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, WALLER
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, WALLER COUNTY (B) - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, WALLER
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - DOBBIN-PLANTERSVILLE WSC	WUG	BRACKISH GROUNDWATER SUPPLIES
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - EL DORADO UD	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - FORT BEND COUNTY MUD #23	WUG	MISSOURI CITY GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - GREATWOOD	WUG	SUGAR LAND GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - GREEN TRAILS MUD	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #11	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #119	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #153	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #154	WUG	CITY OF HOUSTON GRP

Project	Project Type	Associated WMS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #180	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #189	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #221	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #278	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #345	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #400 - WEST	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #14 - PHASE 1	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #14 - PHASE 2	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #15	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #133 - PHASE 1	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #133 - PHASE 2	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #74	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HEMPSTEAD	WUG	EXPANDED USE OF GROUNDWATER, WALLER
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - INDIGO LAKE WATER SYSTEM	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - IRRIGATION, LIBERTY COUNTY (N)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - IRRIGATION, LIBERTY COUNTY (SJ)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - KATY	WUG	WHCRWA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - KINGS MANOR MUD	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, CHAMBERS COUNTY (TSJ)	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (N)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (NT)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (SJ)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (T)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (TSJ)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LONGHORN TOWN UD	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MAGNOLIA	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, AUSTIN COUNTY (B)	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN

Project	Project Type	Associated WMS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 3	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, LEON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, LEON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 3	WUG	EXPANDED USE OF GROUNDWATER, LEON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (N)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (SJ)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (T) - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (T) - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, MADISON COUNTY (T)	WUG	EXPANDED USE OF GROUNDWATER, MADISON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, WALLER COUNTY ,BRAZOS	WUG	EXPANDED USE OF GROUNDWATER, WALLER
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MASON CREEK UD	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (C)	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (B)	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (BC)	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, CHAMBERS COUNTY (TSJ)	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LEON COUNTY (B)	WUG	EXPANDED USE OF GROUNDWATER, LEON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LEON COUNTY (T)	WUG	EXPANDED USE OF GROUNDWATER, LEON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (N)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (NT)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (SJ)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (T) - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (T) - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY

Project	Project Type	Associated WMS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (TSJ)	WUG	EXPANDED USE OF GROUNDWATER, LIBERTY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, MADISON COUNTY (B)	WUG	EXPANDED USE OF GROUNDWATER, MADISON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, MADISON COUNTY (T)	WUG	EXPANDED USE OF GROUNDWATER, MADISON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, SAN JACINTO COUNTY (T)	WUG	EXPANDED USE OF GROUNDWATER, SAN JACINTO
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T)	WUG	EXPANDED USE OF GROUNDWATER, TRINITY
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONT BELVIEU - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONT BELVIEU - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONTGOMERY COUNTY MUD #15	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONTGOMERY COUNTY MUD #94	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MOUNT HOUSTON ROAD MUD - PHASE 1	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MOUNT HOUSTON ROAD MUD - PHASE 2	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NEW CANEY MUD	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTH BELT UD	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTH GREEN MUD	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTHWEST PARK MUD	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - OLD RIVER-WINFREE - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - OLD RIVER-WINFREE - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, CHAMBERS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PATTON VILLAGE	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PINE ISLAND - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, WALLER
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PINE ISLAND - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, WALLER
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PLANTATION MUD	WUG	SUGAR LAND GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PLEAK	WUG	EXPANDED USE OF GROUNDWATER, FORT BEND
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - POINT AQUARIUS MUD	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROMAN FOREST	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROSENBERG GRP PARTICIPANTS - PHASE 1	WUG	ROSENBERG GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROSENBERG GRP PARTICIPANTS - PHASE 2	WUG	ROSENBERG GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SAN FELIPE - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN

Project	Project Type	Associated WMS
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SAN FELIPE - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, AUSTIN
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SJRA GRP PARTICIPANTS	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SPRING VALLEY - PHASE 1	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SPRING VALLEY - PHASE 2	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 1	WUG	EXPANDED USE OF GROUNDWATER, MADISON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 2	WUG	EXPANDED USE OF GROUNDWATER, MADISON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 3	WUG	EXPANDED USE OF GROUNDWATER, MADISON
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SUGAR LAND GRP PARTICIPANTS	WUG	SUGAR LAND GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE COMMONS WATER SUPPLY INC	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC	WUG	EXPANDED USE OF GROUNDWATER, WALKER
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - TRINITY RURAL WSC	WUG	EXPANDED USE OF GROUNDWATER, TRINITY
		EXPANDED USE OF GROUNDWATER, WALKER
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WEST HARRIS COUNTY MUD #6	WUG	CITY OF HOUSTON GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WILLIS	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WOODBRANCH	WUG	SJRA GRP
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WOODCREEK MUD	WUG	CITY OF HOUSTON GRP

Table 5-A5 – Second-Tier Identified Water Need

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
ALVIN	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
AMES	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
ANAHUAC	CHAMBERS	NECHES-TRINITY	MUNICIPAL	0	0	0	0	0	0
ANAHUAC	CHAMBERS	TRINITY	MUNICIPAL	0	0	0	0	0	0
ANGLETON	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
ARCOLA	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	10	132	184	233	274	314
BACLIFF MUD	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
BAILEY'S PRAIRIE	BRAZORIA	BRAZOS	MUNICIPAL	0	0	0	0	0	0
BAILEY'S PRAIRIE	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
BAYOU VISTA	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
BAYTOWN	CHAMBERS	TRINITY-SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
BAYTOWN	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
BAYTOWN	HARRIS	TRINITY-SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
BEACH CITY	CHAMBERS	TRINITY	MUNICIPAL	3	9	15	21	29	36
BEACH CITY	CHAMBERS	TRINITY-SAN JACINTO	MUNICIPAL	28	72	121	176	236	301
BEASLEY	FORT BEND	BRAZOS	MUNICIPAL	0	1	1	0	0	0
BEASLEY	FORT BEND	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
BELLAIRE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
BELLVILLE	AUSTIN	BRAZOS	MUNICIPAL	0	0	0	0	0	0
BENDERS LANDING WATER SYSTEM	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	1,196	2,440	3,631	4,880	4,888
BLUE BELL MANOR UTILITY COMPANY	HARRIS	SAN JACINTO	MUNICIPAL	0	170	310	326	346	363
BOLIVAR PENINSULA SUD	GALVESTON	NECHES-TRINITY	MUNICIPAL	0	0	0	0	0	0
BRAZORIA	BRAZORIA	BRAZOS	MUNICIPAL	0	0	0	0	0	0
BRAZORIA	BRAZORIA	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
BRAZORIA COUNTY MUD #2	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
BRAZORIA COUNTY MUD #21	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
BRAZORIA COUNTY MUD #3	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
BRAZORIA COUNTY MUD #6	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
BROOKSHIRE	WALLER	BRAZOS	MUNICIPAL	0	0	0	0	0	0
BROOKSIDE VILLAGE	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
BUFFALO	LEON	TRINITY	MUNICIPAL	0	0	0	0	0	0
BUNKER HILL VILLAGE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
CENTERVILLE	LEON	TRINITY	MUNICIPAL	0	0	0	0	0	0
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	HARRIS	SAN JACINTO	MUNICIPAL	0	323	1,240	1,153	1,114	1,093
CHIMNEY HILL MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
CLEAR BROOK CITY MUD	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
CLEAR LAKE SHORES	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	221	223	208	204	199	196
CLEVELAND	LIBERTY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
CLEVELAND	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
CLUTE	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	4
COLDSPRING	SAN JACINTO	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
COLDSPRING	SAN JACINTO	TRINITY	MUNICIPAL	0	0	0	0	0	0
CONCORD-ROBBINS WSC	LEON	BRAZOS	MUNICIPAL	0	0	0	0	0	0
CONCORD-ROBBINS WSC	LEON	TRINITY	MUNICIPAL	0	0	0	0	0	0
CONROE	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	1,383	3,363	5,077	7,231	9,582
COUNTY-OTHER	AUSTIN	BRAZOS	MUNICIPAL	0	0	0	0	288	800
COUNTY-OTHER	AUSTIN	BRAZOS-COLORADO	MUNICIPAL	0	14	87	178	282	399
COUNTY-OTHER	AUSTIN	COLORADO	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	BRAZORIA	BRAZOS	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	BRAZORIA	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	10

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
COUNTY-OTHER	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	4,575	8,016	11,211	14,672	18,594	22,829
COUNTY-OTHER	CHAMBERS	NECHES-TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	CHAMBERS	TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	CHAMBERS	TRINITY-SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	FORT BEND	BRAZOS	MUNICIPAL	0	4,038	2,157	2,278	3,458	4,951
COUNTY-OTHER	FORT BEND	BRAZOS-COLORADO	MUNICIPAL	0	0	0	1,586	4,559	9,101
COUNTY-OTHER	FORT BEND	SAN JACINTO	MUNICIPAL	39	0	0	0	0	0
COUNTY-OTHER	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	525	1,206	1,830
COUNTY-OTHER	GALVESTON	NECHES-TRINITY	MUNICIPAL	4	7	7	10	12	14
COUNTY-OTHER	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	1,994	2,160	2,297	2,440	2,597	2,752
COUNTY-OTHER	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	HARRIS	TRINITY-SAN JACINTO	MUNICIPAL	1,564	1,718	1,914	1,959	2,041	2,131
COUNTY-OTHER	LEON	BRAZOS	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	LEON	TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	LIBERTY	NECHES	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	LIBERTY	NECHES-TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	LIBERTY	SAN JACINTO	MUNICIPAL	0	0	0	0	147	309
COUNTY-OTHER	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	LIBERTY	TRINITY-SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	MADISON	BRAZOS	MUNICIPAL	0	0	0	0	0	5
COUNTY-OTHER	MADISON	TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	MONTGOMERY	SAN JACINTO	MUNICIPAL	4,380	16,046	30,015	46,597	68,691	95,994
COUNTY-OTHER	POLK	TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	SAN JACINTO	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	SAN JACINTO	TRINITY	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
COUNTY-OTHER	TRINITY	TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	WALKER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	WALKER	TRINITY	MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	WALLER	BRAZOS	MUNICIPAL	0	0	0	116	458	825
COUNTY-OTHER	WALLER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
COVE	CHAMBERS	TRINITY	MUNICIPAL	0	0	0	0	0	0
CROSBY MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
CUT AND SHOOT	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
DAISETTA	LIBERTY	NECHES	MUNICIPAL	0	0	0	0	0	0
DAISETTA	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
DANBURY	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
DAYTON	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
DAYTON	LIBERTY	TRINITY-SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
DEER PARK	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
DEER PARK	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
DICKINSON	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
DOBBIN-PLANTERSVILLE WSC	MONTGOMERY	SAN JACINTO	MUNICIPAL	153	327	570	890	1,337	1,930
EAST PLANTATION UD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	5	16
EL DORADO UD	HARRIS	SAN JACINTO	MUNICIPAL	0	60	104	100	95	90
EL LAGO	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
FAIRCHILDS	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	0	0
FLO COMMUNITY WSC	LEON	TRINITY	MUNICIPAL	0	0	0	0	0	0
FORT BEND COUNTY MUD #116	FORT BEND	BRAZOS	MUNICIPAL	171	383	445	491	538	585
FORT BEND COUNTY MUD #121	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	28	70
FORT BEND COUNTY MUD #129	FORT BEND	BRAZOS	MUNICIPAL	0	184	322	437	515	509
FORT BEND COUNTY MUD #23	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	418	434	450	468	488

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
FORT BEND COUNTY MUD #25	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	0	0
FORT BEND COUNTY MUD #25	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	114	107	107	112	120
FOUNTAINVIEW SUBDIVISION	HARRIS	SAN JACINTO	MUNICIPAL	50	93	118	116	115	115
FREEPORT	BRAZORIA	BRAZOS	MUNICIPAL	0	0	0	0	0	0
FREEPORT	BRAZORIA	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
FREEPORT	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
FRIENDSWOOD	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
FRIENDSWOOD	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
FULSHEAR	FORT BEND	BRAZOS	MUNICIPAL	0	73	104	131	154	175
FULSHEAR	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	423	457	485	508	528
G & W WSC	WALLER	BRAZOS	MUNICIPAL	0	0	0	0	0	0
G & W WSC	WALLER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
GALENA PARK	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
GALVESTON	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
GREATWOOD	FORT BEND	BRAZOS	MUNICIPAL	0	434	416	406	401	400
GREEN TRAILS MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	150	252	247	243	240
GREENWOOD UD	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
GROVETON	TRINITY	TRINITY	MUNICIPAL	0	0	0	0	0	0
HARDIN	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
HARDIN WSC	LIBERTY	NECHES	MUNICIPAL	0	0	0	0	0	0
HARDIN WSC	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY MUD #106	HARRIS	SAN JACINTO	MUNICIPAL	0	339	619	628	632	633
HARRIS COUNTY MUD #11	HARRIS	SAN JACINTO	MUNICIPAL	0	81	145	146	151	156
HARRIS COUNTY MUD #119	HARRIS	SAN JACINTO	MUNICIPAL	0	133	218	217	219	222
HARRIS COUNTY MUD #132	HARRIS	SAN JACINTO	MUNICIPAL	0	242	397	390	381	375
HARRIS COUNTY MUD #148 - KINGSLAKE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
HARRIS COUNTY MUD #151	HARRIS	SAN JACINTO	MUNICIPAL	0	277	462	449	440	433
HARRIS COUNTY MUD #152	HARRIS	SAN JACINTO	MUNICIPAL	0	311	539	542	544	544
HARRIS COUNTY MUD #153	HARRIS	SAN JACINTO	MUNICIPAL	0	324	539	522	509	498
HARRIS COUNTY MUD #154	HARRIS	SAN JACINTO	MUNICIPAL	0	197	336	335	342	351
HARRIS COUNTY MUD #158	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY MUD #180	HARRIS	SAN JACINTO	MUNICIPAL	0	148	259	251	244	238
HARRIS COUNTY MUD #189	HARRIS	SAN JACINTO	MUNICIPAL	0	102	179	184	191	198
HARRIS COUNTY MUD #221	HARRIS	SAN JACINTO	MUNICIPAL	0	127	218	223	227	234
HARRIS COUNTY MUD #278	HARRIS	SAN JACINTO	MUNICIPAL	0	442	676	659	644	631
HARRIS COUNTY MUD #290	HARRIS	SAN JACINTO	MUNICIPAL	0	167	303	310	314	314
HARRIS COUNTY MUD #345	HARRIS	SAN JACINTO	MUNICIPAL	0	212	356	346	340	334
HARRIS COUNTY MUD #400 - WEST	HARRIS	SAN JACINTO	MUNICIPAL	0	230	420	438	443	441
HARRIS COUNTY MUD #46	HARRIS	SAN JACINTO	MUNICIPAL	0	177	290	277	270	263
HARRIS COUNTY MUD #49	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY MUD #5	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY MUD #50	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY MUD #55	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY MUD #8	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY MUD #96	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY UD #14	HARRIS	SAN JACINTO	MUNICIPAL	0	68	124	139	157	186
HARRIS COUNTY UD #15	HARRIS	SAN JACINTO	MUNICIPAL	0	113	227	229	236	233
HARRIS COUNTY WCID #1	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY WCID #1	HARRIS	TRINITY-SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HARRIS COUNTY WCID #133	HARRIS	SAN JACINTO	MUNICIPAL	0	173	297	320	349	385
HARRIS COUNTY WCID #74	HARRIS	SAN JACINTO	MUNICIPAL	0	204	364	367	374	383
HARRIS COUNTY WCID #96	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
HEDWIG VILLAGE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HEMPSTEAD	WALLER	BRAZOS	MUNICIPAL	0	0	0	0	33	287
HILLCREST	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
HILSHIRE VILLAGE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HITCHCOCK	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
HOLIDAY LAKES	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
HOUSTON	FORT BEND	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HOUSTON	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
HOUSTON	HARRIS	SAN JACINTO	MUNICIPAL	0	0	36,994	48,691	67,828	88,814
HOUSTON	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	11,649	10,768	10,883	9,469	8,303	7,008
HOUSTON	HARRIS	TRINITY-SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HOUSTON	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HUMBLE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HUNTERS CREEK VILLAGE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HUNTSVILLE	WALKER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
HUNTSVILLE	WALKER	TRINITY	MUNICIPAL	0	0	0	0	0	0
INDIGO LAKE WATER SYSTEM	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	344	936	1,767	2,993	5,004
IOWA COLONY	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
IRRIGATION	AUSTIN	BRAZOS	IRRIGATION	0	0	0	0	0	0
IRRIGATION	AUSTIN	BRAZOS-COLORADO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	BRAZORIA	BRAZOS	IRRIGATION	0	0	0	0	0	0
IRRIGATION	BRAZORIA	BRAZOS-COLORADO	IRRIGATION	0	0	0	0	217	479
IRRIGATION	BRAZORIA	SAN JACINTO-BRAZOS	IRRIGATION	49,022	49,539	49,906	50,308	50,743	51,143
IRRIGATION	CHAMBERS	NECHES-TRINITY	IRRIGATION	0	0	0	0	0	0
IRRIGATION	CHAMBERS	TRINITY	IRRIGATION	0	0	0	0	0	0
IRRIGATION	CHAMBERS	TRINITY-SAN JACINTO	IRRIGATION	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
IRRIGATION	FORT BEND	BRAZOS	IRRIGATION	0	0	0	0	0	0
IRRIGATION	FORT BEND	BRAZOS-COLORADO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	FORT BEND	SAN JACINTO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	FORT BEND	SAN JACINTO-BRAZOS	IRRIGATION	1,186	1,186	1,186	1,186	1,186	1,186
IRRIGATION	GALVESTON	NECHES-TRINITY	IRRIGATION	11	11	11	11	11	11
IRRIGATION	GALVESTON	SAN JACINTO-BRAZOS	IRRIGATION	4,300	4,300	4,300	4,300	4,300	4,300
IRRIGATION	HARRIS	SAN JACINTO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	HARRIS	TRINITY-SAN JACINTO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	LEON	BRAZOS	IRRIGATION	0	0	0	0	0	0
IRRIGATION	LEON	TRINITY	IRRIGATION	0	0	0	0	0	0
IRRIGATION	LIBERTY	NECHES	IRRIGATION	8,648	8,648	8,648	8,648	8,648	8,648
IRRIGATION	LIBERTY	NECHES-TRINITY	IRRIGATION	0	0	0	0	0	0
IRRIGATION	LIBERTY	SAN JACINTO	IRRIGATION	1,836	1,836	1,836	1,836	1,836	1,836
IRRIGATION	LIBERTY	TRINITY	IRRIGATION	0	0	0	0	0	0
IRRIGATION	LIBERTY	TRINITY-SAN JACINTO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	MADISON	BRAZOS	IRRIGATION	0	0	0	0	0	0
IRRIGATION	MADISON	TRINITY	IRRIGATION	0	0	0	0	0	0
IRRIGATION	MONTGOMERY	SAN JACINTO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	SAN JACINTO	SAN JACINTO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	SAN JACINTO	TRINITY	IRRIGATION	0	0	0	0	0	0
IRRIGATION	WALKER	SAN JACINTO	IRRIGATION	0	0	0	0	0	0
IRRIGATION	WALKER	TRINITY	IRRIGATION	0	0	0	0	0	0
IRRIGATION	WALLER	BRAZOS	IRRIGATION	0	0	0	0	0	0
IRRIGATION	WALLER	SAN JACINTO	IRRIGATION	0	0	0	0	0	0
JACINTO CITY	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
JAMAICA BEACH	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
JERSEY VILLAGE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
JEWETT	LEON	BRAZOS	MUNICIPAL	0	0	0	0	0	0
JEWETT	LEON	TRINITY	MUNICIPAL	0	0	0	0	0	0
JONES CREEK	BRAZORIA	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
KATY	FORT BEND	SAN JACINTO	MUNICIPAL	0	1,729	1,704	1,687	1,677	1,668
KATY	HARRIS	SAN JACINTO	MUNICIPAL	0	953	1,652	1,683	1,716	1,748
KATY	WALLER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
KEMAH	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	567	855	875	901	923	941
KENEFICK	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
KINGS MANOR MUD	HARRIS	SAN JACINTO	MUNICIPAL	3	34	59	63	69	73
KINGS MANOR MUD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
KIRKMONT MUD	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	6
LA MARQUE	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	249	358	309	302	313	322
LA PORTE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
LA PORTE	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
LAKE JACKSON	BRAZORIA	BRAZOS	MUNICIPAL	0	0	0	0	0	4
LAKE JACKSON	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	POLK	TRINITY	MUNICIPAL	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	SAN JACINTO	TRINITY	MUNICIPAL	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	TRINITY	MUNICIPAL	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WALKER	TRINITY	MUNICIPAL	0	0	0	0	0	0
LAKE WINDCREST WATER SYSTEM	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	63	299	629	1,123	1,818
LEAGUE CITY	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
LEAGUE CITY	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
LIBERTY	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
LIVESTOCK	AUSTIN	BRAZOS	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	AUSTIN	BRAZOS-COLORADO	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	AUSTIN	COLORADO	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	BRAZORIA	BRAZOS	LIVESTOCK	9	17	23	29	35	42
LIVESTOCK	BRAZORIA	BRAZOS-COLORADO	LIVESTOCK	137	159	175	192	211	228
LIVESTOCK	BRAZORIA	SAN JACINTO-BRAZOS	LIVESTOCK	93	164	216	272	332	388
LIVESTOCK	CHAMBERS	NECHES-TRINITY	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	CHAMBERS	TRINITY	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	CHAMBERS	TRINITY-SAN JACINTO	LIVESTOCK	0	0	0	0	47	86
LIVESTOCK	FORT BEND	BRAZOS	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	FORT BEND	BRAZOS-COLORADO	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	FORT BEND	SAN JACINTO	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	FORT BEND	SAN JACINTO-BRAZOS	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	GALVESTON	NECHES-TRINITY	LIVESTOCK	51	51	51	51	51	51
LIVESTOCK	GALVESTON	SAN JACINTO-BRAZOS	LIVESTOCK	177	177	177	177	177	177
LIVESTOCK	HARRIS	SAN JACINTO	LIVESTOCK	522	939	1,213	1,214	1,214	1,215
LIVESTOCK	HARRIS	TRINITY-SAN JACINTO	LIVESTOCK	112	114	120	119	119	118
LIVESTOCK	LEON	BRAZOS	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	LEON	TRINITY	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	LIBERTY	NECHES	LIVESTOCK	41	41	41	41	41	41
LIVESTOCK	LIBERTY	NECHES-TRINITY	LIVESTOCK	24	24	24	24	24	24
LIVESTOCK	LIBERTY	SAN JACINTO	LIVESTOCK	73	73	73	73	73	73
LIVESTOCK	LIBERTY	TRINITY	LIVESTOCK	252	252	252	252	252	252
LIVESTOCK	LIBERTY	TRINITY-SAN JACINTO	LIVESTOCK	29	29	29	29	29	29

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
LIVESTOCK	MADISON	BRAZOS	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	MADISON	TRINITY	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	MONTGOMERY	SAN JACINTO	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	POLK	TRINITY	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	SAN JACINTO	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	TRINITY	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	TRINITY	TRINITY	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	WALKER	SAN JACINTO	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	WALKER	TRINITY	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	WALLER	BRAZOS	LIVESTOCK	0	0	0	0	0	0
LIVESTOCK	WALLER	SAN JACINTO	LIVESTOCK	0	0	0	0	0	0
LIVINGSTON	POLK	TRINITY	MUNICIPAL	0	0	0	0	0	0
LONGHORN TOWN UD	HARRIS	SAN JACINTO	MUNICIPAL	0	80	135	132	130	128
MADISONVILLE	MADISON	TRINITY	MUNICIPAL	0	0	0	0	0	0
MAGNOLIA	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	110	331	681	1,229
MANUFACTURING	AUSTIN	BRAZOS	MANUFACTURING	0	5	10	15	23	32
MANUFACTURING	AUSTIN	BRAZOS-COLORADO	MANUFACTURING	0	0	0	0	0	0
MANUFACTURING	BRAZORIA	BRAZOS	MANUFACTURING	0	0	0	0	0	0
MANUFACTURING	BRAZORIA	BRAZOS-COLORADO	MANUFACTURING	38,769	41,788	44,694	47,532	50,302	52,991
MANUFACTURING	BRAZORIA	SAN JACINTO-BRAZOS	MANUFACTURING	22,179	31,710	41,667	51,293	60,595	69,569
MANUFACTURING	CHAMBERS	TRINITY	MANUFACTURING	0	104	231	338	480	633
MANUFACTURING	CHAMBERS	TRINITY-SAN JACINTO	MANUFACTURING	0	0	0	0	0	0
MANUFACTURING	FORT BEND	BRAZOS	MANUFACTURING	0	579	598	603	510	422
MANUFACTURING	FORT BEND	SAN JACINTO	MANUFACTURING	826	1,714	1,726	1,722	1,595	1,477
MANUFACTURING	FORT BEND	SAN JACINTO-BRAZOS	MANUFACTURING	0	1,078	1,095	1,089	922	768
MANUFACTURING	GALVESTON	SAN JACINTO-BRAZOS	MANUFACTURING	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
MANUFACTURING	HARRIS	SAN JACINTO	MANUFACTURING	0	0	0	2,780	0	0
MANUFACTURING	HARRIS	SAN JACINTO-BRAZOS	MANUFACTURING	0	785	3,444	5,088	2,579	145
MANUFACTURING	HARRIS	TRINITY-SAN JACINTO	MANUFACTURING	13,614	18,158	22,056	24,833	23,043	21,334
MANUFACTURING	LEON	TRINITY	MANUFACTURING	0	74	182	277	362	453
MANUFACTURING	LIBERTY	NECHES	MANUFACTURING	0	22	47	68	85	104
MANUFACTURING	LIBERTY	SAN JACINTO	MANUFACTURING	0	16	34	49	62	76
MANUFACTURING	LIBERTY	TRINITY	MANUFACTURING	72	91	110	127	141	155
MANUFACTURING	MADISON	TRINITY	MANUFACTURING	0	15	32	47	66	87
MANUFACTURING	MONTGOMERY	SAN JACINTO	MANUFACTURING	266	487	701	881	1,077	1,287
MANUFACTURING	SAN JACINTO	SAN JACINTO	MANUFACTURING	0	0	0	0	0	0
MANUFACTURING	WALKER	SAN JACINTO	MANUFACTURING	0	0	0	0	0	0
MANUFACTURING	WALKER	TRINITY	MANUFACTURING	0	0	0	0	0	0
MANUFACTURING	WALLER	BRAZOS	MANUFACTURING	0	10	21	30	40	51
MANUFACTURING	WALLER	SAN JACINTO	MANUFACTURING	0	0	0	0	0	0
MANVEL	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	492	1,319	2,253	3,353	4,718
MASON CREEK UD	HARRIS	SAN JACINTO	MUNICIPAL	0	303	516	498	485	473
MEADOWS PLACE	FORT BEND	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MEADOWS PLACE	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
MINING	AUSTIN	BRAZOS	MINING	0	146	98	50	3	0
MINING	AUSTIN	BRAZOS-COLORADO	MINING	0	42	29	15	1	0
MINING	AUSTIN	COLORADO	MINING	0	5	3	2	1	0
MINING	BRAZORIA	BRAZOS	MINING	111	145	174	206	240	280
MINING	BRAZORIA	BRAZOS-COLORADO	MINING	206	266	321	380	444	521
MINING	BRAZORIA	SAN JACINTO-BRAZOS	MINING	417	561	689	831	980	1,161
MINING	CHAMBERS	NECHES-TRINITY	MINING	0	0	0	0	0	0
MINING	CHAMBERS	TRINITY	MINING	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
MINING	CHAMBERS	TRINITY-SAN JACINTO	MINING	112	112	112	112	112	112
MINING	FORT BEND	BRAZOS	MINING	0	0	0	0	0	0
MINING	FORT BEND	BRAZOS-COLORADO	MINING	0	0	0	0	0	0
MINING	FORT BEND	SAN JACINTO-BRAZOS	MINING	4	9	7	5	4	2
MINING	GALVESTON	NECHES-TRINITY	MINING	70	76	83	90	96	103
MINING	GALVESTON	SAN JACINTO-BRAZOS	MINING	273	292	322	347	372	397
MINING	HARRIS	SAN JACINTO	MINING	2,622	2,605	2,559	2,531	2,508	2,491
MINING	HARRIS	SAN JACINTO-BRAZOS	MINING	176	175	173	171	169	168
MINING	HARRIS	TRINITY-SAN JACINTO	MINING	148	147	143	141	141	139
MINING	LEON	BRAZOS	MINING	0	23	0	0	0	0
MINING	LEON	TRINITY	MINING	0	56	0	0	0	0
MINING	LIBERTY	NECHES	MINING	21	24	23	25	29	34
MINING	LIBERTY	NECHES-TRINITY	MINING	0	1	0	1	3	5
MINING	LIBERTY	SAN JACINTO	MINING	0	3	1	6	10	18
MINING	LIBERTY	TRINITY	MINING	164	176	169	182	198	224
MINING	LIBERTY	TRINITY-SAN JACINTO	MINING	0	1	1	2	4	6
MINING	MADISON	BRAZOS	MINING	0	75	32	0	0	0
MINING	MADISON	TRINITY	MINING	0	300	125	0	0	0
MINING	MONTGOMERY	SAN JACINTO	MINING	0	0	0	0	0	0
MINING	POLK	TRINITY	MINING	0	0	0	0	0	0
MINING	SAN JACINTO	SAN JACINTO	MINING	0	0	0	0	0	0
MINING	SAN JACINTO	TRINITY	MINING	0	0	1	1	1	1
MINING	TRINITY	TRINITY	MINING	5	5	5	5	5	5
MINING	WALKER	SAN JACINTO	MINING	0	0	0	0	0	0
MINING	WALKER	TRINITY	MINING	0	0	0	0	0	0
MINING	WALLER	BRAZOS	MINING	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
MINING	WALLER	SAN JACINTO	MINING	0	0	0	0	0	0
MISSOURI CITY	FORT BEND	BRAZOS	MUNICIPAL	0	360	515	657	750	801
MISSOURI CITY	FORT BEND	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MISSOURI CITY	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	699	1,658	2,545	3,114	3,449
MISSOURI CITY	HARRIS	SAN JACINTO	MUNICIPAL	0	88	365	438	499	555
MONT BELVIEU	CHAMBERS	TRINITY	MUNICIPAL	0	0	71	532	1,054	1,604
MONT BELVIEU	CHAMBERS	TRINITY-SAN JACINTO	MUNICIPAL	0	0	26	165	322	486
MONTGOMERY	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	509	771	1,020	1,294	1,730
MONTGOMERY COUNTY MUD #15	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	17	84	173	318	525
MONTGOMERY COUNTY MUD #18	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	403
MONTGOMERY COUNTY MUD #19	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MONTGOMERY COUNTY MUD #8	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MONTGOMERY COUNTY MUD #83	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MONTGOMERY COUNTY MUD #89	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MONTGOMERY COUNTY MUD #9	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MONTGOMERY COUNTY MUD #94	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	47	98	159	159
MONTGOMERY COUNTY UD #2	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MONTGOMERY COUNTY UD #3	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MONTGOMERY COUNTY UD #4	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
MONTGOMERY COUNTY WCID #1	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	6	32	64
MOUNT HOUSTON ROAD MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	196	367	401	425	441
NASSAU BAY	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
NEEDVILLE	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	0	0
NEEDVILLE	FORT BEND	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
NEW CANEY MUD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	29	128	252
NEW WAVERLY	WALKER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
NEWPORT MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
NORMANGEE	LEON	BRAZOS	MUNICIPAL	0	0	0	0	0	0
NORMANGEE	LEON	TRINITY	MUNICIPAL	0	0	0	0	0	0
NORMANGEE	MADISON	TRINITY	MUNICIPAL	0	0	0	0	0	0
NORTH BELT UD	HARRIS	SAN JACINTO	MUNICIPAL	0	91	156	155	159	163
NORTH CHANNEL WATER AUTHORITY	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
NORTH FORT BEND WATER AUTHORITY	FORT BEND	BRAZOS	MUNICIPAL	4	864	5,496	8,305	9,281	9,193
NORTH FORT BEND WATER AUTHORITY	FORT BEND	SAN JACINTO	MUNICIPAL	0	12,278	13,980	14,623	14,879	14,992
NORTH FORT BEND WATER AUTHORITY	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	2,654	17,843	20,707	22,390	23,425	24,061
NORTH FORT BEND WATER AUTHORITY	HARRIS	SAN JACINTO	MUNICIPAL	0	627	1,066	1,073	1,065	1,058
NORTH GREEN MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	109	184	172	164	157
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	HARRIS	SAN JACINTO	MUNICIPAL	842	37,924	64,584	66,304	68,076	69,748
NORTHWEST PARK MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	896	1,564	1,614	1,682	1,760
OAK RIDGE NORTH	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	4	6
OAKWOOD	LEON	TRINITY	MUNICIPAL	0	0	0	0	0	0
OLD RIVER-WINFREE	CHAMBERS	TRINITY	MUNICIPAL	7	22	39	60	86	113
OLD RIVER-WINFREE	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
ONALASKA	POLK	TRINITY	MUNICIPAL	0	0	0	0	0	0
OYSTER CREEK	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	5	8	8	12	21	31
PANORAMA VILLAGE	MONTGOMERY	SAN JACINTO	MUNICIPAL	19	13	39	75	139	225
PARKWAY UD	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
PASADENA	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
PASADENA	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
PATTON VILLAGE	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	1	15	32	58	90
PEARLAND	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
PEARLAND	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
PEARLAND	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
PECAN GROVE MUD #1	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	0	0
PECAN GROVE MUD #1	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
PINE ISLAND	WALLER	BRAZOS	MUNICIPAL	8	22	39	60	84	110
PINEY POINT VILLAGE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
PLANTATION MUD	FORT BEND	BRAZOS	MUNICIPAL	0	97	82	72	68	67
PLEAK	FORT BEND	BRAZOS	MUNICIPAL	44	101	103	108	113	120
PLUM GROVE	LIBERTY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
POINT AQUARIUS MUD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	6	56
POINT BLANK	SAN JACINTO	TRINITY	MUNICIPAL	0	0	0	0	0	0
PORTER SUD	MONTGOMERY	SAN JACINTO	MUNICIPAL	846	1,209	1,569	1,912	2,299	2,623
PRAIRIE VIEW	WALLER	BRAZOS	MUNICIPAL	0	0	0	0	0	0
PRAIRIE VIEW	WALLER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
RAYFORD ROAD MUD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	10	71	158	191
RICHMOND	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	0	0
RICHWOOD	BRAZORIA	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	10
RIVER PLANTATION MUD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	37
RIVERSIDE	WALKER	TRINITY	MUNICIPAL	0	0	0	0	0	0
RIVERSIDE WSC	SAN JACINTO	TRINITY	MUNICIPAL	0	0	0	0	0	0
RIVERSIDE WSC	WALKER	TRINITY	MUNICIPAL	0	0	0	0	0	0
ROMAN FOREST	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	5	39	93	162
ROSENBERG	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	0	0
ROSENBERG	FORT BEND	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
SAGEMEADOW UD	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
SAN FELIPE	AUSTIN	BRAZOS	MUNICIPAL	23	53	87	129	176	229
SAN JACINTO SUD	SAN JACINTO	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
SAN JACINTO SUD	SAN JACINTO	TRINITY	MUNICIPAL	0	0	0	0	0	0
SAN LEON MUD	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
SANTA FE	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	591	560	548	569	605	645
SEABROOK	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
SEALY	AUSTIN	BRAZOS	MUNICIPAL	0	0	0	0	0	0
SEALY	AUSTIN	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
SHENANDOAH	MONTGOMERY	SAN JACINTO	MUNICIPAL	101	427	540	604	717	864
SHEPHERD	SAN JACINTO	TRINITY	MUNICIPAL	0	0	0	0	0	0
SHOREACRES	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
SIENNA PLANTATION	FORT BEND	BRAZOS	MUNICIPAL	0	0	204	444	664	876
SIENNA PLANTATION	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	632	1,503	2,383	3,179
SIMONTON	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	0	0
SOUTH HOUSTON	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
SOUTHERN MONTGOMERY COUNTY MUD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
SOUTHSIDE PLACE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
SPLENDORA	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
SPRING CREEK UD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	30	50	96	171	197
SPRING VALLEY	HARRIS	SAN JACINTO	MUNICIPAL	0	314	579	624	679	742
STAFFORD	FORT BEND	SAN JACINTO	MUNICIPAL	370	749	761	783	813	852
STAFFORD	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	600	616	644	691	746
STAFFORD	HARRIS	SAN JACINTO	MUNICIPAL	0	13	29	31	31	32
STAGECOACH	MONTGOMERY	SAN JACINTO	MUNICIPAL	6	11	35	70	127	226
STANLEY LAKE MUD	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	0	110	495
STEAM ELECTRIC POWER	CHAMBERS	TRINITY-SAN JACINTO	STEAM ELECTRIC POWER	0	0	0	0	0	0
STEAM ELECTRIC POWER	FORT BEND	BRAZOS	STEAM ELECTRIC POWER	0	0	0	0	554	26,343

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
STEAM ELECTRIC POWER	HARRIS	SAN JACINTO	STEAM ELECTRIC POWER	0	2,872	7,023	12,085	18,254	25,586
STEAM ELECTRIC POWER	HARRIS	SAN JACINTO-BRAZOS	STEAM ELECTRIC POWER	1,060	1,239	1,458	1,724	2,049	2,434
STEAM ELECTRIC POWER	MADISON	TRINITY	STEAM ELECTRIC POWER	238	278	327	387	459	546
STEAM ELECTRIC POWER	MONTGOMERY	SAN JACINTO	STEAM ELECTRIC POWER	0	0	0	0	355	3,464
SUGAR LAND	FORT BEND	BRAZOS	MUNICIPAL	0	1,195	1,688	2,233	2,724	3,052
SUGAR LAND	FORT BEND	SAN JACINTO	MUNICIPAL	0	102	123	143	160	169
SUGAR LAND	FORT BEND	SAN JACINTO-BRAZOS	MUNICIPAL	0	1,212	1,494	1,762	1,972	2,108
SUNBELT FWSD	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
SWEENY	BRAZORIA	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
TARKINGTON SUD	LIBERTY	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
TARKINGTON SUD	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0
TAYLOR LAKE VILLAGE	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
TEXAS CITY	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
THE COMMONS WATER SUPPLY INC	HARRIS	SAN JACINTO	MUNICIPAL	0	107	186	188	189	190
THE CONSOLIDATED WSC	WALKER	TRINITY	MUNICIPAL	7	8	8	8	9	9
THE WOODLANDS	HARRIS	SAN JACINTO	MUNICIPAL	0	1,050	2,107	2,262	2,369	2,441
THE WOODLANDS	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	0	197	2,384	5,107
TIKI ISLAND	GALVESTON	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
TOMBALL	HARRIS	SAN JACINTO	MUNICIPAL	899	1,856	2,570	2,616	2,663	2,707
TRAIL OF THE LAKES MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	303	501	489	481	475
TRINITY	TRINITY	TRINITY	MUNICIPAL	0	0	0	0	0	0
TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	NECHES-TRINITY	MUNICIPAL	0	0	0	0	0	0
TRINITY BAY CONSERVATION DISTRICT	CHAMBERS	TRINITY	MUNICIPAL	0	0	0	0	0	0
TRINITY RURAL WSC	TRINITY	TRINITY	MUNICIPAL	31	38	17	0	0	0
TRINITY RURAL WSC	WALKER	TRINITY	MUNICIPAL	12	13	12	10	11	11

Water User Group	County	Basin	Type	Second-Tier Needs Remaining After Conservation and Direct Reuse (ac-ft)					
				2020	2030	2040	2050	2060	2070
VARNER CREEK UD	BRAZORIA	BRAZOS	MUNICIPAL	0	0	0	0	0	0
WALKER COUNTY SUD	WALKER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
WALKER COUNTY SUD	WALKER	TRINITY	MUNICIPAL	0	0	0	0	0	0
WALLER	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
WALLER	WALLER	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
WALLIS	AUSTIN	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
WEBSTER	HARRIS	SAN JACINTO-BRAZOS	MUNICIPAL	0	0	0	0	0	0
WEST COLUMBIA	BRAZORIA	BRAZOS	MUNICIPAL	0	0	0	0	0	0
WEST COLUMBIA	BRAZORIA	BRAZOS-COLORADO	MUNICIPAL	0	0	0	0	0	0
WEST HARDIN WSC	LIBERTY	NECHES	MUNICIPAL	0	0	0	0	0	0
WEST HARRIS COUNTY MUD #6	HARRIS	SAN JACINTO	MUNICIPAL	0	100	171	173	174	175
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	FORT BEND	SAN JACINTO	MUNICIPAL	288	670	678	680	643	597
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	HARRIS	SAN JACINTO	MUNICIPAL	0	13,905	30,484	32,738	32,963	33,177
WEST UNIVERSITY PLACE	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
WESTON LAKES	FORT BEND	BRAZOS	MUNICIPAL	0	0	0	0	0	0
WESTWOOD NORTH WSC	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	10	48	81	121	178
WILLIS	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	33	95	207	366
WINDFERN FOREST UD	HARRIS	SAN JACINTO	MUNICIPAL	0	0	0	0	0	0
WOODBRANCH	MONTGOMERY	SAN JACINTO	MUNICIPAL	0	0	5	26	58	97
WOODCREEK MUD	HARRIS	SAN JACINTO	MUNICIPAL	0	77	126	122	120	120
WOODLAND HILLS WATER COMPANY	LIBERTY	TRINITY	MUNICIPAL	0	0	0	0	0	0

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Table 5-A6 – Water Management Strategy Supply Allocations

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
ALVIN	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	49	137	218	297	378	468
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	63	125	190	231	255	288
AMES	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	6	12	18	25	33	40
ANAHUAC	WATER LOSS REDUCTION, CHAMBERS	N/A	WATER LOSS REDUCTION	9	16	23	29	34	40
ANGLETON	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	994	997	1,001	1,026	1,063	1,063
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	21	53	77	96	111	123
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	27	49	67	75	75	76
ARCOLA	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	1	4	8	13	17	22
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	10	132	184	233	274	314
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	3	8	11	14	16	18
BACLIFF MUD	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	880	857	833	810	787	763
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	1	3	5	7	9	10
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	6	5	5	5	5	5
BAILEY'S PRAIRIE	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	1	3	4	5	6	6
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	1	2	3	4	4	4
BAYOU VISTA	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	95	93	90	88	85	82
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	1	2	3	4	4	5
BAYTOWN	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	76	213	336	449	556	656
	WATER LOSS REDUCTION, CHAMBERS	N/A	WATER LOSS REDUCTION	9	20	32	42	48	54
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	131	245	346	407	413	420
BEACH CITY	EXPANDED USE OF GROUNDWATER, CHAMBERS	N/A	GULF COAST AQUIFER, CHAMBERS	100	100	200	200	350	350
BEASLEY	EXPANDED USE OF GROUNDWATER, FORT BEND	N/A	GULF COAST AQUIFER, FORT BEND	0	1	1	0	0	0
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	0	1	2	3	4	5
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	0	0	0	0	1	1

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
BELLAIRE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	30	92	157	226	300	379
BELLVILLE	MUNICIPAL CONSERVATION, AUSTIN	N/A	MUNICIPAL CONSERVATION	3	7	12	16	19	23
BENDERS LANDING WATER SYSTEM	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	18	71	133	250	304	295
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	4,717	4,729
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	97	1,196	2,440	3,631	163	159
BLUE BELL MANOR UTILITY COMPANY	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	170	310	326	346	363
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	5	15	25	35	45	54
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	8	15	16	17	18	19
BOLIVAR PENINSULA SUD	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	0	2	3	4	7	9
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	3	6	10	12	14	17
BRAZORIA	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	175	175	175	175	175	175
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	3	9	13	16	19	21
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	5	9	12	16	17	17
BRAZORIA COUNTY MUD #2	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	23	61	92	116	134	146
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	61	116	165	210	250	287
BRAZORIA COUNTY MUD #21	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	6	16	26	35	43	49
BRAZORIA COUNTY MUD #3	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	6	16	24	30	35	39
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	8	14	21	23	24	24
BRAZORIA COUNTY MUD #6	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	7	19	28	36	41	46
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	9	17	25	28	28	28
BROOKSHIRE	MUNICIPAL CONSERVATION, WALLER	N/A	MUNICIPAL CONSERVATION	1	3	5	8	10	12
BROOKSIDE VILLAGE	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	2	6	11	17	25	34
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	3	5	9	13	17	21
BUFFALO	MUNICIPAL CONSERVATION, LEON	N/A	MUNICIPAL CONSERVATION	1	3	4	5	7	8
BUNKER HILL VILLAGE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	13	40	67	97	127	160
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	19	39	44	47	51	55

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
CENTERVILLE	MUNICIPAL CONSERVATION, LEON	N/A	MUNICIPAL CONSERVATION	0	1	2	3	4	5
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	CHCRWA GRP	HOUSTON	HOUSTON LAKE/RESERVOIR	0	323	1,240	1,153	1,114	1,093
			REGIONAL RETURN FLOWS	4,682	4,359	3,442	3,529	3,568	3,589
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	38	116	192	267	340	413
	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION	N/A	DIRECT REUSE, CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	0	236	424	612	762	918
CHIMNEY HILL MUD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	5	13	20	27	33	39
CLEAR BROOK CITY MUD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	13	38	64	90	116	141
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	20	38	42	44	47	49
CLEAR LAKE SHORES	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	1	4	6	8	10	11
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	221	223	208	204	199	196
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	7	14	20	20	20	20
CLEVELAND	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	0	0	0	1	1	1
	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	47	90	128	163	197	228
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	0	0	1	1	2	3
CLUTE	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	582	594	604	626	657	657
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	15	41	63	81	96	109
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	20	38	55	63	65	67
COLDSPRING	WATER LOSS REDUCTION, SAN JACINTO	N/A	WATER LOSS REDUCTION	2	4	6	8	10	12
CONCORD-ROBBINS WSC	MUNICIPAL CONSERVATION, LEON	N/A	MUNICIPAL CONSERVATION	0	1	2	3	4	5
CONROE	CONROE BRACKISH GROUNDWATER DESALINATION	N/A	GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	5,600	5,600	5,600	5,600	5,600	5,600
	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	113	321	499	821	912	981
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	2,045	3,940	5,666	7,295	9,091	10,828
COUNTY-OTHER, AUSTIN	EXPANDED USE OF GROUNDWATER, AUSTIN	N/A	GULF COAST AQUIFER, AUSTIN	0	100	100	300	1,100	1,200
	MUNICIPAL CONSERVATION, AUSTIN	N/A	MUNICIPAL CONSERVATION	5	15	27	38	52	63

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
COUNTY-OTHER, BRAZORIA	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	3,173	3,501	3,273	2,999	2,579	2,579
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	174	589	1,065	1,582	2,131	2,705
	NEW / EXPANDED CONTRACT WITH BRA	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	0	0	0	0	0	10
	NEW / EXPANDED CONTRACT WITH BWA	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	9,743	10,341	10,939	11,537	12,135	12,735
	NEW / EXPANDED CONTRACT WITH BWA - BRACKISH GROUNDWATER	BRAZOSPORT WATER AUTHORITY	GULF COAST AQUIFER, BRAZORIA	1,147	1,063	1,003	937	865	800
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	701	2,258	3,969	5,837	8,008	10,125
	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION	N/A	DIRECT REUSE, MASTER PLANNED COMMUNITIES, BRAZORIA	0	349	703	1,063	1,449	1,874
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	166	208	251	295	345	399
COUNTY-OTHER, CHAMBERS	MUNICIPAL CONSERVATION, CHAMBERS	N/A	MUNICIPAL CONSERVATION	0	0	0	1	1	1
	NEW / EXPANDED CONTRACT WITH CLCND	CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	TRINITY RUN-OF-RIVER, CHAMBERS	2,800	2,800	2,800	2,800	2,800	2,800
	WATER LOSS REDUCTION, CHAMBERS	N/A	WATER LOSS REDUCTION	16	34	39	45	52	58
COUNTY-OTHER, FORT BEND	EXPANDED USE OF GROUNDWATER, FORT BEND	N/A	GULF COAST AQUIFER, FORT BEND	0	0	0	1,586	4,559	9,101
	MISSOURI CITY GRP	MISSOURI CITY	BRAZOS RUN-OF-RIVER, FORT BEND	568	558	555	553	552	552
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	144	441	729	1,148	1,737	2,516
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	39	551	0	525	1,206	2,936
	RICHMOND GRP	RICHMOND	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	189	477	504	576	648	719
	ROSENBERG GRP	ROSENBERG	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	454	468	469	470	473	475
			GULF COAST AQUIFER, FORT BEND	257	279	295	312	329	351
	SUGAR LAND GRP	SUGAR LAND	BRAZOS RUN-OF-RIVER, FORT BEND	1,432	2,008	2,008	2,008	2,008	2,008
			DIRECT REUSE, SUGAR LAND	4,480	4,480	4,480	4,480	4,480	4,480
			GULF COAST AQUIFER, FORT BEND	66	66	66	66	66	66
	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION	N/A	DIRECT REUSE, MASTER PLANNED COMMUNITIES, FORT BEND	0	1,922	2,867	4,560	6,300	8,212
COUNTY-OTHER, GALVESTON	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	6	18	30	42	55	69
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	1,994	2,160	2,297	2,440	2,597	2,752
	NEW / EXPANDED CONTRACT WITH LNVA	BOLIVAR PENINSULA SUD	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	4	7	7	10	12	14

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
COUNTY-OTHER, HARRIS	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	8,047	8,028	9,832	10,116	10,389	10,694
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	273	894	1,493	2,051	2,757	3,486
	NEW / EXPANDED CONTRACT WITH COH	HOUSTON	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,564	1,718	1,914	1,959	2,041	2,131
	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION	N/A	DIRECT REUSE, MASTER PLANNED COMMUNITIES, HARRIS	0	868	1,476	1,993	2,520	3,002
COUNTY-OTHER, LEON	MUNICIPAL CONSERVATION, LEON	N/A	MUNICIPAL CONSERVATION	2	5	9	12	15	18
COUNTY-OTHER, LIBERTY	EXPANDED USE OF GROUNDWATER, LIBERTY	N/A	GULF COAST AQUIFER, LIBERTY	0	0	0	0	325	325
	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	119	224	319	410	499	586
COUNTY-OTHER, MADISON	EXPANDED USE OF GROUNDWATER, MADISON	N/A	SPARTA AQUIFER, MADISON	0	0	0	0	0	25
	WATER LOSS REDUCTION, MADISON	N/A	WATER LOSS REDUCTION	23	46	67	70	74	78
COUNTY-OTHER, MONTGOMERY	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	305	1,040	1,921	3,759	4,913	6,137
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	631	1,606	16,235	11,771	5,344	199
			LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	23,542	43,304	37,613
			REGIONAL RETURN FLOWS	0	0	0	0	0	31,422
	SJRA CATAHOULA AQUIFER SUPPLIES	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	3,920	3,920	3,920	3,920	3,920	3,920
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	4,728	7,231	9,711	10,915	12,102	12,840
			GULF COAST AQUIFER, MONTGOMERY	5,553	8,007	5,106	1,724	2,005	0
	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION	N/A	DIRECT REUSE, MASTER PLANNED COMMUNITIES, MONTGOMERY	0	2,684	5,827	9,680	14,492	20,387
	BRACKISH GROUNDWATER SUPPLIES	N/A	GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	0	0	0	0	3,622	10,000
COUNTY-OTHER, POLK	WATER LOSS REDUCTION, POLK	N/A	WATER LOSS REDUCTION	73	147	219	290	360	426
COUNTY-OTHER, TRINITY	WATER LOSS REDUCTION, TRINITY	N/A	WATER LOSS REDUCTION	7	13	19	24	30	35
COUNTY-OTHER, WALKER	WATER LOSS REDUCTION, WALKER	N/A	WATER LOSS REDUCTION	48	91	130	166	180	182
COUNTY-OTHER, WALLER	EXPANDED USE OF GROUNDWATER, WALLER	N/A	GULF COAST AQUIFER, WALLER	0	0	0	500	500	850
	MUNICIPAL CONSERVATION, WALLER	N/A	MUNICIPAL CONSERVATION	4	15	26	34	43	55
	WATER LOSS REDUCTION, WALLER	N/A	WATER LOSS REDUCTION	68	153	256	379	526	695
COVE	WATER LOSS REDUCTION, CHAMBERS	N/A	WATER LOSS REDUCTION	1	3	4	6	8	9

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
CROSBY MUD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	7	12	16	20	23
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	4	7	7	7	7	7
CUT AND SHOOT	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	1	2	4	7	8	9
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	1	3	3	4	4	5
DAISETTA	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	8	16	24	33	43	53
DANBURY	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	2	5	7	8	10	11
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	2	4	6	7	7	7
DEER PARK	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	34	99	160	218	275	329
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	72	138	200	260	320	356
DICKINSON	ADDITIONAL SUPPLY FROM GCWA	GALVESTON COUNTY WCID #1	ALLENS CREEK LAKE/RESERVOIR	252	245	238	232	225	218
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	6	16	26	36	47	57
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	31	61	87	91	95	99
DOBBIN-PLANTERSVILLE WSC	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	5	17	31	61	81	104
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	9	21	41	59	79	105
	BRACKISH GROUNDWATER SUPPLIES	N/A	GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	153	327	570	890	1,337	1,930
EAST PLANTATION UD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	2	4	7	11	13	13
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	5	16
	RIVER PLANTATION AND EAST PLANTATIONJOINT GRP	RIVER PLANTATION MUD	DIRECT REUSE, RIVER PLANTATION MUD	0	65	65	65	65	65
EL DORADO UD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	60	104	100	95	90
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	2	6	9	13	16	18
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	5	10	14	18	22	25
EL LAGO	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	7	11	15	18	21
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	4	7	7	7	7	7
FAIRCHILDS	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	1	1	2	3	5	6
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	1	2	3	4	4	5
FLO COMMUNITY WSC	MUNICIPAL CONSERVATION, LEON	N/A	MUNICIPAL CONSERVATION	1	2	3	4	5	6

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
FORT BEND COUNTY MUD #116	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	3	9	15	21	27	34
	RICHMOND GRP	RICHMOND	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	174	392	460	512	565	619
FORT BEND COUNTY MUD #121	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	2	6	10	14	19	24
	RICHMOND GRP	RICHMOND	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	0	0	0	1	47	94
FORT BEND COUNTY MUD #129	MISSOURI CITY GRP	MISSOURI CITY	BRAZOS RUN-OF-RIVER, FORT BEND	0	184	322	437	515	509
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	4	13	24	35	46	52
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	8	22	32	38	42	42
FORT BEND COUNTY MUD #23	MISSOURI CITY GRP	MISSOURI CITY	GULF COAST AQUIFER, FORT BEND	0	418	434	450	468	488
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	7	19	28	36	44	51
FORT BEND COUNTY MUD #25	FORT BEND MUD 25 GRP	N/A	DIRECT REUSE, FORT BEND COUNTY MUD #25	0	184	184	184	184	184
		SUGAR LAND	BRAZOS RUN-OF-RIVER, FORT BEND	0	560	560	560	560	560
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	7	16	24	30	36	41
FOUNTAINVIEW SUBDIVISION	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	1	4	6	8	10	11
	NEW / EXPANDED CONTRACT WITH COH	HOUSTON	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	50	93	118	116	115	115
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	2	4	4	4	4	4
FREEPORT	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	1,039	1,126	1,217	1,337	1,483	1,483
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	15	41	62	80	96	110
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	19	37	54	62	65	67
FRIENDSWOOD	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	11	33	55	79	104	132
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	17	57	99	145	193	245
FULSHEAR	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	8	21	33	44	55	64
	NFBWA GRP	NORTH FORT BEND WATER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	496	561	616	662	703
G & W WSC	MUNICIPAL CONSERVATION, WALLER	N/A	MUNICIPAL CONSERVATION	1	2	4	7	9	11
GALENA PARK	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	7	18	28	38	47	55
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	11	21	29	33	34	34

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
GALVESTON	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	0	0	586	3,743	3,964	3,846
			COH REUSE	4,435	4,317	3,614	339	0	0
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	37	110	188	263	339	420
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	213	426	626	659	690	724
GREATWOOD	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	8	20	29	36	43	48
	SUGAR LAND GRP	SUGAR LAND	GULF COAST AQUIFER, FORT BEND	0	434	416	406	401	400
GREEN TRAILS MUD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	150	252	247	243	240
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	13	20	27	33	38
GREENWOOD UD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	9	14	19	24	28
GROVETON	GROVETON GROUNDWATER EXPANSION	N/A	YEGUA-JACKSON AQUIFER, TRINITY	161	161	161	161	161	161
	WATER LOSS REDUCTION, TRINITY	N/A	WATER LOSS REDUCTION	2	3	5	5	7	8
HARDIN	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	7	15	24	33	43	53
HARDIN WSC	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	5	10	12	14	16	18
HARRIS COUNTY MUD #106	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	10	30	50	68	84	99
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	15	30	32	33	34	34
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	1,255	1,282	1,298	1,307	1,312
HARRIS COUNTY MUD #11	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	81	145	146	151	156
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	8	12	16	21	25
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	4	4	4	4	4	5
HARRIS COUNTY MUD #119	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	133	218	217	219	222
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	11	18	24	30	35
HARRIS COUNTY MUD #132	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	7	20	32	42	52	61
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	865	841	834	826	820
HARRIS COUNTY MUD #148 - KINGSLAKE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	2	6	10	13	16	19

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
HARRIS COUNTY MUD #151	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	8	23	36	49	59	69
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	983	967	953	945	938
HARRIS COUNTY MUD #152	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	9	25	41	56	70	82
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	1,089	1,099	1,106	1,112	1,116
HARRIS COUNTY MUD #153	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	324	539	522	509	498
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	10	27	43	57	69	81
HARRIS COUNTY MUD #154	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	197	336	335	342	351
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	6	17	27	36	45	54
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	3	3	3	3	3	3
HARRIS COUNTY MUD #158	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	12	18	24	29	34
HARRIS COUNTY MUD #180	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	12	20	27	32	38
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	6	8	9	8	8	8
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	148	259	251	244	238
HARRIS COUNTY MUD #189	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	102	179	184	191	198
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	8	14	19	24	29
HARRIS COUNTY MUD #221	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	127	218	223	227	234
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	10	16	22	28	33
HARRIS COUNTY MUD #278	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	442	676	659	644	631
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	8	29	46	61	75	87
HARRIS COUNTY MUD #290	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	5	14	24	33	41	48
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	7	14	16	16	16	17
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	602	618	628	635	638
HARRIS COUNTY MUD #345	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	212	356	346	340	334
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	6	18	28	38	46	54
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	3	3	3	3	3	3

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
HARRIS COUNTY MUD #400 - WEST	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	230	420	438	443	441
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	6	19	32	45	56	66
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	9	19	21	22	23	23
HARRIS COUNTY MUD #46	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	5	15	23	31	37	44
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	636	617	603	596	589
HARRIS COUNTY MUD #49	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	11	17	23	29	34
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	5	10	11	11	12	12
HARRIS COUNTY MUD #5	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	12	19	26	34	42
HARRIS COUNTY MUD #50	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	2	6	10	13	16	18
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	4	8	11	14	16	16
HARRIS COUNTY MUD #55	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	12	33	54	74	99	126
HARRIS COUNTY MUD #8	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	11	16	21	26	30
HARRIS COUNTY MUD #96	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	5	14	23	32	42	51
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	6	10	10	11	12	12
HARRIS COUNTY UD #14	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	68	124	139	157	186
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	2	5	9	13	17	23
HARRIS COUNTY UD #15	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	113	227	229	236	233
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	13	22	32	42	52
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	24	49	76	106	138	169
HARRIS COUNTY WCID #1	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	5	13	21	29	37	45
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	7	14	17	18	18	19
HARRIS COUNTY WCID #133	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	173	297	320	349	385
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	5	15	24	33	44	55
HARRIS COUNTY WCID #74	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	204	364	367	374	383
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	6	18	29	40	50	60
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	9	18	19	20	20	21

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
HARRIS COUNTY WCID #96	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	16	49	77	103	125	146
HEDWIG VILLAGE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	12	36	61	87	114	142
HEMPSTEAD	EXPANDED USE OF GROUNDWATER, WALLER	N/A	GULF COAST AQUIFER, WALLER	0	0	0	0	300	300
	MUNICIPAL CONSERVATION, WALLER	N/A	MUNICIPAL CONSERVATION	2	6	10	14	17	21
	WATER LOSS REDUCTION, WALLER	N/A	WATER LOSS REDUCTION	22	49	79	115	157	199
HILLCREST	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	1	3	5	6	7	7
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	4	7	10	13	15	18
HILSHIRE VILLAGE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	2	5	8	12	16	20
HITCHCOCK	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	317	309	300	292	283	275
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	2	7	12	17	22	26
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	12	26	39	41	43	45
HOLIDAY LAKES	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	1	2	3	4	5	5
HOUSTON	CITY OF HOUSTON GRP	N/A	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	2,837	10,697	8,825	12,034	13,732
			REGIONAL RETURN FLOWS	0	0	11,384	24,659	10,340	30,154
		TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	50,000	52,249	84,200	84,200	84,200	84,200
	COH REUSE	N/A	COH REUSE	0	0	53,015	56,028	62,069	66,849
	EAST TEXAS TRANSFER	SABINE RIVER AUTHORITY	TOLEDO BEND LAKE/RESERVOIR	0	0	250,000	250,000	250,000	250,000
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	47	118	177	229	276	317
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3,568	10,767	18,083	25,543	33,193	41,044
	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	8	28	51	92	109	111
	OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	N/A	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	13,989	13,989	13,989	13,989	13,989	13,989
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	121	240	353	462	482	493
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	6,423	12,925	19,510	26,283	28,372	30,192
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	14	38	71	111	134	140
HUMBLE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	22	72	127	182	235	284
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	55	124	195	267	336	401

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
HUNTERS CREEK VILLAGE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	19	57	98	141	186	233
INDIGO LAKE WATER SYSTEM	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	10	32	62	130	185	267
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	2,464
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	344	936	1,767	2,993	2,540
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	15	39	81	126	180	267
IOWA COLONY	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	3	9	16	23	29	34
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	4	8	14	18	20	21
IRRIGATION, AUSTIN	IRRIGATION CONSERVATION	N/A	IRRIGATION CONSERVATION	3,035	3,035	3,035	3,035	3,035	3,035
IRRIGATION, BRAZORIA	IRRIGATION CONSERVATION	N/A	IRRIGATION CONSERVATION	24,816	24,816	24,816	24,816	24,816	24,816
IRRIGATION, CHAMBERS	IRRIGATION CONSERVATION	N/A	IRRIGATION CONSERVATION	20,733	20,733	20,733	20,733	20,733	20,733
	NEW / EXPANDED CONTRACT WITH LNVA	LOWER NECHES VALLEY AUTHORITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	0	0	25,000	25,000	25,000	25,000
IRRIGATION, FORT BEND	IRRIGATION CONSERVATION	N/A	IRRIGATION CONSERVATION	11,222	11,222	11,222	11,222	11,222	11,222
	RICHMOND GRP	RICHMOND	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	16	33	33	33	33	33
IRRIGATION, GALVESTON	IRRIGATION CONSERVATION	N/A	IRRIGATION CONSERVATION	1,743	1,743	1,743	1,743	1,743	1,743
IRRIGATION, HARRIS	IRRIGATION CONSERVATION	N/A	IRRIGATION CONSERVATION	1,179	1,179	1,179	1,179	1,179	1,179
IRRIGATION, LIBERTY	EXPANDED USE OF GROUNDWATER, LIBERTY	N/A	GULF COAST AQUIFER, LIBERTY	10,550	10,550	10,550	10,550	10,550	10,550
	IRRIGATION CONSERVATION	N/A	IRRIGATION CONSERVATION	14,822	14,822	14,822	14,822	14,822	14,822
	NEW / EXPANDED CONTRACT WITH LNVA	LOWER NECHES VALLEY AUTHORITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	0	0	25,000	25,000	25,000	25,000
IRRIGATION, WALLER	IRRIGATION CONSERVATION	N/A	IRRIGATION CONSERVATION	8,573	8,573	8,573	8,573	8,573	8,573
JACINTO CITY	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	6	17	27	38	47	57
JAMAICA BEACH	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	1	2	3	4	4	5
JERSEY VILLAGE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	14	40	63	85	107	127
JEWETT	MUNICIPAL CONSERVATION, LEON	N/A	MUNICIPAL CONSERVATION	1	2	3	5	7	9
JONES CREEK	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	2	6	8	10	12	13

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
KATY	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	9	51	75	94	110	124
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	26	76	124	171	214	255
	MUNICIPAL CONSERVATION, WALLER	N/A	MUNICIPAL CONSERVATION	1	2	3	4	6	7
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	2,682	3,356	3,370	3,393	3,416
KEMAH	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	3	10	16	22	28	33
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	567	855	875	901	923	941
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	15	38	54	56	57	58
KENEFICK	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	5	10	15	20	26	32
KINGS MANOR MUD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	1	2	4	5	6	7
	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	2	5	6	10	10	10
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	3	34	59	63	69	73
KIRKMONT MUD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	9	15	22	29	36
	NEW / EXPANDED CONTRACT WITH COH	HOUSTON	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	6
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	4	7	7	8	8	9
LA MARQUE	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	COH REUSE	338	213	247	238	212	187
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	7	22	34	46	58	68
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	249	358	309	302	313	322
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	40	82	115	116	117	118
LA PORTE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	39	108	169	226	278	328
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	62	115	158	157	159	161
LAKE JACKSON	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	1,532	1,595	1,709	1,865	2,049	2,049
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	56	150	228	293	348	395
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	86	164	237	307	378	402
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	12	31	55	84	115	149
	WATER LOSS REDUCTION, POLK	N/A	WATER LOSS REDUCTION	42	88	136	184	231	274
	WATER LOSS REDUCTION, SAN JACINTO	N/A	WATER LOSS REDUCTION	9	19	30	41	51	62
	WATER LOSS REDUCTION, TRINITY	N/A	WATER LOSS REDUCTION	2	3	5	6	6	6

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
LAKE WINDCREST WATER SYSTEM	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	8	21	36	69	91	119
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	733	821	1,038	1,345	1,775	2,378
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	12	26	47	67	89	119
LEAGUE CITY	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	422	411	400	389	377	367
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	32	101	172	243	309	371
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	10	17	23	29	35
	OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	N/A	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	5,600	5,600	5,600	5,600	5,600	5,600
LIBERTY	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	2	2	2	2	3	3
LIVESTOCK, CHAMBERS	EXPANDED USE OF GROUNDWATER, CHAMBERS	N/A	GULF COAST AQUIFER, CHAMBERS	0	0	0	0	100	100
LIVESTOCK, LIBERTY	EXPANDED USE OF GROUNDWATER, LIBERTY	N/A	GULF COAST AQUIFER, LIBERTY	700	700	700	700	700	700
LONGHORN TOWN UD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	80	135	132	130	128
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	2	7	10	14	17	20
MADISONVILLE	WATER LOSS REDUCTION, MADISON	N/A	WATER LOSS REDUCTION	16	31	46	62	78	94
MAGNOLIA	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	6	17	28	52	67	89
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	0	110	331	681	1,229
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	9	21	36	50	66	89
MANUFACTURING, AUSTIN	EXPANDED USE OF GROUNDWATER, AUSTIN	N/A	GULF COAST AQUIFER, AUSTIN	0	100	100	100	100	100
	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	1	3	5	6	9	11
MANUFACTURING, BRAZORIA	BRAZOS SALTWATER BARRIER	DOW CHEMICAL USA	BRAZOS RUN-OF-RIVER, BRAZORIA	72,396	72,396	72,396	72,396	70,989	68,576
	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	849	349	347	280	280	280
		DOW CHEMICAL USA	BRAZOS RUN-OF-RIVER, BRAZORIA	71,431	71,431	71,431	71,431	71,431	71,431
	FREEPORT SEAWATER DESALINATION	BRAZOS RIVER AUTHORITY	FREEPORT DESALINATION	0	0	11,200	11,200	11,200	11,200
	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	3,055	6,553	10,486	14,845	19,623	24,811
	NEW / EXPANDED CONTRACT WITH BRA	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	13,736	16,849	19,839	22,768	25,636	28,442
			BRA SYSTEM OPERATION PERMIT	25,033	24,939	24,855	24,764	24,666	24,549

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
MANUFACTURING, CHAMBERS	EXPANDED USE OF GROUNDWATER, CHAMBERS	N/A	GULF COAST AQUIFER, CHAMBERS	0	250	250	500	500	650
	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	136	292	467	657	877	1,124
MANUFACTURING, FORT BEND	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	110	228	350	472	555	627
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	826	3,371	3,419	3,414	3,027	2,667
MANUFACTURING, GALVESTON	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	0	0	0	0	3,620	7,409
			COH REUSE	12,904	12,559	12,213	11,872	7,912	1,342
	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	695	1,409	2,142	2,896	3,669	4,464
MANUFACTURING, HARRIS	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	5,234	11,001	17,193	23,567	28,790	33,764
	NEW / EXPANDED CONTRACT WITH COH	HOUSTON	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	785	3,444	7,868	2,579	145
	SJRA REUSE SUPPLIES FOR MANUFACTURING	SAN JACINTO RIVER AUTHORITY	REGIONAL RETURN FLOWS	22,054	21,308	20,617	19,957	19,224	18,452
			SJRA REUSE PERMIT	3,205	3,951	4,642	5,302	6,035	6,807
MANUFACTURING, LEON	EXPANDED USE OF GROUNDWATER, LEON	N/A	CARRIZO-WILCOX AQUIFER, LEON	0	200	200	400	400	500
	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	10	23	40	58	78	101
MANUFACTURING, LIBERTY	EXPANDED USE OF GROUNDWATER, LIBERTY	N/A	GULF COAST AQUIFER, LIBERTY	100	325	425	425	425	425
	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	6	13	21	31	42	55
MANUFACTURING, MADISON	EXPANDED USE OF GROUNDWATER, MADISON	N/A	SPARTA AQUIFER, MADISON	0	100	100	100	100	100
	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	3	6	10	14	19	24
MANUFACTURING, MONTGOMERY	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	26	58	96	139	187	242
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	1,287
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	266	487	701	881	1,077	0
MANUFACTURING, SAN JACINTO	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	0	0	0	1	1	1
MANUFACTURING, WALKER	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	4	7	12	15	19	22
MANUFACTURING, WALLER	EXPANDED USE OF GROUNDWATER, WALLER	N/A	GULF COAST AQUIFER, WALLER	0	100	100	100	100	100
	INDUSTRIAL CONSERVATION	N/A	INDUSTRIAL CONSERVATION	1	4	6	8	12	15
MANVEL	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	17	74	150	243	354	489
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	0	492	1,319	2,253	3,353	4,718

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
MASON CREEK UD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	303	516	498	485	473
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	10	28	44	59	71	83
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	15	28	29	29	29	29
MEADOWS PLACE	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	4	10	15	19	23	26
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	9	18	20	20	21	21
MINING, AUSTIN	EXPANDED USE OF GROUNDWATER, AUSTIN	N/A	GULF COAST AQUIFER, AUSTIN	0	350	350	350	350	350
MINING, BRAZORIA	NEW / EXPANDED CONTRACT WITH BRA	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATION PERMIT	317	411	495	586	684	801
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	417	561	689	831	980	1,161
MINING, CHAMBERS	EXPANDED USE OF GROUNDWATER, CHAMBERS	N/A	GULF COAST AQUIFER, CHAMBERS	125	125	125	125	125	125
MINING, FORT BEND	EXPANDED USE OF GROUNDWATER, FORT BEND	N/A	GULF COAST AQUIFER, FORT BEND	4	9	7	5	4	2
MINING, GALVESTON	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	273	292	322	347	372	397
	NEW / EXPANDED CONTRACT WITH LNVA	BOLIVAR PENINSULA SUD	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	70	76	83	90	96	103
MINING, HARRIS	NEW / EXPANDED CONTRACT WITH COH	HOUSTON	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,946	2,927	2,875	2,843	2,818	2,798
MINING, LEON	EXPANDED USE OF GROUNDWATER, LEON	N/A	CARRIZO-WILCOX AQUIFER, LEON	0	200	200	200	200	200
MINING, LIBERTY	EXPANDED USE OF GROUNDWATER, LIBERTY	N/A	GULF COAST AQUIFER, LIBERTY	300	600	600	600	600	700
MINING, MADISON	EXPANDED USE OF GROUNDWATER, MADISON	N/A	CARRIZO-WILCOX AQUIFER, MADISON	0	400	400	400	400	400
MINING, SAN JACINTO	EXPANDED USE OF GROUNDWATER, SAN JACINTO	N/A	GULF COAST AQUIFER, SAN JACINTO	0	0	100	100	100	100
MINING, TRINITY	EXPANDED USE OF GROUNDWATER, TRINITY	N/A	CARRIZO-WILCOX AQUIFER, TRINITY	100	100	100	100	100	100
MISSOURI CITY	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	COH REUSE	3,683	3,592	3,499	1,181	0	0
	FORT BEND WCID 2 GRP	FORT BEND COUNTY WCID #2	BRAZOS RUN-OF-RIVER, FORT BEND	932	1,640	1,622	1,613	1,610	1,608
	MISSOURI CITY GRP	COUNTY-OTHER, FORT BEND	GULF COAST AQUIFER, FORT BEND	534	369	353	342	334	326
		N/A	BRAZOS RUN-OF-RIVER, FORT BEND	1,349	1,266	388	0	0	0
			DIRECT REUSE, MISSOURI CITY	639	639	639	639	639	639
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	66	192	327	463	582	681
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	7	22	39	56	75	95
	NEW / EXPANDED CONTRACT WITH COH	HOUSTON	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	393	545
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	0	0	0	2,226	3,731	4,146
	REALLOCATE EXISTING SUPPLY	N/A	BRAZOS RUN-OF-RIVER, FORT BEND	0	79	1,953	1,246	97	0

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
MONT BELVIEU	EXPANDED USE OF GROUNDWATER, CHAMBERS	N/A	GULF COAST AQUIFER, CHAMBERS	0	0	700	700	2,100	2,100
	MUNICIPAL CONSERVATION, CHAMBERS	N/A	MUNICIPAL CONSERVATION	0	1	1	1	2	3
	WATER LOSS REDUCTION, CHAMBERS	N/A	WATER LOSS REDUCTION	31	75	130	194	228	264
MONTGOMERY	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	5	24	40	71	83	98
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	0	509	771	0	0	0
			LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	1,020	1,294	1,730
MONTGOMERY COUNTY MUD #15	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	4	11	17	29	35	43
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	17	84	173	318	525
MONTGOMERY COUNTY MUD #18	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	11	34	52	86	95	114
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	403
MONTGOMERY COUNTY MUD #19	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	2	5	7	10	10	10
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	209	202	198	196	198	199
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	3	6	9	10	10	10
MONTGOMERY COUNTY MUD #8	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	4	9	14	23	25	29
	MONTGOMERY COUNTY MUDS #8 AND #9 REUSE	HUNTSVILLE	HUNTSVILLE EFFLUENT	677	677	677	677	677	677
		N/A	MONTGOMERY MUDS 8 AN 9 REUSE PERMIT	163	163	163	163	163	163
MONTGOMERY COUNTY MUD #83	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	2	6	8	13	13	13
MONTGOMERY COUNTY MUD #89	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	3	7	10	15	17	17
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	268	270	273	293	322	332
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	4	9	12	15	16	17
MONTGOMERY COUNTY MUD #9	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	4	11	16	27	30	34
	MONTGOMERY COUNTY MUDS #8 AND #9 REUSE	HUNTSVILLE	HUNTSVILLE EFFLUENT	677	677	677	677	677	677
		N/A	MONTGOMERY MUDS 8 AN 9 REUSE PERMIT	163	163	163	163	163	163
MONTGOMERY COUNTY MUD #94	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	5	12	18	30	32	31
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	0	47	98	159	159

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
MONTGOMERY COUNTY UD #2	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	1	3	5	8	8	9
MONTGOMERY COUNTY UD #3	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	2	6	9	14	18	22
MONTGOMERY COUNTY UD #4	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	4	13	18	30	38	47
MONTGOMERY COUNTY WCID #1	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	2	5	8	12	14	14
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	9	15	24	44	67	94
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	3	7	10	12	13	14
MOUNT HOUSTON ROAD MUD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	196	367	401	425	441
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	14	25	36	46	56
NASSAU BAY	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	9	24	38	52	64	75
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	13	24	25	25	26	26
NEEDVILLE	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	2	4	6	7	9	10
NEW CANEY MUD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	6	16	23	37	41	45
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	0	0	29	128	252
NEWPORT MUD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	8	22	35	48	59	71
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	11	22	23	23	24	24
NORMANGEE	MUNICIPAL CONSERVATION, LEON	N/A	MUNICIPAL CONSERVATION	0	1	1	2	2	3
	WATER LOSS REDUCTION, MADISON	N/A	WATER LOSS REDUCTION	0	0	1	1	1	1
NORTH BELT UD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	91	156	155	159	163
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	8	12	17	21	25
NORTH CHANNEL WATER AUTHORITY	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	82	233	372	502	627	742
NORTH FORT BEND WATER AUTHORITY	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	348	1,162	2,048	2,830	3,476	3,999
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	16	44	70	94	116	135
	NFBWA GRAND LAKES REUSE	N/A	DIRECT REUSE, NORTH FORT BEND WATER AUTHORITY	661	661	661	661	661	661
	NFBWA GRP	HOUSTON	COH REUSE	0	0	14,223	12,228	11,352	11,778
			LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	23,076	44,982	35,029	33,710	33,206	32,165
			REGIONAL RETURN FLOWS	10,280	9,068	12,683	15,942	17,276	17,850
	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION	N/A	DIRECT REUSE, NORTH FORT BEND WATER AUTHORITY	0	1,160	1,996	2,415	2,886	3,432

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
NORTH GREEN MUD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	109	184	172	164	157
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	11	17	22	28	33
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	10	18	26	33	39	46
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	990	2,963	4,899	6,767	8,547	10,238
	NHCRWA GRP	HOUSTON	COH REUSE	0	0	52,629	59,520	63,681	68,171
			HOUSTON LAKE/RESERVOIR	842	31,898	26,561	25,215	23,896	22,645
			LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	48,323	49,861	31,137	29,506	29,286	28,771
			REGIONAL RETURN FLOWS	24,330	31,277	28,356	24,241	21,465	18,625
	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION	N/A	DIRECT REUSE, NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	0	99	189	274	341	404
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	1,581	3,158	4,552	4,713	4,873	5,024
NORTHWEST PARK MUD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	896	1,564	1,614	1,682	1,760
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	25	72	118	164	208	253
OAK RIDGE NORTH	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	5	12	17	25	25	25
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	73	81	102	113	119	120
OAKWOOD	MUNICIPAL CONSERVATION, LEON	N/A	MUNICIPAL CONSERVATION	0	0	1	1	1	1
OLD RIVER-WINFREE	EXPANDED USE OF GROUNDWATER, CHAMBERS	N/A	GULF COAST AQUIFER, CHAMBERS	100	100	100	100	100	200
	WATER LOSS REDUCTION, CHAMBERS	N/A	WATER LOSS REDUCTION	2	4	6	9	10	12
	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	1	2	3	4	5	7
ONALASKA	WATER LOSS REDUCTION, POLK	N/A	WATER LOSS REDUCTION	10	22	37	52	68	83
OYSTER CREEK	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	71	77	85	95	107	107
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	3	7	11	14	16	18
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	3	6	9	11	11	11
PANORAMA VILLAGE	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	5	12	17	27	30	33
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	19	13	39	0	0	0
			LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	75	139	225

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
PARKWAY UD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	4	12	19	25	31	36
PASADENA	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	183	521	831	1,123	1,404	1,674
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	308	585	838	947	970	995
PATTON VILLAGE	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	1	3	5	8	9	11
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	1	15	32	58	90
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	2	4	6	8	9	11
PEARLAND	CITY OF PEARLAND REUSE	N/A	DIRECT REUSE, PEARLAND	314	1,154	1,154	1,154	1,154	1,154
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	146	413	664	899	1,117	1,310
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	3	7	13	19	26	34
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	16	56	107	159	210	257
	PEARLAND SWTP	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	72	3,136	3,136	3,136	3,136	3,136
			COH REUSE	3,064	0	0	0	0	0
		N/A	BRAZOS RUN-OF-RIVER, FORT BEND	8,064	8,064	8,064	8,064	8,064	8,064
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	172	344	445	479	516	553
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	6	12	19	22	26	30
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	25	58	83	93	100	106
PECAN GROVE MUD #1	ADDITIONAL SUPPLY FROM BRA	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	0	1	2	4	5	6
	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	400	389	377	366	355	343
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	11	27	38	48	56	63
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	19	18	18	18	18	18
PINE ISLAND	EXPANDED USE OF GROUNDWATER, WALLER	N/A	GULF COAST AQUIFER, WALLER	100	100	100	100	100	200
	MUNICIPAL CONSERVATION, WALLER	N/A	MUNICIPAL CONSERVATION	0	1	1	1	2	2
PINEY POINT VILLAGE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	14	43	75	110	148	189
PLANTATION MUD	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	2	5	8	9	11	12
	SUGAR LAND GRP	SUGAR LAND	GULF COAST AQUIFER, FORT BEND	0	97	82	72	68	67
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	6	12	16	20	22	22

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
PLEAK	EXPANDED USE OF GROUNDWATER, FORT BEND	N/A	GULF COAST AQUIFER, FORT BEND	44	101	103	108	113	120
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	1	2	4	5	6	7
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	2	4	5	5	6	6
PLUM GROVE	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	5	10	15	21	27	34
POINT AQUARIUS MUD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	3	7	10	16	17	19
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	0	0	0	6	56
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	5	9	13	15	17	19
PORTER SUD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	14	43	71	122	139	149
	PORTER SUD JOINT GRP	CONROE	CONROE REUSE PERMIT	2,240	2,240	2,240	2,240	2,299	2,623
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	23	54	93	119	135	149
PRAIRIE VIEW	MUNICIPAL CONSERVATION, WALLER	N/A	MUNICIPAL CONSERVATION	3	7	12	17	22	26
RAYFORD ROAD MUD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	8	21	30	48	51	51
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	153	170	222	285	357	384
RICHMOND	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	11	28	41	55	68	80
	NEW / EXPANDED CONTRACT WITH BRA	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	0	170	313	519	783	1,049
RICHWOOD	DOW RESERVOIR EXPANSION	BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	154	155	158	166	176	176
	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	4	11	16	21	25	28
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	5	10	14	16	17	17
RIVER PLANTATION MUD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	4	11	18	32	37	38
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	37
	RIVER PLANTATION AND EAST PLANTATIONJOINT GRP	N/A	DIRECT REUSE, RIVER PLANTATION MUD	0	27	27	27	27	27
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	6	8	9	11	13	14
RIVERSIDE	WATER LOSS REDUCTION, WALKER	N/A	WATER LOSS REDUCTION	2	3	5	6	8	9
ROMAN FOREST	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	3	6	10	16	18	21
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	0	5	39	93	162
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	4	8	13	16	18	21

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
ROSENBERG	ADDITIONAL SUPPLY FROM BRA	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	0	65	79	0	0	0
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	26	65	98	129	159	191
	NEW / EXPANDED CONTRACT WITH BRA	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	0	0	51	233	467	746
SAGEMEADOW UD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	6	17	28	40	52	64
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	9	17	19	20	21	22
SAN FELIPE	EXPANDED USE OF GROUNDWATER, AUSTIN	N/A	GULF COAST AQUIFER, AUSTIN	100	100	100	250	250	250
	MUNICIPAL CONSERVATION, AUSTIN	N/A	MUNICIPAL CONSERVATION	0	2	3	4	5	6
SAN JACINTO SUD	WATER LOSS REDUCTION, SAN JACINTO	N/A	WATER LOSS REDUCTION	8	15	22	30	37	45
SAN LEON MUD	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	376	367	358	347	337	327
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	1	3	4	6	8	10
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	5	10	16	18	19	20
SANTA FE	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	4	11	18	24	30	37
	NEW / EXPANDED CONTRACT WITH GCWA	GULF COAST WATER AUTHORITY	COH REUSE	591	560	548	569	605	645
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	22	41	59	60	62	64
SEABROOK	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	15	42	67	90	111	132
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	22	42	44	44	45	46
SEALY	MUNICIPAL CONSERVATION, AUSTIN	N/A	MUNICIPAL CONSERVATION	3	9	14	20	25	31
SHENANDOAH	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	11	34	51	79	84	88
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	101	427	68	0	0	0
			LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	132	245	392
	PANORAMA AND SHENANDOAH JOINT GRP	N/A	GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	0	0	472	472	472	472
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	17	43	66	77	82	88
SHEPHERD	WATER LOSS REDUCTION, SAN JACINTO	N/A	WATER LOSS REDUCTION	10	20	30	41	51	62
SHOREACRES	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	7	12	16	20	23

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
SIENNA PLANTATION	MISSOURI CITY GRP	MISSOURI CITY	BRAZOS RUN-OF-RIVER, FORT BEND	0	0	836	1,203	1,217	1,316
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	24	76	149	237	335	436
	NEW / EXPANDED CONTRACT WITH GCWA	MISSOURI CITY	COH REUSE	0	0	0	0	0	863
	REALLOCATE EXISTING SUPPLY	MISSOURI CITY	BRAZOS RUN-OF-RIVER, FORT BEND	0	0	0	744	1,830	1,876
SIMONTON	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	1	2	3	4	6	7
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	1	3	4	5	5	6
SOUTH HOUSTON	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	16	44	70	95	120	144
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	45	85	121	156	192	228
SOUTHERN MONTGOMERY COUNTY MUD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	7	18	24	36	36	36
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	21	24	24	28	36	47
SOUTHSIDE PLACE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	2	6	10	15	19	24
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	3	6	7	7	8	8
SPLENDORA	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	2	4	6	11	13	16
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	2	4	4	5	6	7
SPRING CREEK UD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	5	14	20	32	35	35
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	516	551	572	618	681	702
SPRING VALLEY	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	314	579	624	679	742
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	8	26	43	62	81	101
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	11	16	17	18	20	21
STAFFORD	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	1,785	1,734	1,683	1,632	1,580	1,530
	FORT BEND WCID 2 GRP	FORT BEND COUNTY WCID #2	BRAZOS RUN-OF-RIVER, FORT BEND	2,428	5,080	5,098	5,107	5,110	5,112
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	24	58	86	112	135	158
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	1	2	3	4	5	6
STAGECOACH	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	0	1	2	5	7	11
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	6	11	35	0	0	0
			LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	70	127	226
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	0	1	3	4	7	11

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
STANLEY LAKE MUD	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	5	13	23	43	56	71
	NEW / EXPANDED CONTRACT WITH SJRA	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	110	495
STEAM ELECTRIC POWER, FORT BEND	NEW / EXPANDED CONTRACT WITH BRA	NRG	ALLENS CREEK LAKE/RESERVOIR	0	0	0	0	554	26,343
STEAM ELECTRIC POWER, HARRIS	NEW / EXPANDED CONTRACT WITH COH	HOUSTON	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,060	4,111	7,016	7,977	9,328	10,624
			REGIONAL RETURN FLOWS	0	0	1,465	5,832	10,975	17,396
STEAM ELECTRIC POWER, MADISON	EXPANDED USE OF GROUNDWATER, MADISON	N/A	CARRIZO-WILCOX AQUIFER, MADISON	300	300	400	400	550	550
STEAM ELECTRIC POWER, MONTGOMERY	SJRA CATAHOULA AQUIFER SUPPLIES	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	3,920	3,920	3,920	3,920	3,920	3,920
SUGAR LAND	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	0	2,084	3,206	3,108	3,011	2,914
			COH REUSE	3,400	1,218	0	0	0	0
	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	157	411	631	835	1,022	1,182
	SUGAR LAND GRP	N/A	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	5,110	5,110	5,110	5,110	5,110	5,110
			BRAZOS RUN-OF-RIVER, FORT BEND	7,488	6,450	6,546	6,644	6,741	6,838
			DIRECT REUSE, SUGAR LAND	1,120	1,120	1,120	1,120	1,120	1,120
	WATER LOSS REDUCTION, FORT BEND	N/A	WATER LOSS REDUCTION	57	61	64	68	71	73
SUNBELT FWSD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	14	39	62	85	110	135
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	45	85	122	161	202	245
SWEENY	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	6	15	22	27	31	34
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	7	14	19	21	21	21
TAYLOR LAKE VILLAGE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	5	15	23	31	38	45
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	8	15	15	15	15	16
TEXAS CITY	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	2,200	2,142	2,084	2,025	1,967	1,908
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	16	49	81	113	146	178
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	91	184	270	283	297	309
THE COMMONS WATER SUPPLY INC	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	107	186	188	189	190
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	9	14	19	24	28
THE CONSOLIDATED WSC	EXPANDED USE OF GROUNDWATER, WALKER	N/A	YEGUA-JACKSON AQUIFER, WALKER	100	100	100	100	100	100

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
THE WOODLANDS	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	31	95	164	233	297	356
	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	203	514	735	1,148	1,239	1,314
	NHCRWA GRP	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	HOUSTON LAKE/RESERVOIR	0	1,050	2,107	2,262	2,369	2,441
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	3,940	4,856	5,811	7,006	8,828	11,067
TIKI ISLAND	ADDITIONAL SUPPLY FROM GCWA	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	76	74	73	70	68	66
	MUNICIPAL CONSERVATION, GALVESTON	N/A	MUNICIPAL CONSERVATION	1	2	2	3	4	5
	WATER LOSS REDUCTION, GALVESTON	N/A	WATER LOSS REDUCTION	3	6	8	8	8	8
TOMBALL	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	26	76	126	174	220	263
	NHCRWA GRP	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	HOUSTON LAKE/RESERVOIR	899	1,856	2,570	2,616	2,663	2,707
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	38	75	83	86	88	91
TRAIL OF THE LAKES MUD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	8	24	39	52	64	74
	WHCRWA GRP	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	1,042	1,027	1,016	1,009	1,004
TRINITY	WATER LOSS REDUCTION, TRINITY	N/A	WATER LOSS REDUCTION	10	21	29	35	43	52
TRINITY BAY CONSERVATION DISTRICT	MUNICIPAL CONSERVATION, CHAMBERS	N/A	MUNICIPAL CONSERVATION	0	0	1	1	1	1
	WATER LOSS REDUCTION, CHAMBERS	N/A	WATER LOSS REDUCTION	32	71	117	167	191	216
TRINITY RURAL WSC	EXPANDED USE OF GROUNDWATER, TRINITY	N/A	YEGUA-JACKSON AQUIFER, WALKER	40	40	40	40	40	40
	EXPANDED USE OF GROUNDWATER, WALKER	N/A	YEGUA-JACKSON AQUIFER, WALKER	60	60	60	60	60	60
	WATER LOSS REDUCTION, TRINITY	N/A	WATER LOSS REDUCTION	21	42	59	72	90	108
	WATER LOSS REDUCTION, WALKER	N/A	WATER LOSS REDUCTION	2	3	5	7	8	10
VARNER CREEK UD	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	2	6	8	11	12	13
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	3	5	6	6	6	6
WALLER	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	1	2	3	4	6	7
	MUNICIPAL CONSERVATION, WALLER	N/A	MUNICIPAL CONSERVATION	1	2	2	3	4	4
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	1	2	2	2	2	2

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
WALLIS	MUNICIPAL CONSERVATION, AUSTIN	N/A	MUNICIPAL CONSERVATION	0	1	1	2	2	3
	WATER LOSS REDUCTION, AUSTIN	N/A	WATER LOSS REDUCTION	3	6	8	11	14	18
WEBSTER	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	31	94	156	216	272	324
	OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	N/A	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	90	90	90	90	90	90
WEST COLUMBIA	MUNICIPAL CONSERVATION, BRAZORIA	N/A	MUNICIPAL CONSERVATION	5	12	17	22	25	27
	WATER LOSS REDUCTION, BRAZORIA	N/A	WATER LOSS REDUCTION	4	4	4	4	4	4
WEST HARDIN WSC	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	1	3	5	7	8	11
WEST HARRIS COUNTY MUD #6	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	100	171	173	174	175
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	3	8	13	17	22	26
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	8	20	28	35	42	47
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	569	1,672	2,807	3,963	4,935	5,835
	WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION	N/A	DIRECT REUSE, WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	0	154	319	500	602	711
	WHCRWA GRP	HOUSTON	COH REUSE	0	0	38,360	42,693	46,410	50,669
			LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	31,547	50,292	31,377	29,605	29,173	28,366
			REGIONAL RETURN FLOWS	15,738	22,169	22,159	19,598	16,313	12,861
		TRAIL OF THE LAKES MUD	GULF COAST AQUIFER, HARRIS	0	1,826	0	0	0	0
WEST UNIVERSITY PLACE	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	23	69	116	166	218	272
	WATER LOSS REDUCTION, HARRIS	N/A	WATER LOSS REDUCTION	34	68	76	81	87	94
WESTON LAKES	MUNICIPAL CONSERVATION, FORT BEND	N/A	MUNICIPAL CONSERVATION	9	24	37	50	63	76
WESTWOOD NORTH WSC	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	3	8	11	19	20	22
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	281	295	328	361	394	441
WILLIS	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	7	17	24	39	44	49
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	0	33	95	207	366
WINDFERN FOREST UD	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	7	19	30	39	48	56

Water User Group	Water Management Strategy	Seller	Supply Source	Allocated Supply Volume (ac-ft)					
				2020	2030	2040	2050	2060	2070
WOODBRANCH	MUNICIPAL CONSERVATION, MONTGOMERY	N/A	MUNICIPAL CONSERVATION	1	2	3	6	7	9
	SJRA GRP	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	0	0	5	26	58	97
	WATER LOSS REDUCTION, MONTGOMERY	N/A	WATER LOSS REDUCTION	1	3	4	6	7	9
WOODCREEK MUD	CITY OF HOUSTON GRP	HOUSTON	GULF COAST AQUIFER, HARRIS	0	77	126	122	120	120
	MUNICIPAL CONSERVATION, HARRIS	N/A	MUNICIPAL CONSERVATION	2	6	10	13	16	19
WOODLAND HILLS WATER COMPANY	WATER LOSS REDUCTION, LIBERTY	N/A	WATER LOSS REDUCTION	30	76	134	205	284	369

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Table 5-A7 – Source Water Balance After WMS Allocation

Source	Reg	County	Basin	Total Existing and WMS Allocations From Source (ac-ft)						Unallocated Source Balance (ac-ft)					
				2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
ALLENS CREEK LAKE/RESERVOIR	H	RESERVOIR	BRAZOS	20,611	28,926	33,648	39,762	47,240	79,780	79,039	70,724	66,002	59,888	52,410	19,870
BRA SYSTEM OPERATION PERMIT1	G	RESERVOIR	BRAZOS	25,350	25,350	25,350	25,350	25,350	25,350	0	0	0	0	0	0
BRAZOS RIVER ALLUVIUM AQUIFER	H	AUSTIN	BRAZOS	0	0	0	0	0	0	7,944	7,944	7,944	7,944	7,944	7,944
BRAZOS RIVER ALLUVIUM AQUIFER	H	WALLER	BRAZOS	0	0	0	0	0	0	12,027	12,027	12,027	12,027	12,027	12,027
BRAZOS RUN-OF-RIVER	H	BRAZORIA	BRAZOS	320,155	323,164	326,173	329,182	330,784	331,384	0	0	0	0	0	0
BRAZOS RUN-OF-RIVER	H	FORT BEND	BRAZOS	247,788	249,246	250,704	252,162	253,620	255,085	0	0	0	0	0	0
BRAZOS RUN-OF-RIVER	H	WALLER	BRAZOS	61	61	61	61	61	61	0	0	0	0	0	0
BRAZOS-COLORADO RUN-OF-RIVER	H	BRAZORIA	BRAZOS-COLORADO	3,211	3,211	3,211	3,211	3,211	3,211	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	H	LEON	BRAZOS	805	807	810	827	843	859	2,807	2,596	2,515	2,524	2,513	2,497
CARRIZO-WILCOX AQUIFER	H	LEON	TRINITY	6,082	6,554	6,294	6,075	5,651	5,523	4,781	4,690	5,273	5,746	6,189	6,317
CARRIZO-WILCOX AQUIFER	H	MADISON	BRAZOS	273	273	273	262	219	193	106	96	77	71	113	139
CARRIZO-WILCOX AQUIFER	H	MADISON	TRINITY	1,358	1,759	1,860	1,814	1,794	1,692	1,122	640	444	405	416	518
CARRIZO-WILCOX AQUIFER	H	TRINITY	TRINITY	100	100	100	100	100	100	1,001	1,001	1,001	1,001	1,001	1,001
CARRIZO-WILCOX AQUIFER	H	WALKER	TRINITY	0	0	0	0	0	0	2,099	2,099	2,099	2,099	2,099	2,099
COH REUSE	H	HARRIS	SAN JACINTO	33,712	33,712	191,939	204,181	217,224	231,179	0	0	0	0	0	0
CONROE LAKE/RESERVOIR	H	RESERVOIR	SAN JACINTO	79,300	78,540	77,780	77,020	76,260	75,500	0	0	0	0	0	0
CONROE REUSE PERMIT	H	MONTGOMERY	SAN JACINTO	2,240	2,240	2,240	2,240	2,299	2,623	256	523	754	965	1,133	1,071
DIRECT REUSE, ALVIN	H	BRAZORIA	SAN JACINTO-BRAZOS	77	77	77	77	77	77	0	0	0	0	0	0
DIRECT REUSE, BACLIFF MUD	H	GALVESTON	SAN JACINTO-BRAZOS	68	68	68	68	68	68	0	0	0	0	0	0
DIRECT REUSE, CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	H	HARRIS	SAN JACINTO	0	236	424	612	762	918	0	0	0	0	0	0
DIRECT REUSE, CHIMNEY HILL MUD	H	HARRIS	SAN JACINTO	5	5	5	5	5	5	0	0	0	0	0	0
DIRECT REUSE, COUNTY-OTHER, FORT BEND	H	FORT BEND	SAN JACINTO-BRAZOS	916	916	916	916	916	916	0	0	0	0	0	0
DIRECT REUSE, COUNTY-OTHER, GALVESTON	H	GALVESTON	SAN JACINTO-BRAZOS	82	82	82	82	82	82	0	0	0	0	0	0
DIRECT REUSE, COUNTY-OTHER, HARRIS	H	HARRIS	SAN JACINTO	233	233	233	233	233	233	0	0	0	0	0	0
DIRECT REUSE, COUNTY-OTHER, HARRIS	H	HARRIS	SAN JACINTO-BRAZOS	436	436	436	436	436	436	0	0	0	0	0	0

Source	Reg	County	Basin	Total Existing and WMS Allocations From Source (ac-ft)						Unallocated Source Balance (ac-ft)					
				2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
DIRECT REUSE, FORT BEND	H	FORT BEND	SAN JACINTO-BRAZOS	0	0	0	0	0	0	0	0	0	0	0	0
DIRECT REUSE, FORT BEND COUNTY MUD #25	H	FORT BEND	SAN JACINTO-BRAZOS	405	589	589	589	589	589	0	0	0	0	0	0
DIRECT REUSE, FREEPORT	H	BRAZORIA	SAN JACINTO-BRAZOS	3	3	3	3	3	3	0	0	0	0	0	0
DIRECT REUSE, GALVESTON	H	GALVESTON	SAN JACINTO-BRAZOS	337	337	337	337	337	337	0	0	0	0	0	0
DIRECT REUSE, HARRIS COUNTY MUD #11	H	HARRIS	SAN JACINTO	5	5	5	5	5	5	0	0	0	0	0	0
DIRECT REUSE, HOUSTON	H	HARRIS	SAN JACINTO	1,452	1,452	1,452	1,452	1,452	1,452	0	0	0	0	0	0
DIRECT REUSE, LA PORTE	H	HARRIS	SAN JACINTO-BRAZOS	196	196	196	196	196	196	0	0	0	0	0	0
DIRECT REUSE, LAKE JACKSON	H	BRAZORIA	SAN JACINTO-BRAZOS	747	747	747	747	747	747	0	0	0	0	0	0
DIRECT REUSE, LEAGUE CITY	H	GALVESTON	SAN JACINTO-BRAZOS	555	555	555	555	555	555	0	0	0	0	0	0
DIRECT REUSE, MANUFACTURING, BRAZORIA	H	BRAZORIA	BRAZOS	485	485	485	485	485	485	0	0	0	0	0	0
DIRECT REUSE, MANUFACTURING, FORT BEND	H	FORT BEND	SAN JACINTO-BRAZOS	524	524	524	524	524	524	0	0	0	0	0	0
DIRECT REUSE, MANUFACTURING, HARRIS	H	HARRIS	SAN JACINTO	25	25	25	25	25	25	0	0	0	0	0	0
DIRECT REUSE, MANUFACTURING, LEON	H	LEON	TRINITY	27	27	27	27	27	27	0	0	0	0	0	0
DIRECT REUSE, MANVEL	H	BRAZORIA	SAN JACINTO-BRAZOS	46	46	46	46	46	46	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, BRAZORIA	H	BRAZORIA	BRAZOS	0	85	209	329	461	601	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, BRAZORIA	H	BRAZORIA	BRAZOS-COLORADO	0	114	217	326	440	570	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, BRAZORIA	H	BRAZORIA	SAN JACINTO-BRAZOS	0	150	277	408	548	703	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, FORT BEND	H	FORT BEND	BRAZOS	0	689	769	1,136	1,639	2,222	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, FORT BEND	H	FORT BEND	BRAZOS-COLORADO	0	804	1,397	1,930	2,468	3,051	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, FORT BEND	H	FORT BEND	SAN JACINTO	0	429	701	911	1,110	1,355	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, FORT BEND	H	FORT BEND	SAN JACINTO-BRAZOS	0	0	0	583	1,083	1,584	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, HARRIS	H	HARRIS	SAN JACINTO	0	306	443	533	734	910	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, HARRIS	H	HARRIS	SAN JACINTO-BRAZOS	0	335	578	798	971	1,132	0	0	0	0	0	0
DIRECT REUSE, MASTER PLANNED COMMUNITIES, HARRIS	H	HARRIS	TRINITY-SAN JACINTO	0	227	455	662	815	960	0	0	0	0	0	0

Source	Reg	County	Basin	Total Existing and WMS Allocations From Source (ac-ft)						Unallocated Source Balance (ac-ft)					
				2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
DIRECT REUSE, MASTER PLANNED COMMUNITIES, MONTGOMERY	H	MONTGOMERY	SAN JACINTO	0	2,684	5,827	9,680	14,492	20,387	0	0	0	0	0	0
DIRECT REUSE, MISSOURI CITY	H	FORT BEND	SAN JACINTO-BRAZOS	639	639	639	639	639	639	0	0	0	0	0	0
DIRECT REUSE, MONTGOMERY COUNTY MUD #123	H	MONTGOMERY	SAN JACINTO	0	0	0	0	0	0	69	69	69	69	69	69
DIRECT REUSE, NORTH FORT BEND WATER AUTHORITY	H	FORT BEND	BRAZOS	0	480	1,168	1,393	1,635	1,915	0	0	0	0	0	0
DIRECT REUSE, NORTH FORT BEND WATER AUTHORITY	H	FORT BEND	SAN JACINTO	661	862	901	949	1,009	1,085	0	0	0	0	0	0
DIRECT REUSE, NORTH FORT BEND WATER AUTHORITY	H	FORT BEND	SAN JACINTO-BRAZOS	0	472	573	710	871	1,059	0	0	0	0	0	0
DIRECT REUSE, NORTH FORT BEND WATER AUTHORITY	H	HARRIS	SAN JACINTO	0	7	15	24	32	34	0	0	0	0	0	0
DIRECT REUSE, NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	H	HARRIS	SAN JACINTO	0	99	189	274	341	404	0	0	0	0	0	0
DIRECT REUSE, PANORAMA VILLAGE	H	MONTGOMERY	SAN JACINTO	43	43	43	43	43	43	0	0	0	0	0	0
DIRECT REUSE, PEARLAND	H	BRAZORIA	SAN JACINTO-BRAZOS	314	1,154	1,154	1,154	1,154	1,154	0	0	0	0	0	0
DIRECT REUSE, RIVER PLANTATION MUD	H	MONTGOMERY	SAN JACINTO	236	328	328	328	328	328	0	0	0	0	0	0
DIRECT REUSE, ROSENBERG	H	FORT BEND	BRAZOS	29	29	29	29	29	29	0	0	0	0	0	0
DIRECT REUSE, SOUTH HOUSTON	H	HARRIS	SAN JACINTO	29	29	29	29	29	29	0	0	0	0	0	0
DIRECT REUSE, SUGAR LAND	H	FORT BEND	BRAZOS	5,600	5,600	5,600	5,600	5,600	5,600	0	0	0	0	0	0
DIRECT REUSE, THE WOODLANDS	H	MONTGOMERY	SAN JACINTO	1,314	1,314	1,314	1,314	1,314	1,314	0	0	0	0	0	0
DIRECT REUSE, TRINITY BAY CONSERVATION DISTRICT	H	CHAMBERS	NECHES-TRINITY	399	399	399	399	399	399	0	0	0	0	0	0
DIRECT REUSE, WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	H	FORT BEND	SAN JACINTO	0	57	72	94	136	189	0	0	0	0	0	0
DIRECT REUSE, WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	H	HARRIS	SAN JACINTO	0	97	247	406	466	522	0	0	0	0	0	0
FREEPORT DESALINATION	H	GULF OF MEXICO	GULF OF MEXICO	0	0	11,200	11,200	11,200	11,200	0	0	0	0	0	0
GULF COAST AQUIFER	H	AUSTIN	BRAZOS	5,528	5,652	5,793	5,970	6,177	6,380	1,057	933	792	615	408	205
GULF COAST AQUIFER	H	AUSTIN	BRAZOS-COLORADO	8,042	9,022	9,450	10,335	11,422	11,680	7,566	6,586	6,158	5,273	4,186	3,928
GULF COAST AQUIFER	H	AUSTIN	COLORADO	64	68	74	80	88	97	57	53	47	41	33	24
GULF COAST AQUIFER	H	BRAZORIA	BRAZOS	6,658	6,658	6,658	6,658	6,658	6,658	0	0	0	0	0	0

Source	Reg	County	Basin	Total Existing and WMS Allocations From Source (ac-ft)						Unallocated Source Balance (ac-ft)					
				2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
GULF COAST AQUIFER	H	BRAZORIA	BRAZOS-COLORADO	11,648	11,648	11,648	11,648	11,648	11,648	0	0	0	0	0	0
GULF COAST AQUIFER	H	BRAZORIA	SAN JACINTO-BRAZOS	32,090	32,090	32,090	32,090	32,090	32,090	0	0	0	0	0	0
GULF COAST AQUIFER	H	CHAMBERS	NECHES-TRINITY	3,787	3,831	4,574	4,621	6,172	6,226	5,740	5,696	4,953	4,906	3,355	3,301
GULF COAST AQUIFER	H	CHAMBERS	TRINITY	7,218	8,096	8,686	9,149	9,537	10,038	2,894	2,016	1,426	963	575	74
GULF COAST AQUIFER	H	CHAMBERS	TRINITY-SAN JACINTO	1,698	1,876	2,008	2,059	2,068	2,068	370	192	60	9	0	0
GULF COAST AQUIFER	H	FORT BEND	BRAZOS	68,997	55,450	61,076	66,680	72,723	79,344	0	0	0	0	0	0
GULF COAST AQUIFER	H	FORT BEND	BRAZOS-COLORADO	28,832	24,222	25,603	27,693	31,629	37,029	0	0	0	0	0	0
GULF COAST AQUIFER	H	FORT BEND	SAN JACINTO	20,676	15,573	17,201	18,400	19,485	20,510	0	0	0	0	0	0
GULF COAST AQUIFER	H	FORT BEND	SAN JACINTO-BRAZOS	41,327	31,922	37,278	42,271	45,544	48,605	0	0	0	0	0	0
GULF COAST AQUIFER	H	GALVESTON	NECHES-TRINITY	2	2	2	3	3	4	0	0	0	0	0	0
GULF COAST AQUIFER	H	GALVESTON	SAN JACINTO-BRAZOS	6,020	6,394	6,701	7,008	7,291	7,562	0	0	0	0	0	0
GULF COAST AQUIFER	H	HARRIS	SAN JACINTO	413,789	294,756	216,217	224,775	233,149	241,998	0	0	0	0	0	0
GULF COAST AQUIFER	H	HARRIS	SAN JACINTO-BRAZOS	14,348	13,182	9,437	11,226	12,034	12,913	0	0	0	0	0	0
GULF COAST AQUIFER	H	HARRIS	TRINITY-SAN JACINTO	10,745	9,288	6,366	7,038	7,455	7,864	0	0	0	0	0	0
GULF COAST AQUIFER	H	LIBERTY	NECHES	4,802	4,941	4,956	4,973	4,993	5,013	272	133	118	101	81	61
GULF COAST AQUIFER	H	LIBERTY	NECHES-TRINITY	182	283	284	285	287	288	182	81	80	79	77	76
GULF COAST AQUIFER	H	LIBERTY	SAN JACINTO	4,130	4,600	4,859	4,966	5,378	5,464	1,722	1,252	993	886	474	388
GULF COAST AQUIFER	H	LIBERTY	TRINITY	13,642	14,394	15,256	16,097	16,954	17,888	9,245	8,493	7,631	6,790	5,933	4,999
GULF COAST AQUIFER	H	LIBERTY	TRINITY-SAN JACINTO	3,736	3,867	3,895	3,929	3,966	4,004	5,120	4,989	4,961	4,927	4,890	4,852
GULF COAST AQUIFER	H	MONTGOMERY	SAN JACINTO	80,673	80,673	80,673	80,673	80,673	80,673	0	0	0	0	0	0
GULF COAST AQUIFER	H	POLK	TRINITY	7,272	7,537	7,751	7,946	8,119	8,272	14,558	14,293	14,032	13,837	13,664	13,511
GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	1,657	1,754	1,932	2,029	2,116	2,197	8,711	8,614	8,436	8,339	8,252	8,171
GULF COAST AQUIFER	H	SAN JACINTO	TRINITY	2,086	2,212	2,312	2,446	2,566	2,676	6,725	6,599	6,499	6,365	6,245	6,135
GULF COAST AQUIFER	H	WALKER	SAN JACINTO	3,285	3,339	3,355	3,371	3,387	3,401	5,831	5,777	5,761	5,745	5,729	5,715
GULF COAST AQUIFER	H	WALKER	TRINITY	1,818	1,794	1,775	1,765	1,767	1,771	7,055	7,079	7,022	7,032	7,030	7,026
GULF COAST AQUIFER	H	WALLER	BRAZOS	11,572	12,209	12,909	13,547	14,062	14,550	3,361	2,724	2,024	1,386	871	383
GULF COAST AQUIFER	H	WALLER	SAN JACINTO	18,631	19,455	20,283	21,590	22,720	23,731	8,063	7,239	6,411	5,104	3,974	2,963

Source	Reg	County	Basin	Total Existing and WMS Allocations From Source (ac-ft)						Unallocated Source Balance (ac-ft)					
				2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
GULF COAST AQUIFER (CATAHOULA FORMATION)	H	MONTGOMERY	SAN JACINTO	17,220	17,821	18,760	19,193	23,262	30,233	611	10	0	0	0	0
HOUSTON LAKE/RESERVOIR	H	RESERVOIR	SAN JACINTO	179,000	177,060	175,120	173,180	171,240	169,300	0	0	0	0	0	0
HUNTSVILLE EFFLUENT	H	WALKER	SAN JACINTO	1,354	1,354	1,354	1,354	1,354	1,354	886	886	886	886	886	886
INDIRECT REUSE, HOUSTON	H	HARRIS	SAN JACINTO	2,239	2,239	2,239	2,239	2,239	2,239	0	0	0	0	0	0
INDIRECT REUSE, SJRA	H	HARRIS	SAN JACINTO	9,836	9,836	9,836	9,836	9,836	9,836	5,108	5,108	5,108	5,108	5,108	5,108
INDIRECT REUSE, THE WOODLANDS	H	MONTGOMERY	SAN JACINTO	144	144	144	144	144	144	0	0	0	0	0	0
INDUSTRIAL CONSERVATION	H	CONSERVATION	CONSERVATION	9,281	19,597	30,828	42,709	53,881	65,261	0	0	0	0	0	0
IRRIGATION CONSERVATION	H	CONSERVATION	CONSERVATION	86,123	86,123	86,123	86,123	86,123	86,123	0	0	0	0	0	0
LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	H	RESERVOIR	TRINITY	1,344,0 00	1,344,0 00	1,344,0 00	1,344,0 00	1,344,0 00	1,344,0 00	0	0	0	0	0	0
MONTGOMERY MUDS 8 AN 9 REUSE PERMIT	H	MONTGOMERY	SAN JACINTO	326	326	326	326	326	326	0	10	47	86	128	218
MUNICIPAL CONSERVATION	H	CONSERVATION	CONSERVATION	9,052	27,156	45,258	65,000	83,102	101,203	0	0	0	0	0	0
NECHES-TRINITY RUN-OF-RIVER	H	CHAMBERS	NECHES-TRINITY	37,700	37,700	37,700	37,700	37,700	37,700	0	0	0	0	0	0
QUEEN CITY AQUIFER	H	LEON	BRAZOS	123	125	126	133	140	145	122	120	119	112	105	100
QUEEN CITY AQUIFER	H	LEON	TRINITY	349	349	349	349	349	349	0	0	0	0	0	0
QUEEN CITY AQUIFER	H	MADISON	BRAZOS	0	0	0	0	0	0	1	1	1	1	1	1
QUEEN CITY AQUIFER	H	MADISON	TRINITY	59	92	123	164	208	303	320	287	256	215	171	76
QUEEN CITY AQUIFER	H	TRINITY	TRINITY	0	0	0	0	0	0	0	0	0	0	0	0
QUEEN CITY AQUIFER	H	WALKER	TRINITY	62	62	62	62	62	62	167	167	167	167	167	167
REGIONAL RETURN FLOWS	H	HARRIS	SAN JACINTO	77,084	88,181	100,106	113,758	99,161	150,349	1,849	1,582	1,351	1,140	32,328	645
SAN BERNARD RIVER ALLUVIUM AQUIFER	H	AUSTIN	BRAZOS-COLORADO	0	0	0	0	0	0	520	520	520	520	520	520
SAN JACINTO RIVER ALLUVIUM AQUIFER	H	WALKER	SAN JACINTO	0	0	0	0	0	0	1,450	1,450	1,450	1,450	1,450	1,450
SAN JACINTO RUN-OF-RIVER	H	HARRIS	SAN JACINTO	12,511	12,511	12,511	12,511	12,511	12,511	0	0	0	0	0	0
SAN JACINTO RUN-OF-RIVER	H	MONTGOMERY	SAN JACINTO	141	141	141	141	141	141	0	0	0	0	0	0
SAN JACINTO-BRAZOS RUN-OF-RIVER	H	BRAZORIA	SAN JACINTO-BRAZOS	32,599	32,599	32,599	32,599	32,599	32,599	0	0	0	0	0	0
SAN JACINTO-BRAZOS RUN-OF-RIVER	H	FORT BEND	SAN JACINTO-BRAZOS	5,803	5,803	5,803	5,803	5,803	5,803	0	0	0	0	0	0
SAN JACINTO-BRAZOS RUN-OF-RIVER	H	GALVESTON	SAN JACINTO-BRAZOS	36	36	36	36	36	36	0	0	0	0	0	0
SAN JACINTO-BRAZOS RUN-OF-RIVER	H	HARRIS	SAN JACINTO-BRAZOS	388	388	388	388	388	388	0	0	0	0	0	0

Source	Reg	County	Basin	Total Existing and WMS Allocations From Source (ac-ft)						Unallocated Source Balance (ac-ft)					
				2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
SJRA REUSE PERMIT	H	MONTGOMERY	SAN JACINTO	3,205	3,951	4,642	5,302	6,035	6,807	0	0	0	0	0	0
SPARTA AQUIFER	H	LEON	BRAZOS	0	0	0	0	0	0	0	0	0	0	0	0
SPARTA AQUIFER	H	LEON	TRINITY	21	21	21	21	21	21	0	0	0	0	0	0
SPARTA AQUIFER	H	MADISON	BRAZOS	0	0	0	0	0	0	0	0	0	0	0	0
SPARTA AQUIFER	H	MADISON	TRINITY	2,900	3,048	3,096	3,159	3,226	3,305	413	265	217	154	87	8
SPARTA AQUIFER	H	TRINITY	TRINITY	0	0	0	0	0	0	302	302	302	302	302	302
SPARTA AQUIFER	H	WALKER	SAN JACINTO	0	0	0	0	0	0	266	266	266	266	266	266
SPARTA AQUIFER	H	WALKER	TRINITY	0	0	0	0	0	0	2,084	2,084	2,084	2,084	2,084	2,084
TOLEDO BEND LAKE/RESERVOIR1	I	RESERVOIR	SABINE	0	0	250,000	250,000	250,000	250,000	0	0	0	0	0	0
TRINITY RIVER ALLUVIUM AQUIFER	H	WALKER	TRINITY	0	0	0	0	0	0	3,913	3,913	3,913	3,913	3,913	3,913
TRINITY RUN-OF-RIVER	H	CHAMBERS	TRINITY	60,835	60,835	60,835	60,835	60,835	60,835	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	H	LEON	TRINITY	156	156	156	156	156	156	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	H	LIBERTY	TRINITY	51,077	51,077	51,077	51,077	51,077	51,077	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	H	MADISON	TRINITY	169	169	169	169	169	169	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	H	POLK	TRINITY	26,510	26,510	26,510	26,510	26,510	26,510	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	H	WALKER	TRINITY	439	439	439	439	439	439	0	0	0	0	0	0
TRINITY-SAN JACINTO RUN-OF-RIVER	H	CHAMBERS	TRINITY-SAN JACINTO	31,213	31,213	31,213	31,213	31,213	31,213	0	0	0	0	0	0
TRINITY-SAN JACINTO RUN-OF-RIVER	H	HARRIS	TRINITY-SAN JACINTO	2,198	2,198	2,198	2,198	2,198	2,198	0	0	0	0	0	0
TRINITY-SAN JACINTO RUN-OF-RIVER	H	LIBERTY	TRINITY-SAN JACINTO	1,905	1,905	1,905	1,905	1,905	1,905	0	0	0	0	0	0
WATER LOSS REDUCTION	H	CONSERVATION	CONSERVATION	11,312	22,481	33,184	42,062	45,914	49,457	0	0	0	0	0	0
YEGUA-JACKSON AQUIFER	H	LEON	TRINITY	0	0	0	0	0	0	4	4	4	4	4	4
YEGUA-JACKSON AQUIFER	H	MADISON	BRAZOS	0	0	0	0	0	0	63	63	63	63	63	63
YEGUA-JACKSON AQUIFER	H	MADISON	TRINITY	265	306	345	398	454	459	790	749	710	657	601	596
YEGUA-JACKSON AQUIFER	H	POLK	TRINITY	0	0	0	0	0	0	0	0	0	0	0	0
YEGUA-JACKSON AQUIFER	H	TRINITY	TRINITY	607	609	607	605	607	610	1,584	1,582	1,584	1,586	1,584	1,581
YEGUA-JACKSON AQUIFER	H	WALKER	SAN JACINTO	0	0	0	0	0	0	351	351	351	351	351	351
YEGUA-JACKSON AQUIFER	H	WALKER	TRINITY	1,461	1,498	1,524	1,553	1,579	1,601	2,362	2,325	2,299	2,270	2,244	2,222

Table 5-A8 – Project Cost Summary (Sponsor-Level Data)

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
ALLENS CREEK RESERVOIR	WMS	BRAZOS RIVER AUTHORITY	$94,868,068	$6,906,835	$6,906,835	$6,906,835	$6,906,835	$994,625	$994,625
		HOUSTON	$221,358,826	$16,115,949	$16,115,949	$16,115,949	$16,115,949	$2,320,790	$2,320,790
BRA SYSTEM OPERATION PERMIT	WMS	BRAZOS RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
BRAZOS SALTWATER BARRIER	WMS	DOW CHEMICAL USA	$55,771,408	$5,025,714	$5,025,714	$358,800	$358,800	$358,800	$358,800
BWA BRACKISH GROUNDWATER DEVELOPMENT	WMS	BRAZOSPORT WATER AUTHORITY	$34,016,950	$6,718,216	$6,718,216	$3,871,700	$3,871,700	$3,871,700	$3,871,700
BWA CONVENTIONAL TREATMENT EXPANSION	WMS	BRAZOSPORT WATER AUTHORITY	$15,951,976	$2,963,331	$2,963,331	$1,628,480	$1,628,480	$1,628,480	$1,628,480
CHCRWA GRP	WMS	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
CHCRWA TRANSMISSION AND INTERNAL DISTRIBUTION	WMS	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	$23,207,659	$1,915,660	$1,915,660	$208,000	$208,000	$208,000	$208,000
CITY OF CONROE REUSE PROJECT	WMS	CONROE	$0	$0	$0	$0	$0	$0	$0
CITY OF HOUSTON GRP	WMS	HOUSTON	$0	$0	$0	$0	$0	$0	$0
CITY OF HOUSTON REUSE	WMS	HOUSTON	$78,121,149	$0	$0	$8,813,733	$8,813,733	$2,276,607	$2,276,607
CITY OF HOUSTON TREATMENT EXPANSION - PHASE 1	WMS	HOUSTON	$183,404,685	$0	$0	$28,901,793	$28,901,793	$13,554,612	$13,554,612
CITY OF HOUSTON TREATMENT EXPANSION - PHASE 2	WMS	HOUSTON	$105,124,744	$0	$0	$0	$0	$16,476,272	$16,476,272
CLCND WEST CHAMBERS SYSTEM	WMS	CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	$24,657,839	$3,790,051	$3,790,051	$1,726,700	$1,726,700	$1,726,700	$1,726,700
COH NORTHEAST WATER PURIFICATION PLANT EXPANSION	WMS	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	$18,715,506	$4,162,841	$4,162,841	$2,596,740	$2,596,740	$2,596,740	$2,596,740
		HOUSTON	$192,837,642	$42,892,370	$42,892,370	$26,755,845	$26,755,845	$26,755,845	$26,755,845
		NORTH FORT BEND WATER AUTHORITY	$266,358,201	$59,245,355	$59,245,355	$36,956,679	$36,956,679	$36,956,679	$36,956,679
		NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$462,850,625	$102,950,649	$102,950,649	$64,219,619	$64,219,619	$64,219,619	$64,219,619
		WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	$322,850,444	$71,810,776	$71,810,776	$44,794,867	$44,794,867	$44,794,867	$44,794,867
COH, NHCRWA, AND CHCRWA SHARED TRANSMISSION	WMS	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	$10,365,344	$855,600	$855,600	$92,900	$92,900	$92,900	$92,900
		HOUSTON	$32,870,079	$2,630,638	$2,630,638	$212,000	$212,000	$212,000	$212,000
		NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$107,089,958	$8,839,667	$8,839,667	$959,800	$959,800	$959,800	$959,800
CONROE BRACKISH GROUNDWATER DESALINATION	WMS	CONROE	$40,691,342	$4,801,167	$4,801,167	$1,807,027	$1,807,027	$1,807,027	$1,807,027

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
DOW RESERVOIR AND PUMP STATION EXPANSION PROJECT	WMS	BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		DOW CHEMICAL USA	$255,865,694	$24,274,775	$24,274,775	$2,864,105	$2,864,105	$2,864,105	$2,864,105
EAST TEXAS TRANSFER	WMS	HOUSTON	$388,064,210	$0	$0	$36,165,341	$36,165,341	$3,692,388	$3,692,388
		LOWER NECHES VALLEY AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		SABINE RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
FORT BEND MUD 25 GRP	WMS	FORT BEND COUNTY MUD #25	$2,148,043	$0	$209,648	$209,648	$29,901	$29,901	$29,901
FORT BEND WCID 2 GRP INFRASTRUCTURE	WMS	FORT BEND COUNTY WCID #2	$36,668,844	$2,687,180	$5,374,360	$3,840,148	$2,305,936	$2,305,936	$2,305,936
FREEPORT SEAWATER DESALINATION	WMS	BRAZOS RIVER AUTHORITY	$132,937,747	$0	$0	$27,488,592	$27,488,592	$16,364,450	$16,364,450
GCWA REUSE FROM COH	WMS	GULF COAST WATER AUTHORITY	$56,379,232	$6,290,628	$6,290,628	$1,572,852	$1,572,852	$1,572,852	$1,572,852
		HOUSTON	$0	$0	$0	$0	$0	$0	$0
GRAND LAKES RECLAIMED WATER SYSTEM	WMS	NORTH FORT BEND WATER AUTHORITY	$13,148,843	$1,504,512	$1,504,512	$404,226	$404,226	$404,226	$404,226
GROVETON WELL DEVELOPMENT	WMS	GROVETON	$2,195,000	$205,626	$205,626	$21,950	$21,950	$21,950	$21,950
INDUSTRIAL CONSERVATION, AUSTIN COUNTY	WUG	MANUFACTURING, AUSTIN	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, BRAZORIA COUNTY	WUG	MANUFACTURING, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, CHAMBERS COUNTY	WUG	MANUFACTURING, CHAMBERS	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, FORT BEND COUNTY	WUG	MANUFACTURING, FORT BEND	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, GALVESTON COUNTY	WUG	MANUFACTURING, GALVESTON	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, HARRIS COUNTY	WUG	MANUFACTURING, HARRIS	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, LBERTY COUNTY	WUG	MANUFACTURING, LIBERTY	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, LEON COUNTY	WUG	MANUFACTURING, LEON	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, MADISON COUNTY	WUG	MANUFACTURING, MADISON	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, MONTGOMERY COUNTY	WUG	MANUFACTURING, MONTGOMERY	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, SAN JACINTO COUNTY	WUG	MANUFACTURING, SAN JACINTO	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, WALKER COUNTY	WUG	MANUFACTURING, WALKER	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, WALLER COUNTY	WUG	MANUFACTURING, WALLER	$0	$0	$0	$0	$0	$0	$0
IRRIGATION CONSERVATION, AUSTIN COUNTY	WUG	IRRIGATION, AUSTIN	$37,085	$346,936	$346,936	$343,833	$343,833	$343,833	$343,833
IRRIGATION CONSERVATION, BRAZORIA COUNTY	WUG	IRRIGATION, BRAZORIA	$345,807	$2,806,841	$2,806,841	$2,777,905	$2,777,905	$2,777,905	$2,777,905

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
IRRIGATION CONSERVATION, CHAMBERS COUNTY	WUG	IRRIGATION, CHAMBERS	$265,366	$2,361,418	$2,361,418	$2,339,212	$2,339,212	$2,339,212	$2,339,212
IRRIGATION CONSERVATION, FORT BEND COUNTY	WUG	IRRIGATION, FORT BEND	$149,215	$1,274,241	$1,274,241	$1,261,756	$1,261,756	$1,261,756	$1,261,756
IRRIGATION CONSERVATION, GALVESTON COUNTY	WUG	IRRIGATION, GALVESTON	$21,311	$199,260	$199,260	$197,476	$197,476	$197,476	$197,476
IRRIGATION CONSERVATION, HARRIS COUNTY	WUG	IRRIGATION, HARRIS	$14,417	$134,783	$134,783	$133,576	$133,576	$133,576	$133,576
IRRIGATION CONSERVATION, LIBERTY COUNTY	WUG	IRRIGATION, LIBERTY	$189,776	$1,688,169	$1,688,169	$1,672,288	$1,672,288	$1,672,288	$1,672,288
IRRIGATION CONSERVATION, WALLER COUNTY	WUG	IRRIGATION, WALLER	$132,732	$960,490	$960,490	$949,383	$949,383	$949,383	$949,383
LAKE LIVINGSTON TO SJRA TRANSFER	WMS	SAN JACINTO RIVER AUTHORITY	$166,710,892	$0	$0	$0	$15,543,306	$15,543,306	$1,593,050
LUCE BAYOU TRANSFER	WMS	HOUSTON	$360,004,806	$36,827,109	$36,827,109	$10,343,031	$10,343,031	$10,343,031	$10,343,031
MISSOURI CITY GRP INFRASTRUCTURE	WMS	MISSOURI CITY	$50,959,636	$4,162,849	$4,162,849	$413,150	$413,150	$413,150	$413,150
MONTGOMERY COUNTY MUDS #8 AND #9 REUSE	WMS	MONTGOMERY COUNTY MUD #8	$7,675,887	$1,142,059	$1,142,059	$499,746	$499,746	$499,746	$499,746
		MONTGOMERY COUNTY MUD #9	$7,675,887	$1,142,058	$1,142,058	$499,745	$499,745	$499,745	$499,745
MUNICIPAL CONSERVATION, ALVIN	WUG	ALVIN	$2,707,480	$40,278	$41,648	$43,382	$44,550	$48,006	$52,884
MUNICIPAL CONSERVATION, ANGLETON	WUG	ANGLETON	$910,930	$17,262	$16,112	$15,323	$14,400	$14,097	$13,899
MUNICIPAL CONSERVATION, ARCOLA	WUG	ARCOLA	$102,250	$822	$1,216	$1,592	$1,950	$2,159	$2,486
MUNICIPAL CONSERVATION, BACLIFF MUD	WUG	BACLIFF MUD	$60,520	$822	$912	$995	$1,050	$1,143	$1,130
MUNICIPAL CONSERVATION, BAILEY'S PRAIRIE	WUG	BAILEY'S PRAIRIE	$47,200	$822	$912	$796	$750	$762	$678
MUNICIPAL CONSERVATION, BAYOU VISTA	WUG	BAYOU VISTA	$37,000	$822	$608	$597	$600	$508	$565
MUNICIPAL CONSERVATION, BAYTOWN	WUG	BAYTOWN	$4,061,780	$62,472	$64,752	$66,864	$67,350	$70,612	$74,128
MUNICIPAL CONSERVATION, BEASLEY	WUG	BEASLEY	$22,250	$0	$304	$398	$450	$508	$565
MUNICIPAL CONSERVATION, BELLAIRE	WUG	BELLAIRE	$1,986,980	$24,660	$27,968	$31,243	$33,900	$38,100	$42,827
MUNICIPAL CONSERVATION, BELLVILLE	WUG	BELLVILLE	$143,940	$2,466	$2,128	$2,388	$2,400	$2,413	$2,599
MUNICIPAL CONSERVATION, BENDERS LANDING WATER SYSTEM	WUG	BENDERS LANDING WATER SYSTEM	$1,722,900	$14,796	$21,584	$26,467	$37,500	$38,608	$33,335
MUNICIPAL CONSERVATION, BLUE BELL MANOR UTILITY COMPANY	WUG	BLUE BELL MANOR UTILITY COMPANY	$307,120	$4,110	$4,560	$4,975	$5,250	$5,715	$6,102
MUNICIPAL CONSERVATION, BOLIVAR PENINSULA SUD	WUG	BOLIVAR PENINSULA SUD	$37,110	$0	$608	$597	$600	$889	$1,017
MUNICIPAL CONSERVATION, BRAZORIA	WUG	BRAZORIA	$149,750	$2,466	$2,736	$2,587	$2,400	$2,413	$2,373
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #2	WUG	BRAZORIA COUNTY MUD #2	$1,066,740	$18,906	$18,544	$18,308	$17,400	$17,018	$16,498

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #21	WUG	BRAZORIA COUNTY MUD #21	$312,180	$4,932	$4,864	$5,174	$5,250	$5,461	$5,537
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #3	WUG	BRAZORIA COUNTY MUD #3	$279,240	$4,932	$4,864	$4,776	$4,500	$4,445	$4,407
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #6	WUG	BRAZORIA COUNTY MUD #6	$329,070	$5,754	$5,776	$5,572	$5,400	$5,207	$5,198
MUNICIPAL CONSERVATION, BROOKSHIRE	WUG	BROOKSHIRE	$65,550	$822	$912	$995	$1,200	$1,270	$1,356
MUNICIPAL CONSERVATION, BROOKSIDE VILLAGE	WUG	BROOKSIDE VILLAGE	$152,240	$1,644	$1,824	$2,189	$2,550	$3,175	$3,842
MUNICIPAL CONSERVATION, BUFFALO	WUG	BUFFALO	$50,730	$822	$912	$796	$750	$889	$904
MUNICIPAL CONSERVATION, BUNKER HILL VILLAGE	WUG	BUNKER HILL VILLAGE	$849,380	$10,686	$12,160	$13,333	$14,550	$16,129	$18,080
MUNICIPAL CONSERVATION, CENTERVILLE	WUG	CENTERVILLE	$22,250	$0	$304	$398	$450	$508	$565
MUNICIPAL CONSERVATION, CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	WUG	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	$2,346,070	$31,236	$35,264	$38,208	$40,050	$43,180	$46,669
MUNICIPAL CONSERVATION, CHIMNEY HILL MUD	WUG	CHIMNEY HILL MUD	$246,900	$4,110	$3,952	$3,980	$4,050	$4,191	$4,407
MUNICIPAL CONSERVATION, CLEAR BROOK CITY MUD	WUG	CLEAR BROOK CITY MUD	$791,390	$10,686	$11,552	$12,736	$13,500	$14,732	$15,933
MUNICIPAL CONSERVATION, CLEAR LAKE SHORES	WUG	CLEAR LAKE SHORES	$69,450	$822	$1,216	$1,194	$1,200	$1,270	$1,243
MUNICIPAL CONSERVATION, CLEVELAND	WUG	CLEVELAND	$3,900	$0	$0	$0	$150	$127	$113
MUNICIPAL CONSERVATION, CLUTE	WUG	CLUTE	$739,900	$12,330	$12,464	$12,537	$12,150	$12,192	$12,317
MUNICIPAL CONSERVATION, CONCORD-ROBBINS WSC	WUG	CONCORD-ROBBINS WSC	$22,250	$0	$304	$398	$450	$508	$565
MUNICIPAL CONSERVATION, CONROE	WUG	CONROE	$6,395,980	$92,886	$97,584	$99,301	$123,150	$115,824	$110,853
MUNICIPAL CONSERVATION, COUNTY-OTHER - AUSTIN COUNTY	WUG	COUNTY-OTHER, AUSTIN	$334,670	$4,110	$4,560	$5,374	$5,700	$6,604	$7,119
MUNICIPAL CONSERVATION, COUNTY-OTHER - BRAZORIA COUNTY	WUG	COUNTY-OTHER, BRAZORIA	$13,476,210	$143,028	$179,056	$211,936	$237,300	$270,637	$305,664
MUNICIPAL CONSERVATION, COUNTY-OTHER - CHAMBERS COUNTY	WUG	COUNTY-OTHER, CHAMBERS	$3,900	$0	$0	$0	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - FORT BEND COUNTY	WUG	COUNTY-OTHER, FORT BEND	$10,746,090	$118,368	$134,064	$145,071	$172,200	$220,598	$284,308
MUNICIPAL CONSERVATION, COUNTY-OTHER - GALVESTON COUNTY	WUG	COUNTY-OTHER, GALVESTON	$374,560	$4,932	$5,472	$5,970	$6,300	$6,985	$7,797
MUNICIPAL CONSERVATION, COUNTY-OTHER - HARRIS COUNTY	WUG	COUNTY-OTHER, HARRIS	$18,449,940	$224,406	$271,775	$297,107	$307,649	$350,139	$393,918
MUNICIPAL CONSERVATION, COUNTY-OTHER - LEON COUNTY	WUG	COUNTY-OTHER, LEON	$106,940	$1,644	$1,520	$1,791	$1,800	$1,905	$2,034
MUNICIPAL CONSERVATION, COUNTY-OTHER - MONTGOMERY COUNTY	WUG	COUNTY-OTHER, MONTGOMERY	$28,304,310	$250,710	$316,160	$382,279	$563,850	$623,951	$693,481
MUNICIPAL CONSERVATION, COUNTY-OTHER - WALLER COUNTY	WUG	COUNTY-OTHER, WALLER	$297,980	$3,288	$4,560	$5,174	$5,100	$5,461	$6,215

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, CROSBY MUD	WUG	CROSBY MUD	$145,210	$2,466	$2,128	$2,388	$2,400	$2,540	$2,599
MUNICIPAL CONSERVATION, CUT AND SHOOT	WUG	CUT AND SHOOT	$53,090	$822	$608	$796	$1,050	$1,016	$1,017
MUNICIPAL CONSERVATION, DANBURY	WUG	DANBURY	$82,700	$1,644	$1,520	$1,393	$1,200	$1,270	$1,243
MUNICIPAL CONSERVATION, DEER PARK	WUG	DEER PARK	$1,946,860	$27,948	$30,096	$31,840	$32,700	$34,925	$37,177
MUNICIPAL CONSERVATION, DICKINSON	WUG	DICKINSON	$327,800	$4,932	$4,864	$5,174	$5,400	$5,969	$6,441
MUNICIPAL CONSERVATION, DOBBIN-PLANTERSVILLE WSC	WUG	DOBBIN-PLANTERSVILLE WSC	$466,360	$4,110	$5,168	$6,169	$9,150	$10,287	$11,752
MUNICIPAL CONSERVATION, EAST PLANTATION UD	WUG	EAST PLANTATION UD	$90,230	$1,644	$1,216	$1,393	$1,650	$1,651	$1,469
MUNICIPAL CONSERVATION, EL DORADO UD	WUG	EL DORADO UD	$112,750	$1,644	$1,824	$1,791	$1,950	$2,032	$2,034
MUNICIPAL CONSERVATION, EL LAGO	WUG	EL LAGO	$136,920	$2,466	$2,128	$2,189	$2,250	$2,286	$2,373
MUNICIPAL CONSERVATION, FAIRCHILDS	WUG	FAIRCHILDS	$32,870	$822	$304	$398	$450	$635	$678
MUNICIPAL CONSERVATION, FLO COMMUNITY WSC	WUG	FLO COMMUNITY WSC	$39,400	$822	$608	$597	$600	$635	$678
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #116	WUG	FORT BEND COUNTY MUD #116	$186,080	$2,466	$2,736	$2,985	$3,150	$3,429	$3,842
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #121	WUG	FORT BEND COUNTY MUD #121	$126,830	$1,644	$1,824	$1,990	$2,100	$2,413	$2,712
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #129	WUG	FORT BEND COUNTY MUD #129	$289,840	$3,288	$3,952	$4,776	$5,250	$5,842	$5,876
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #23	WUG	FORT BEND COUNTY MUD #23	$338,530	$5,754	$5,776	$5,572	$5,400	$5,588	$5,763
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #25	WUG	FORT BEND COUNTY MUD #25	$290,990	$5,754	$4,864	$4,776	$4,500	$4,572	$4,633
MUNICIPAL CONSERVATION, FOUNTAINVIEW SUBDIVISION	WUG	FOUNTAINVIEW SUBDIVISION	$69,450	$822	$1,216	$1,194	$1,200	$1,270	$1,243
MUNICIPAL CONSERVATION, FREEPORT	WUG	FREEPORT	$737,550	$12,330	$12,464	$12,338	$12,000	$12,193	$12,430
MUNICIPAL CONSERVATION, FRIENDSWOOD	WUG	FRIENDSWOOD	$1,949,420	$23,016	$27,360	$30,646	$33,600	$37,719	$42,601
MUNICIPAL CONSERVATION, FULSHEAR	WUG	FULSHEAR	$403,440	$6,576	$6,384	$6,567	$6,600	$6,985	$7,232
MUNICIPAL CONSERVATION, G & W WSC	WUG	G & W WSC	$56,620	$822	$608	$796	$1,050	$1,143	$1,243
MUNICIPAL CONSERVATION, GALENA PARK	WUG	GALENA PARK	$346,820	$5,754	$5,472	$5,572	$5,700	$5,969	$6,215
MUNICIPAL CONSERVATION, GALVESTON	WUG	GALVESTON	$2,312,290	$30,414	$33,440	$37,412	$39,450	$43,053	$47,460
MUNICIPAL CONSERVATION, GREATWOOD	WUG	GREATWOOD	$347,120	$6,576	$6,080	$5,771	$5,400	$5,461	$5,424
MUNICIPAL CONSERVATION, GREEN TRAILS MUD	WUG	GREEN TRAILS MUD	$237,550	$3,288	$3,952	$3,980	$4,050	$4,191	$4,294
MUNICIPAL CONSERVATION, GREENWOOD UD	WUG	GREENWOOD UD	$170,500	$2,466	$2,736	$2,786	$2,850	$3,048	$3,164

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #106	WUG	HARRIS COUNTY MUD #106	$593,450	$8,220	$9,120	$9,950	$10,200	$10,668	$11,187
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #11	WUG	HARRIS COUNTY MUD #11	$151,780	$2,466	$2,432	$2,388	$2,400	$2,667	$2,825
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #119	WUG	HARRIS COUNTY MUD #119	$215,790	$3,288	$3,344	$3,582	$3,600	$3,810	$3,955
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #132	WUG	HARRIS COUNTY MUD #132	$379,990	$5,754	$6,080	$6,368	$6,300	$6,604	$6,893
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #148 - KINGSLAKE	WUG	HARRIS COUNTY MUD #148 - KINGSLAKE	$115,870	$1,644	$1,824	$1,990	$1,950	$2,032	$2,147
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #151	WUG	HARRIS COUNTY MUD #151	$433,720	$6,576	$6,992	$7,164	$7,350	$7,493	$7,797
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #152	WUG	HARRIS COUNTY MUD #152	$497,130	$7,398	$7,600	$8,159	$8,400	$8,890	$9,266
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #153	WUG	HARRIS COUNTY MUD #153	$514,510	$8,220	$8,208	$8,557	$8,550	$8,763	$9,153
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #154	WUG	HARRIS COUNTY MUD #154	$326,900	$4,932	$5,168	$5,373	$5,400	$5,715	$6,102
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #158	WUG	HARRIS COUNTY MUD #158	$216,430	$3,288	$3,648	$3,582	$3,600	$3,683	$3,842
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #180	WUG	HARRIS COUNTY MUD #180	$233,240	$3,288	$3,648	$3,980	$4,050	$4,064	$4,294
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #189	WUG	HARRIS COUNTY MUD #189	$168,590	$2,466	$2,432	$2,786	$2,850	$3,048	$3,277
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #221	WUG	HARRIS COUNTY MUD #221	$192,750	$2,466	$3,040	$3,184	$3,300	$3,556	$3,729
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #278	WUG	HARRIS COUNTY MUD #278	$530,520	$6,576	$8,816	$9,154	$9,150	$9,525	$9,831
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #290	WUG	HARRIS COUNTY MUD #290	$287,230	$4,110	$4,256	$4,776	$4,950	$5,207	$5,424
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #345	WUG	HARRIS COUNTY MUD #345	$336,200	$4,932	$5,472	$5,572	$5,700	$5,842	$6,102
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #400 - WEST	WUG	HARRIS COUNTY MUD #400 - WEST	$383,960	$4,932	$5,776	$6,368	$6,750	$7,112	$7,458
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #46	WUG	HARRIS COUNTY MUD #46	$275,680	$4,110	$4,560	$4,577	$4,650	$4,699	$4,972
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #49	WUG	HARRIS COUNTY MUD #49	$209,900	$3,288	$3,344	$3,383	$3,450	$3,683	$3,842
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #5	WUG	HARRIS COUNTY MUD #5	$236,810	$3,288	$3,648	$3,781	$3,900	$4,318	$4,746
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #50	WUG	HARRIS COUNTY MUD #50	$114,740	$1,644	$1,824	$1,990	$1,950	$2,032	$2,034
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #55	WUG	HARRIS COUNTY MUD #55	$685,530	$9,864	$10,032	$10,746	$11,100	$12,573	$14,238
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #8	WUG	HARRIS COUNTY MUD #8	$196,580	$3,288	$3,344	$3,184	$3,150	$3,302	$3,390
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #96	WUG	HARRIS COUNTY MUD #96	$288,400	$4,110	$4,256	$4,577	$4,800	$5,334	$5,763

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, HARRIS COUNTY UD #14	WUG	HARRIS COUNTY UD #14	$116,630	$1,644	$1,520	$1,791	$1,950	$2,159	$2,599
MUNICIPAL CONSERVATION, HARRIS COUNTY UD #15	WUG	HARRIS COUNTY UD #15	$276,280	$3,288	$3,952	$4,378	$4,800	$5,334	$5,876
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #1	WUG	HARRIS COUNTY WCID #1	$263,750	$4,110	$3,952	$4,179	$4,350	$4,699	$5,085
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #133	WUG	HARRIS COUNTY WCID #133	$301,990	$4,110	$4,560	$4,776	$4,950	$5,588	$6,215
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #74	WUG	HARRIS COUNTY WCID #74	$353,050	$4,932	$5,472	$5,771	$6,000	$6,350	$6,780
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #96	WUG	HARRIS COUNTY WCID #96	$911,940	$13,152	$14,896	$15,323	$15,450	$15,875	$16,498
MUNICIPAL CONSERVATION, HEDWIG VILLAGE	WUG	HEDWIG VILLAGE	$765,210	$9,864	$10,944	$12,139	$13,050	$14,478	$16,046
MUNICIPAL CONSERVATION, HEMPSTEAD	WUG	HEMPSTEAD	$120,900	$1,644	$1,824	$1,990	$2,100	$2,159	$2,373
MUNICIPAL CONSERVATION, HILLCREST	WUG	HILLCREST	$53,090	$822	$912	$995	$900	$889	$791
MUNICIPAL CONSERVATION, HILSHIRE VILLAGE	WUG	HILSHIRE VILLAGE	$108,480	$1,644	$1,520	$1,592	$1,800	$2,032	$2,260
MUNICIPAL CONSERVATION, HITCHCOCK	WUG	HITCHCOCK	$144,420	$1,644	$2,128	$2,388	$2,550	$2,794	$2,938
MUNICIPAL CONSERVATION, HOLIDAY LAKES	WUG	HOLIDAY LAKES	$38,270	$822	$608	$597	$600	$635	$565
MUNICIPAL CONSERVATION, HOUSTON	WUG	HOUSTON	$227,698,870	$2,978,104	$3,317,552	$3,643,888	$3,879,601	$4,264,405	$4,686,337
MUNICIPAL CONSERVATION, HUMBLE	WUG	HUMBLE	$1,544,820	$18,084	$21,888	$25,273	$27,300	$29,845	$32,092
MUNICIPAL CONSERVATION, HUNTERS CREEK VILLAGE	WUG	HUNTERS CREEK VILLAGE	$1,235,490	$15,618	$17,328	$19,502	$21,150	$23,622	$26,329
MUNICIPAL CONSERVATION, INDIGO LAKE WATER SYSTEM	WUG	INDIGO LAKE WATER SYSTEM	$1,034,520	$8,220	$9,728	$12,338	$19,500	$23,495	$30,171
MUNICIPAL CONSERVATION, IOWA COLONY	WUG	IOWA COLONY	$193,610	$2,466	$2,736	$3,184	$3,450	$3,683	$3,842
MUNICIPAL CONSERVATION, JACINTO CITY	WUG	JACINTO CITY	$335,830	$4,932	$5,168	$5,373	$5,700	$5,969	$6,441
MUNICIPAL CONSERVATION, JAMAICA BEACH	WUG	JAMAICA BEACH	$37,000	$822	$608	$597	$600	$508	$565
MUNICIPAL CONSERVATION, JERSEY VILLAGE	WUG	JERSEY VILLAGE	$768,950	$11,508	$12,160	$12,537	$12,750	$13,589	$14,351
MUNICIPAL CONSERVATION, JEWETT	WUG	JEWETT	$46,830	$822	$608	$597	$750	$889	$1,017
MUNICIPAL CONSERVATION, JONES CREEK	WUG	JONES CREEK	$95,530	$1,644	$1,824	$1,592	$1,500	$1,524	$1,469
MUNICIPAL CONSERVATION, KATY	WUG	KATY	$2,348,840	$29,592	$39,216	$40,198	$40,350	$41,910	$43,618
MUNICIPAL CONSERVATION, KEMAH	WUG	KEMAH	$192,750	$2,466	$3,040	$3,184	$3,300	$3,556	$3,729
MUNICIPAL CONSERVATION, KINGS MANOR MUD	WUG	KINGS MANOR MUD	$127,870	$2,466	$2,128	$1,990	$2,250	$2,032	$1,921
MUNICIPAL CONSERVATION, KIRKMONT MUD	WUG	KIRKMONT MUD	$192,380	$2,466	$2,736	$2,985	$3,300	$3,683	$4,068

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, LA MARQUE	WUG	LA MARQUE	$411,580	$5,754	$6,688	$6,766	$6,900	$7,366	$7,684
MUNICIPAL CONSERVATION, LA PORTE	WUG	LA PORTE	$2,047,910	$32,058	$32,832	$33,631	$33,900	$35,306	$37,064
MUNICIPAL CONSERVATION, LAKE JACKSON	WUG	LAKE JACKSON	$2,697,850	$46,032	$45,600	$45,372	$43,950	$44,196	$44,635
MUNICIPAL CONSERVATION, LAKE WINDCREST WATER SYSTEM	WUG	LAKE WINDCREST WATER SYSTEM	$554,780	$6,576	$6,384	$7,164	$10,350	$11,557	$13,447
MUNICIPAL CONSERVATION, LEAGUE CITY	WUG	LEAGUE CITY	$2,288,290	$28,770	$33,744	$37,611	$39,900	$42,926	$45,878
MUNICIPAL CONSERVATION, LONGHORN TOWN UD	WUG	LONGHORN TOWN UD	$122,810	$1,644	$2,128	$1,990	$2,100	$2,159	$2,260
MUNICIPAL CONSERVATION, MAGNOLIA	WUG	MAGNOLIA	$420,380	$4,932	$5,168	$5,572	$7,800	$8,509	$10,057
MUNICIPAL CONSERVATION, MANVEL	WUG	MANVEL	$2,029,850	$13,974	$22,496	$29,850	$36,450	$44,958	$55,257
MUNICIPAL CONSERVATION, MASON CREEK UD	WUG	MASON CREEK UD	$527,340	$8,220	$8,512	$8,756	$8,850	$9,017	$9,379
MUNICIPAL CONSERVATION, MEADOWS PLACE	WUG	MEADOWS PLACE	$180,220	$3,288	$3,040	$2,985	$2,850	$2,921	$2,938
MUNICIPAL CONSERVATION, MISSOURI CITY	WUG	MISSOURI CITY	$4,468,760	$60,007	$65,057	$72,834	$77,850	$83,440	$87,688
MUNICIPAL CONSERVATION, MONT BELVIEU	WUG	MONT BELVIEU	$12,460	$0	$304	$199	$150	$254	$339
MUNICIPAL CONSERVATION, MONTGOMERY	WUG	MONTGOMERY	$516,310	$4,110	$7,296	$7,960	$10,650	$10,541	$11,074
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #15	WUG	MONTGOMERY COUNTY MUD #15	$236,690	$3,288	$3,344	$3,383	$4,350	$4,445	$4,859
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #18	WUG	MONTGOMERY COUNTY MUD #18	$675,730	$9,042	$10,336	$10,348	$12,900	$12,065	$12,882
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #19	WUG	MONTGOMERY COUNTY MUD #19	$84,570	$1,644	$1,520	$1,393	$1,500	$1,270	$1,130
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #8	WUG	MONTGOMERY COUNTY MUD #8	$187,120	$3,288	$2,736	$2,786	$3,450	$3,175	$3,277
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #83	WUG	MONTGOMERY COUNTY MUD #83	$101,300	$1,644	$1,824	$1,592	$1,950	$1,651	$1,469
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #89	WUG	MONTGOMERY COUNTY MUD #89	$129,140	$2,466	$2,128	$1,990	$2,250	$2,159	$1,921
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #9	WUG	MONTGOMERY COUNTY MUD #9	$215,180	$3,288	$3,344	$3,184	$4,050	$3,810	$3,842
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #94	WUG	MONTGOMERY COUNTY MUD #94	$234,070	$4,110	$3,648	$3,582	$4,500	$4,064	$3,503
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #2	WUG	MONTGOMERY COUNTY UD #2	$59,620	$822	$912	$995	$1,200	$1,016	$1,017
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #3	WUG	MONTGOMERY COUNTY UD #3	$121,310	$1,644	$1,824	$1,791	$2,100	$2,286	$2,486
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #4	WUG	MONTGOMERY COUNTY UD #4	$254,590	$3,288	$3,952	$3,582	$4,500	$4,826	$5,311
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY WCID #1	WUG	MONTGOMERY COUNTY WCID #1	$99,160	$1,644	$1,520	$1,592	$1,800	$1,778	$1,582

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, MOUNT HOUSTON ROAD MUD	WUG	MOUNT HOUSTON ROAD MUD	$300,890	$3,288	$4,256	$4,975	$5,400	$5,842	$6,328
MUNICIPAL CONSERVATION, NASSAU BAY	WUG	NASSAU BAY	$466,590	$7,398	$7,296	$7,562	$7,800	$8,128	$8,475
MUNICIPAL CONSERVATION, NEEDVILLE	WUG	NEEDVILLE	$73,770	$1,644	$1,216	$1,194	$1,050	$1,143	$1,130
MUNICIPAL CONSERVATION, NEW CANEY MUD	WUG	NEW CANEY MUD	$302,150	$4,932	$4,864	$4,577	$5,550	$5,207	$5,085
MUNICIPAL CONSERVATION, NEWPORT MUD	WUG	NEWPORT MUD	$429,450	$6,576	$6,688	$6,965	$7,200	$7,493	$8,023
MUNICIPAL CONSERVATION, NHCRWA	WUG	NHCRWA	$59,468,460	$813,780	$900,752	$974,901	$1,015,050	$1,085,469	$1,156,894
MUNICIPAL CONSERVATION, NORMANGEE	WUG	NORMANGEE	$13,960	$0	$304	$199	$300	$254	$339
MUNICIPAL CONSERVATION, NORTH BELT UD	WUG	NORTH BELT UD	$153,280	$2,466	$2,432	$2,388	$2,550	$2,667	$2,825
MUNICIPAL CONSERVATION, NORTH CHANNEL WATER AUTHORITY	WUG	NORTH CHANNEL WATER AUTHORITY	$4,510,390	$67,404	$70,832	$74,028	$75,300	$79,629	$83,846
MUNICIPAL CONSERVATION, NORTH FORT BEND WATER AUTHORITY	WUG	NORTH FORT BEND WATER AUTHORITY	$24,492,410	$299,208	$366,625	$421,482	$438,600	$456,184	$467,142
MUNICIPAL CONSERVATION, NORTH GREEN MUD	WUG	NORTH GREEN MUD	$206,000	$3,288	$3,344	$3,383	$3,300	$3,556	$3,729
MUNICIPAL CONSERVATION, NORTHWEST PARK MUD	WUG	NORTHWEST PARK MUD	$1,455,250	$20,550	$21,888	$23,482	$24,600	$26,416	$28,589
MUNICIPAL CONSERVATION, OAK RIDGE NORTH	WUG	OAK RIDGE NORTH	$208,910	$4,110	$3,648	$3,383	$3,750	$3,175	$2,825
MUNICIPAL CONSERVATION, OAKWOOD	WUG	OAKWOOD	$5,890	$0	$0	$199	$150	$127	$113
MUNICIPAL CONSERVATION, OYSTER CREEK	WUG	OYSTER CREEK	$129,490	$2,466	$2,128	$2,189	$2,100	$2,032	$2,034
MUNICIPAL CONSERVATION, PANORAMA VILLAGE	WUG	PANORAMA VILLAGE	$227,300	$4,110	$3,648	$3,383	$4,050	$3,810	$3,729
MUNICIPAL CONSERVATION, PARKWAY UD	WUG	PARKWAY UD	$224,720	$3,288	$3,648	$3,781	$3,750	$3,937	$4,068
MUNICIPAL CONSERVATION, PASADENA	WUG	PASADENA	$10,100,990	$150,426	$158,384	$165,369	$168,450	$178,308	$189,162
MUNICIPAL CONSERVATION, PATTON VILLAGE	WUG	PATTON VILLAGE	$63,150	$822	$912	$995	$1,200	$1,143	$1,243
MUNICIPAL CONSERVATION, PEARLAND	WUG	PEARLAND	$9,506,440	$135,630	$144,704	$156,016	$161,550	$171,831	$180,913
MUNICIPAL CONSERVATION, PECAN GROVE MUD #1	WUG	PECAN GROVE MUD #1	$462,430	$9,042	$8,208	$7,562	$7,200	$7,112	$7,119
MUNICIPAL CONSERVATION, PINE ISLAND	WUG	PINE ISLAND	$11,330	$0	$304	$199	$150	$254	$226
MUNICIPAL CONSERVATION, PINEY POINT VILLAGE	WUG	PINEY POINT VILLAGE	$961,580	$11,508	$13,072	$14,925	$16,500	$18,796	$21,357
MUNICIPAL CONSERVATION, PLANTATION MUD	WUG	PLANTATION MUD	$88,590	$1,644	$1,520	$1,592	$1,350	$1,397	$1,356
MUNICIPAL CONSERVATION, PLEAK	WUG	PLEAK	$45,290	$822	$608	$796	$750	$762	$791
MUNICIPAL CONSERVATION, POINT AQUARIUS MUD	WUG	POINT AQUARIUS MUD	$132,900	$2,466	$2,128	$1,990	$2,400	$2,159	$2,147
MUNICIPAL CONSERVATION, PORTER SUD	WUG	PORTER SUD	$914,990	$11,508	$13,072	$14,129	$18,300	$17,653	$16,837

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, PRAIRIE VIEW	WUG	PRAIRIE VIEW	$152,640	$2,466	$2,128	$2,388	$2,550	$2,794	$2,938
MUNICIPAL CONSERVATION, RAYFORD ROAD MUD	WUG	RAYFORD ROAD MUD	$383,700	$6,576	$6,384	$5,970	$7,200	$6,477	$5,763
MUNICIPAL CONSERVATION, RICHMOND	WUG	RICHMOND	$516,390	$9,042	$8,512	$8,159	$8,250	$8,636	$9,040
MUNICIPAL CONSERVATION, RICHWOOD	WUG	RICHWOOD	$193,050	$3,288	$3,344	$3,184	$3,150	$3,175	$3,164
MUNICIPAL CONSERVATION, RIVER PLANTATION MUD	WUG	RIVER PLANTATION MUD	$240,070	$3,288	$3,344	$3,582	$4,800	$4,699	$4,294
MUNICIPAL CONSERVATION, ROMAN FOREST	WUG	ROMAN FOREST	$133,390	$2,466	$1,824	$1,990	$2,400	$2,286	$2,373
MUNICIPAL CONSERVATION, ROSENBERG	WUG	ROSENBERG	$1,217,600	$21,372	$19,760	$19,502	$19,350	$20,193	$21,583
MUNICIPAL CONSERVATION, SAGEMEADOW UD	WUG	SAGEMEADOW UD	$355,080	$4,932	$5,168	$5,572	$6,000	$6,604	$7,232
MUNICIPAL CONSERVATION, SAN FELIPE	WUG	SAN FELIPE	$31,180	$0	$608	$597	$600	$635	$678
MUNICIPAL CONSERVATION, SAN LEON MUD	WUG	SAN LEON MUD	$55,760	$822	$912	$796	$900	$1,016	$1,130
MUNICIPAL CONSERVATION, SANTA FE	WUG	SANTA FE	$218,050	$3,288	$3,344	$3,582	$3,600	$3,810	$4,181
MUNICIPAL CONSERVATION, SEABROOK	WUG	SEABROOK	$809,440	$12,330	$12,768	$13,333	$13,500	$14,097	$14,916
MUNICIPAL CONSERVATION, SEALY	WUG	SEALY	$176,660	$2,466	$2,736	$2,786	$3,000	$3,175	$3,503
MUNICIPAL CONSERVATION, SHENANDOAH	WUG	SHENANDOAH	$619,890	$9,042	$10,336	$10,149	$11,850	$10,668	$9,944
MUNICIPAL CONSERVATION, SHOREACRES	WUG	SHOREACRES	$145,210	$2,466	$2,128	$2,388	$2,400	$2,540	$2,599
MUNICIPAL CONSERVATION, SIENNA PLANTATION	WUG	SIENNA PLANTATION	$1,998,460	$19,728	$23,104	$29,651	$35,550	$42,545	$49,268
MUNICIPAL CONSERVATION, SIMONTON	WUG	SIMONTON	$41,800	$822	$608	$597	$600	$762	$791
MUNICIPAL CONSERVATION, SOUTH HOUSTON	WUG	SOUTH HOUSTON	$862,200	$13,152	$13,376	$13,930	$14,250	$15,240	$16,272
MUNICIPAL CONSERVATION, SOUTHERN MONTGOMERY COUNTY MUD	WUG	SOUTHERN MONTGOMERY COUNTY MUD	$300,420	$5,754	$5,472	$4,776	$5,400	$4,572	$4,068
MUNICIPAL CONSERVATION, SOUTHSIDE PLACE	WUG	SOUTHSIDE PLACE	$128,330	$1,644	$1,824	$1,990	$2,250	$2,413	$2,712
MUNICIPAL CONSERVATION, SPLENDORA	WUG	SPLENDORA	$91,630	$1,644	$1,216	$1,194	$1,650	$1,651	$1,808
MUNICIPAL CONSERVATION, SPRING CREEK UD	WUG	SPRING CREEK UD	$255,460	$4,110	$4,256	$3,980	$4,800	$4,445	$3,955
MUNICIPAL CONSERVATION, SPRING VALLEY	WUG	SPRING VALLEY	$540,370	$6,576	$7,904	$8,557	$9,300	$10,287	$11,413
MUNICIPAL CONSERVATION, STAFFORD	WUG	STAFFORD	$1,102,130	$20,550	$18,240	$17,711	$17,400	$17,780	$18,532
MUNICIPAL CONSERVATION, STAGECOACH	WUG	STAGECOACH	$35,840	$0	$304	$398	$750	$889	$1,243
MUNICIPAL CONSERVATION, STANLEY LAKE MUD	WUG	STANLEY LAKE MUD	$342,240	$4,110	$3,952	$4,577	$6,450	$7,112	$8,023
MUNICIPAL CONSERVATION, SUGAR LAND	WUG	SUGAR LAND	$7,681,760	$129,055	$124,943	$125,568	$125,250	$129,794	$133,566

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, SUNBELT FWSD	WUG	SUNBELT FWSD	$776,770	$11,508	$11,856	$12,338	$12,750	$13,970	$15,255
MUNICIPAL CONSERVATION, SWEENY	WUG	SWEENY	$256,990	$4,932	$4,560	$4,378	$4,050	$3,937	$3,842
MUNICIPAL CONSERVATION, TAYLOR LAKE VILLAGE	WUG	TAYLOR LAKE VILLAGE	$278,080	$4,110	$4,560	$4,577	$4,650	$4,826	$5,085
MUNICIPAL CONSERVATION, TEXAS CITY	WUG	TEXAS CITY	$997,730	$13,152	$14,896	$16,119	$16,950	$18,542	$20,114
MUNICIPAL CONSERVATION, THE COMMONS WATER SUPPLY INC	WUG	THE COMMONS WATER SUPPLY INC	$170,500	$2,466	$2,736	$2,786	$2,850	$3,048	$3,164
MUNICIPAL CONSERVATION, THE WOODLANDS	WUG	THE WOODLANDS	$11,473,170	$192,348	$185,136	$178,901	$207,150	$195,072	$188,710
MUNICIPAL CONSERVATION, TIKI ISLAND	WUG	TIKI ISLAND	$33,510	$822	$608	$398	$450	$508	$565
MUNICIPAL CONSERVATION, TOMBALL	WUG	TOMBALL	$1,533,090	$21,372	$23,104	$25,074	$26,100	$27,940	$29,719
MUNICIPAL CONSERVATION, TRAIL OF THE LAKES MUD	WUG	TRAIL OF THE LAKES MUD	$459,230	$6,576	$7,296	$7,761	$7,800	$8,128	$8,362
MUNICIPAL CONSERVATION, TRINITY BAY CONSERVATION DISTRICT	WUG	TRINITY BAY CONSERVATION DISTRICT	$5,890	$0	$0	$199	$150	$127	$113
MUNICIPAL CONSERVATION, VARNER CREEK UD	WUG	VARNER CREEK UD	$97,030	$1,644	$1,824	$1,592	$1,650	$1,524	$1,469
MUNICIPAL CONSERVATION, WALLER	WUG	WALLER	$74,180	$1,644	$1,216	$995	$1,050	$1,270	$1,243
MUNICIPAL CONSERVATION, WALLIS	WUG	WALLIS	$13,960	$0	$304	$199	$300	$254	$339
MUNICIPAL CONSERVATION, WEBSTER	WUG	WEBSTER	$1,886,580	$25,482	$28,576	$31,044	$32,400	$34,544	$36,612
MUNICIPAL CONSERVATION, WEST COLUMBIA	WUG	WEST COLUMBIA	$206,670	$4,110	$3,648	$3,383	$3,300	$3,175	$3,051
MUNICIPAL CONSERVATION, WEST HARRIS COUNTY MUD #6	WUG	WEST HARRIS COUNTY MUD #6	$157,670	$2,466	$2,432	$2,587	$2,550	$2,794	$2,938
MUNICIPAL CONSERVATION, WEST UNIVERSITY PLACE	WUG	WEST UNIVERSITY PLACE	$1,462,880	$18,906	$20,976	$23,084	$24,900	$27,686	$30,736
MUNICIPAL CONSERVATION, WESTON LAKES	WUG	WESTON LAKES	$461,460	$7,398	$7,296	$7,363	$7,500	$8,001	$8,588
MUNICIPAL CONSERVATION, WESTWOOD NORTH WSC	WUG	WESTWOOD NORTH WSC	$149,630	$2,466	$2,432	$2,189	$2,850	$2,540	$2,486
MUNICIPAL CONSERVATION, WHCRWA	WUG	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	$34,492,720	$474,294	$514,368	$564,165	$599,700	$632,079	$664,666
MUNICIPAL CONSERVATION, WILLIS	WUG	WILLIS	$326,730	$5,754	$5,168	$4,776	$5,850	$5,588	$5,537
MUNICIPAL CONSERVATION, WINDFERN FOREST UD	WUG	WINDFERN FOREST UD	$357,740	$5,754	$5,776	$5,970	$5,850	$6,096	$6,328
MUNICIPAL CONSERVATION, WOODBRANCH	WUG	WOODBRANCH	$48,330	$822	$608	$597	$900	$889	$1,017
MUNICIPAL CONSERVATION, WOODCREEK MUD	WUG	WOODCREEK MUD	$115,870	$1,644	$1,824	$1,990	$1,950	$2,032	$2,147
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, BRAZORIA COUNTY	WUG	COUNTY-OTHER, BRAZORIA	$5,069,657	$0	$100,957	$204,508	$225,485	$260,396	$302,466
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, CHCRWA	WUG	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	$547,319	$0	$68,335	$123,319	$129,799	$136,919	$148,230

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, FORT BEND COUNTY	WUG	COUNTY-OTHER, FORT BEND	$15,483,621	$0	$556,597	$833,491	$966,510	$1,131,736	$1,325,430
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, HARRIS COUNTY	WUG	COUNTY-OTHER, HARRIS	$4,612,547	$0	$251,618	$428,983	$422,687	$452,770	$484,671
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, MONTGOMERY COUNTY	WUG	COUNTY-OTHER, MONTGOMERY	$47,190,817	$0	$777,832	$1,694,780	$2,051,853	$2,603,662	$3,290,756
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, NFBWA	WUG	NORTH FORT BEND WATER AUTHORITY	$19,989,803	$0	$336,041	$580,100	$511,887	$518,436	$553,829
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, NHCRWA	WUG	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$6,067,108	$0	$28,564	$54,892	$58,070	$61,217	$65,275
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, WHCRWA	WUG	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	$4,493,242	$0	$44,763	$92,642	$106,007	$108,007	$114,802
NEW / EXPANDED CONTRACT WITH BRA - COUNTY-OTHER, BRAZORIA COUNTY (BC)	WUG	BRAZOS RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		COUNTY-OTHER, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BRA - MANUFACTURING, BRAZORIA COUNTY (BC)	WUG	BRAZOS RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MANUFACTURING, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BRA - MINING, BRAZORIA COUNTY (B)	WUG	BRAZOS RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MINING, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BRA - MINING, BRAZORIA COUNTY (BC)	WUG	BRAZOS RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MINING, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BRA - STEAM ELECTRIC POWER, FORT BEND COUNTY (B)	WUG	BRAZOS RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		STEAM ELECTRIC POWER, FORT BEND	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - ANGLETON	WUG	ANGLETON	$0	$0	$0	$0	$0	$0	$0
		BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - BRAZORIA	WUG	BRAZORIA	$0	$0	$0	$0	$0	$0	$0
		BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - CLUTE	WUG	BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		CLUTE	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB)	WUG	BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		COUNTY-OTHER, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - FREEPORT	WUG	BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		FREEPORT	$0	$0	$0	$0	$0	$0	$0

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
NEW / EXPANDED CONTRACT WITH BWA - LAKE JACKSON	WUG	BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		LAKE JACKSON	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - MANUFACTURING, BRAZORIA COUNTY (SJB)	WUG	BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MANUFACTURING, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - OYSTER CREEK	WUG	BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		OYSTER CREEK	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - RICHWOOD	WUG	BRAZOSPORT WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		RICHWOOD	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH CLCND - COUNTY-OTHER, CHAMBERS COUNTY (TSJ)	WUG	CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT	$0	$0	$0	$0	$0	$0	$0
		COUNTY-OTHER, CHAMBERS	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - COUNTY-OTHER, HARRIS COUNTY (TSJ)	WUG	COUNTY-OTHER, HARRIS	$0	$0	$0	$0	$0	$0	$0
		HOUSTON	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - FOUNTAINVIEW SUBDIVISION	WUG	FOUNTAINVIEW SUBDIVISION	$0	$0	$0	$0	$0	$0	$0
		HOUSTON	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - KIRKMONT MUD	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		KIRKMONT MUD	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MANUFACTURING, HARRIS COUNTY (SJ)	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		MANUFACTURING, HARRIS	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MANUFACTURING, HARRIS COUNTY (SJB)	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		MANUFACTURING, HARRIS	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (SJ)	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		MINING, HARRIS	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (SJB)	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		MINING, HARRIS	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (TSJ)	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		MINING, HARRIS	$0	$0	$0	$0	$0	$0	$0

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
NEW / EXPANDED CONTRACT WITH COH - MISSOURI CITY, HARRIS COUNTY	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		MISSOURI CITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - STEAM ELECTRIC POWER, HARRIS COUNTY (SJ)	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		STEAM ELECTRIC POWER, HARRIS	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - STEAM ELECTRIC POWER, HARRIS COUNTY (SJB)	WUG	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		STEAM ELECTRIC POWER, HARRIS	$21,579,187	$278,872	$278,872	$64,766	$64,766	$64,766	$64,766
NEW / EXPANDED CONTRACT WITH GCWA - ARCOLA	WUG	ARCOLA	$0	$0	$0	$0	$0	$0	$0
		GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - CLEAR LAKE SHORES	WUG	CLEAR LAKE SHORES	$0	$0	$0	$0	$0	$0	$0
		GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER - COUNTY-OTHER, FORT BEND COUTY (SJB)	WUG	COUNTY-OTHER, FORT BEND	$0	$0	$0	$0	$0	$0	$0
		GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, BRAZORIA COUNTY (SJB)	WUG	COUNTY-OTHER, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
		GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, FORT BEND COUTY (B)	WUG	COUNTY-OTHER, FORT BEND	$0	$0	$0	$0	$0	$0	$0
		GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, FORT BEND COUTY (SJ)	WUG	COUNTY-OTHER, FORT BEND	$0	$0	$0	$0	$0	$0	$0
		GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, GALVESTON COUNTY (SJB)	WUG	COUNTY-OTHER, GALVESTON	$0	$0	$0	$0	$0	$0	$0
		GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - KEMAH	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		KEMAH	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - LA MARQUE	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		LA MARQUE	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (B)	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MANUFACTURING, FORT BEND	$0	$0	$0	$0	$0	$0	$0

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (SJ)	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MANUFACTURING, FORT BEND	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (SJB)	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MANUFACTURING, FORT BEND	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MANVEL	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MANVEL	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MINING, BRAZORIA COUNTY (SJB)	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MINING, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MINING, GALVESTON COUNTY (SJB)	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MINING, GALVESTON	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MISSOURI CITY	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MISSOURI CITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - SANTA FE	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		SANTA FE	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - SIENNA PLANTATION	WUG	GULF COAST WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		SIENNA PLANTATION	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH LNVA	WUG	IRRIGATION, LIBERTY	$0	$0	$0	$0	$0	$0	$0
		LOWER NECHES VALLEY AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH LNVA - COUNTY-OTHER, GALVESTON COUNTY (NT)	WUG	COUNTY-OTHER, GALVESTON	$0	$0	$0	$0	$0	$0	$0
		LOWER NECHES VALLEY AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH LNVA - MINING, GALVESTON COUNTY (NT)	WUG	LOWER NECHES VALLEY AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		MINING, GALVESTON	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - BENDERS LANDING WATER SYSTEM	WUG	BENDERS LANDING WATER SYSTEM	$0	$0	$0	$0	$0	$0	$0
		SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - COUNTY-OTHER, MONTGOMERY COUNTY (SJ)	WUG	COUNTY-OTHER, MONTGOMERY	$0	$0	$0	$0	$0	$0	$0
		SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
NEW / EXPANDED CONTRACT WITH SJRA - INDIGO LAKE WATER SYSTEM	WUG	INDIGO LAKE WATER SYSTEM	$0	$0	$0	$0	$0	$0	$0
		SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - MANUFACTURING, MONTGOMERY COUNTY (SJ)	WUG	MANUFACTURING, MONTGOMERY	$0	$0	$0	$0	$0	$0	$0
		SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - MONTGOMERY	WUG	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0
		SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - PANORAMA VILLAGE	WUG	PANORAMA VILLAGE	$0	$0	$0	$0	$0	$0	$0
		SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - RIVER PLANTATION MUD	WUG	RIVER PLANTATION MUD	$0	$0	$0	$0	$0	$0	$0
		SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - SHENANDOAH	WUG	SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		SHENANDOAH	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - STAGECOACH	WUG	SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		STAGECOACH	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - STANLEY LAKE MUD	WUG	SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		STANLEY LAKE MUD	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - STEAM ELECTRIC POWER, MONTGOMERY COUNTY (SJ)	WUG	SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		STEAM ELECTRIC POWER, MONTGOMERY	$0	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SUGAR LAND - FORT BEND MUD 25	WUG	FORT BEND COUNTY MUD #25	$0	$0	$0	$0	$0	$0	$0
		SUGAR LAND	$0	$0	$0	$0	$0	$0	$0
NFBWA GROUNDWATER REDUCTION PLAN	WMS	NORTH FORT BEND WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
NFBWA PHASE 2 DISTRIBUTION SEGMENTS	WMS	NORTH FORT BEND WATER AUTHORITY	$65,450,062	$5,934,717	$5,934,717	$457,900	$457,900	$457,900	$457,900
NHCRWA DISTRIBUTION EXPANSION - 2025 PHASE	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$537,692,455	$43,957,902	$43,957,902	$4,393,550	$4,393,550	$4,393,550	$4,393,550
NHCRWA DISTRIBUTION EXPANSION - 2035 PHASE	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$373,353,219	$0	$30,244,283	$30,244,283	$2,772,300	$2,772,300	$2,772,300
NHCRWA DISTRIBUTION EXPANSION - 2045 PHASE	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$11,503,412	$0	$0	$905,141	$905,141	$58,700	$58,700
NHCRWA GROUNDWATER REDUCTION PLAN	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
NHCRWA TRANSMISSION LINES	WMS	NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$155,993,406	$12,358,768	$12,358,768	$880,500	$880,500	$880,500	$880,500
OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	WMS	HOUSTON	$99,886,253	$8,963,415	$8,963,415	$605,000	$605,000	$605,000	$605,000
PANORAMA AND SHENANDOAH GRP INFRASTRUCTURE	WMS	PANORAMA VILLAGE	$0	$0	$0	$0	$0	$0	$0
		SHENANDOAH	$1,619,114	$0	$0	$188,486	$188,486	$53,000	$53,000
PEARLAND REUSE INFRASTRUCTURE	WMS	PEARLAND	$5,895,808	$154,751	$596,982	$468,137	$103,625	$103,625	$103,625
PEARLAND SURFACE WATER TREATMENT PLANT DEVELOPMENT	WMS	PEARLAND	$112,947,347	$9,402,243	$14,604,574	$8,500,389	$5,153,215	$5,153,215	$5,153,215
PORTER SUD GRP INFRASTRUCTURE	WMS	PORTER SUD	$22,061,536	$2,800,465	$2,800,465	$954,371	$954,371	$954,371	$954,371
REGIONAL RETURN FLOWS DEVELOPMENT	WMS	HOUSTON	$0	$0	$0	$0	$0	$0	$0
		NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
		SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
RICHMOND GRP INFRASTUCTURE	WMS	RICHMOND	$32,167,109	$2,580,112	$2,580,112	$213,200	$213,200	$213,200	$213,200
RIVER PLANTATION REUSE EXPANSION	WMS	EAST PLANTATION UD	$0	$0	$0	$0	$0	$0	$0
		RIVER PLANTATION MUD	$0	$0	$0	$0	$0	$0	$0
ROSENBERG GRP INFRASTUCTURE	WMS	ROSENBERG	$12,469,012	$1,025,842	$1,025,842	$108,350	$108,350	$108,350	$108,350
SJRA CATAHOULA AQUIFER SUPPLIES	WMS	SAN JACINTO RIVER AUTHORITY	$10,980,367	$1,668,030	$1,668,030	$749,200	$749,200	$749,200	$749,200
SJRA CONROE REUSE PROJECT	WMS	SAN JACINTO RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
SJRA GROUNDWATER REDUCTION PLAN - 2025 PHASE	WMS	SAN JACINTO RIVER AUTHORITY	$73,426,045	$6,114,317	$6,114,317	$711,500	$711,500	$711,500	$711,500
SJRA GROUNDWATER REDUCTION PLAN - 2035 PHASE	WMS	SAN JACINTO RIVER AUTHORITY	$291,557,644	$0	$24,278,522	$24,278,522	$2,825,200	$2,825,200	$2,825,200
SJRA GROUNDWATER REDUCTION PLAN - 2045 PHASE	WMS	SAN JACINTO RIVER AUTHORITY	$178,389,686	$0	$0	$14,854,825	$14,854,825	$1,728,600	$1,728,600
SJRA GROUNDWATER REDUCTION PLAN - 2055 PHASE	WMS	SAN JACINTO RIVER AUTHORITY	$291,557,643	$0	$0	$0	$24,278,522	$24,278,522	$2,825,200
SUGAR LAND GRP	WMS	SUGAR LAND	$0	$0	$0	$0	$0	$0	$0
SUGAR LAND GRP - REUSE INFRASTRUCTURE	WMS	SUGAR LAND	$59,317,522	$8,068,167	$8,068,167	$3,104,517	$3,104,517	$3,104,517	$3,104,517
SUGAR LAND SURFACE WATER TREATMENT EXPANSION	WMS	SUGAR LAND	$75,916,240	$8,838,404	$8,838,404	$2,485,784	$2,485,784	$2,485,784	$2,485,784
SUGAR LAND TRANSMISSION EXPANSION	WMS	SUGAR LAND	$13,417,202	$1,240,527	$1,240,527	$117,784	$117,784	$117,784	$117,784
TRA TO COH TRANSFER	WMS	HOUSTON	$0	$766,047	$766,047	$766,047	$766,047	$766,047	$766,047
		TRINITY RIVER AUTHORITY	$0	$0	$0	$0	$0	$0	$0

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, ALVIN	WUG	ALVIN	$6,399,090	$34,965	$69,500	$105,070	$127,512	$143,310	$159,552
WATER LOSS REDUCTION, AMES	WUG	AMES	$744,620	$3,330	$6,672	$9,954	$13,800	$18,546	$22,160
WATER LOSS REDUCTION, ANAHUAC	WUG	ANAHUAC	$838,860	$4,995	$8,896	$12,719	$16,008	$19,108	$22,160
WATER LOSS REDUCTION, ANGLETON	WUG	ANGLETON	$2,049,340	$14,985	$27,244	$37,051	$41,400	$42,150	$42,104
WATER LOSS REDUCTION, ARCOLA	WUG	ARCOLA	$388,880	$1,665	$4,448	$6,083	$7,728	$8,992	$9,972
WATER LOSS REDUCTION, BACLIFF MUD	WUG	BACLIFF MUD	$172,150	$3,330	$2,780	$2,765	$2,760	$2,810	$2,770
WATER LOSS REDUCTION, BAILEY'S PRAIRIE	WUG	BAILEY'S PRAIRIE	$99,980	$555	$1,112	$1,659	$2,208	$2,248	$2,216
WATER LOSS REDUCTION, BAYTOWN	WUG	BAYTOWN	$12,036,000	$77,700	$147,340	$209,034	$247,848	$259,082	$262,596
WATER LOSS REDUCTION, BEASLEY	WUG	BEASLEY	$11,160	$0	$0	$0	$0	$562	$554
WATER LOSS REDUCTION, BLUE BELL MANOR UTILITY COMPANY	WUG	BLUE BELL MANOR UTILITY COMPANY	$516,540	$4,440	$8,340	$8,848	$9,384	$10,116	$10,526
WATER LOSS REDUCTION, BOLIVAR PENINSULA SUD	WUG	BOLIVAR PENINSULA SUD	$344,410	$1,665	$3,336	$5,530	$6,624	$7,868	$9,418
WATER LOSS REDUCTION, BRAZORIA	WUG	BRAZORIA	$422,190	$2,775	$5,004	$6,636	$8,832	$9,554	$9,418
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #2	WUG	BRAZORIA COUNTY MUD #2	$6,050,140	$33,855	$64,496	$91,245	$115,920	$140,500	$158,998
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #3	WUG	BRAZORIA COUNTY MUD #3	$633,170	$4,440	$7,784	$11,613	$12,696	$13,488	$13,296
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #6	WUG	BRAZORIA COUNTY MUD #6	$749,760	$4,995	$9,452	$13,825	$15,456	$15,736	$15,512
WATER LOSS REDUCTION, BROOKSIDE VILLAGE	WUG	BROOKSIDE VILLAGE	$377,860	$1,665	$2,780	$4,977	$7,176	$9,554	$11,634
WATER LOSS REDUCTION, BUNKER HILL VILLAGE	WUG	BUNKER HILL VILLAGE	$1,416,370	$10,545	$21,684	$24,332	$25,944	$28,662	$30,470
WATER LOSS REDUCTION, CLEAR BROOK CITY MUD	WUG	CLEAR BROOK CITY MUD	$1,333,020	$11,100	$21,128	$23,226	$24,288	$26,414	$27,146
WATER LOSS REDUCTION, CLEAR LAKE SHORES	WUG	CLEAR LAKE SHORES	$560,890	$3,885	$7,784	$11,060	$11,040	$11,240	$11,080
WATER LOSS REDUCTION, CLEVELAND	WUG	CLEVELAND	$4,778,020	$26,085	$50,040	$71,337	$90,528	$111,838	$127,974
WATER LOSS REDUCTION, CLUTE	WUG	CLUTE	$1,710,670	$11,100	$21,128	$30,415	$34,776	$36,530	$37,118
WATER LOSS REDUCTION, COLDSPRING	WUG	COLDSPRING	$233,360	$1,110	$2,224	$3,318	$4,416	$5,620	$6,648
WATER LOSS REDUCTION, COUNTY-OTHER - BRAZORIA COUNTY	WUG	COUNTY-OTHER, BRAZORIA	$9,243,570	$92,130	$115,648	$138,803	$162,840	$193,890	$221,046
WATER LOSS REDUCTION, COUNTY-OTHER - CHAMBERS COUNTY	WUG	COUNTY-OTHER, CHAMBERS	$1,355,490	$8,880	$18,905	$21,567	$24,840	$29,225	$32,132
WATER LOSS REDUCTION, COUNTY-OTHER - LIBERTY COUNTY	WUG	COUNTY-OTHER, LIBERTY	$11,983,960	$66,045	$124,543	$176,407	$226,319	$280,438	$324,644
WATER LOSS REDUCTION, COUNTY-OTHER - MADISON COUNTY	WUG	COUNTY-OTHER, MADISON	$1,988,320	$12,765	$25,576	$37,051	$38,640	$41,588	$43,212

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, COUNTY-OTHER - POLK COUNTY	WUG	COUNTY-OTHER, POLK	$8,417,580	$40,515	$81,732	$121,107	$160,080	$202,320	$236,004
WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY	WUG	COUNTY-OTHER, TRINITY	$711,180	$3,885	$7,228	$10,507	$13,248	$16,860	$19,390
WATER LOSS REDUCTION, COUNTY-OTHER - WALKER COUNTY	WUG	COUNTY-OTHER, WALKER	$4,427,460	$26,640	$50,596	$71,890	$91,632	$101,160	$100,828
WATER LOSS REDUCTION, COUNTY-OTHER - WALLER COUNTY	WUG	COUNTY-OTHER, WALLER	$11,542,260	$37,740	$85,068	$141,568	$209,208	$295,612	$385,030
WATER LOSS REDUCTION, COVE	WUG	COVE	$172,290	$555	$1,668	$2,212	$3,312	$4,496	$4,986
WATER LOSS REDUCTION, CROSBY MUD	WUG	CROSBY MUD	$216,590	$2,220	$3,892	$3,871	$3,864	$3,934	$3,878
WATER LOSS REDUCTION, CUT AND SHOOT	WUG	CUT AND SHOOT	$111,080	$555	$1,668	$1,659	$2,208	$2,248	$2,770
WATER LOSS REDUCTION, DAISETTA	WUG	DAISETTA	$983,520	$4,440	$8,896	$13,272	$18,216	$24,166	$29,362
WATER LOSS REDUCTION, DANBURY	WUG	DANBURY	$183,280	$1,110	$2,224	$3,318	$3,864	$3,934	$3,878
WATER LOSS REDUCTION, DEER PARK	WUG	DEER PARK	$7,478,720	$39,960	$76,728	$110,600	$143,520	$179,840	$197,224
WATER LOSS REDUCTION, DICKINSON	WUG	DICKINSON	$2,577,000	$17,205	$33,916	$48,111	$50,232	$53,390	$54,846
WATER LOSS REDUCTION, DOBBIN-PLANTERSVILLE WSC	WUG	DOBBIN-PLANTERSVILLE WSC	$1,744,800	$4,995	$11,676	$22,673	$32,568	$44,398	$58,170
WATER LOSS REDUCTION, EL DORADO UD	WUG	EL DORADO UD	$522,270	$2,775	$5,560	$7,742	$9,936	$12,364	$13,850
WATER LOSS REDUCTION, EL LAGO	WUG	EL LAGO	$216,590	$2,220	$3,892	$3,871	$3,864	$3,934	$3,878
WATER LOSS REDUCTION, FAIRCHILDS	WUG	FAIRCHILDS	$105,520	$555	$1,112	$1,659	$2,208	$2,248	$2,770
WATER LOSS REDUCTION, FORT BEND COUNTY MUD #129	WUG	FORT BEND COUNTY MUD #129	$1,022,160	$4,440	$12,232	$17,696	$20,976	$23,604	$23,268
WATER LOSS REDUCTION, FOUNTAINVIEW SUBDIVISION	WUG	FOUNTAINVIEW SUBDIVISION	$122,180	$1,110	$2,224	$2,212	$2,208	$2,248	$2,216
WATER LOSS REDUCTION, FREEPORT	WUG	FREEPORT	$1,688,510	$10,545	$20,572	$29,862	$34,223	$36,531	$37,118
WATER LOSS REDUCTION, GALENA PARK	WUG	GALENA PARK	$899,780	$6,105	$11,676	$16,037	$18,216	$19,108	$18,836
WATER LOSS REDUCTION, GALVESTON	WUG	GALVESTON	$18,538,930	$118,215	$236,856	$346,178	$363,768	$387,780	$401,096
WATER LOSS REDUCTION, GROVETON	WUG	GROVETON	$166,690	$1,110	$1,668	$2,765	$2,760	$3,934	$4,432
WATER LOSS REDUCTION, HARDIN	WUG	HARDIN	$972,410	$3,885	$8,340	$13,272	$18,216	$24,166	$29,362
WATER LOSS REDUCTION, HARDIN WSC	WUG	HARDIN WSC	$416,630	$2,775	$5,560	$6,636	$7,728	$8,992	$9,972
WATER LOSS REDUCTION, HARRIS COUNTY MUD #106	WUG	HARRIS COUNTY MUD #106	$988,610	$8,325	$16,680	$17,696	$18,216	$19,108	$18,836
WATER LOSS REDUCTION, HARRIS COUNTY MUD #11	WUG	HARRIS COUNTY MUD #11	$138,820	$2,220	$2,224	$2,212	$2,208	$2,248	$2,770
WATER LOSS REDUCTION, HARRIS COUNTY MUD #154	WUG	HARRIS COUNTY MUD #154	$99,960	$1,665	$1,668	$1,659	$1,656	$1,686	$1,662

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, HARRIS COUNTY MUD #180	WUG	HARRIS COUNTY MUD #180	$260,990	$3,330	$4,448	$4,977	$4,416	$4,496	$4,432
WATER LOSS REDUCTION, HARRIS COUNTY MUD #290	WUG	HARRIS COUNTY MUD #290	$477,590	$3,885	$7,784	$8,848	$8,832	$8,992	$9,418
WATER LOSS REDUCTION, HARRIS COUNTY MUD #345	WUG	HARRIS COUNTY MUD #345	$99,960	$1,665	$1,668	$1,659	$1,656	$1,686	$1,662
WATER LOSS REDUCTION, HARRIS COUNTY MUD #400 - WEST	WUG	HARRIS COUNTY MUD #400 - WEST	$649,840	$4,995	$10,564	$11,613	$12,144	$12,926	$12,742
WATER LOSS REDUCTION, HARRIS COUNTY MUD #49	WUG	HARRIS COUNTY MUD #49	$338,820	$2,775	$5,560	$6,083	$6,072	$6,744	$6,648
WATER LOSS REDUCTION, HARRIS COUNTY MUD #50	WUG	HARRIS COUNTY MUD #50	$383,350	$2,220	$4,448	$6,083	$7,728	$8,992	$8,864
WATER LOSS REDUCTION, HARRIS COUNTY MUD #96	WUG	HARRIS COUNTY MUD #96	$338,840	$3,330	$5,560	$5,530	$6,072	$6,744	$6,648
WATER LOSS REDUCTION, HARRIS COUNTY UD #15	WUG	HARRIS COUNTY UD #15	$3,122,860	$13,320	$27,244	$42,028	$58,512	$77,556	$93,626
WATER LOSS REDUCTION, HARRIS COUNTY WCID #1	WUG	HARRIS COUNTY WCID #1	$516,480	$3,885	$7,784	$9,401	$9,936	$10,116	$10,526
WATER LOSS REDUCTION, HARRIS COUNTY WCID #74	WUG	HARRIS COUNTY WCID #74	$594,240	$4,995	$10,008	$10,507	$11,040	$11,240	$11,634
WATER LOSS REDUCTION, HEMPSTEAD	WUG	HEMPSTEAD	$3,451,010	$12,210	$27,244	$43,687	$63,480	$88,234	$110,246
WATER LOSS REDUCTION, HILLCREST	WUG	HILLCREST	$372,200	$2,220	$3,892	$5,530	$7,176	$8,430	$9,972
WATER LOSS REDUCTION, HITCHCOCK	WUG	HITCHCOCK	$1,144,110	$6,660	$14,456	$21,567	$22,632	$24,166	$24,930
WATER LOSS REDUCTION, HOUSTON	WUG	HOUSTON	$701,968,780	$3,639,690	$7,340,868	$11,023,502	$14,824,514	$16,291,255	$17,077,049
WATER LOSS REDUCTION, HUMBLE	WUG	HUMBLE	$7,656,740	$30,525	$68,944	$107,835	$147,384	$188,832	$222,154
WATER LOSS REDUCTION, INDIGO LAKE WATER SYSTEM	WUG	INDIGO LAKE WATER SYSTEM	$3,934,320	$8,325	$21,684	$44,793	$69,552	$101,160	$147,918
WATER LOSS REDUCTION, IOWA COLONY	WUG	IOWA COLONY	$472,200	$2,220	$4,448	$7,742	$9,936	$11,240	$11,634
WATER LOSS REDUCTION, KEMAH	WUG	KEMAH	$1,543,930	$8,325	$21,128	$29,862	$30,912	$32,034	$32,132
WATER LOSS REDUCTION, KENEFICK	WUG	KENEFICK	$600,100	$2,775	$5,560	$8,295	$11,040	$14,612	$17,728
WATER LOSS REDUCTION, KIRKMONT MUD	WUG	KIRKMONT MUD	$238,810	$2,220	$3,892	$3,871	$4,416	$4,496	$4,986
WATER LOSS REDUCTION, LA MARQUE	WUG	LA MARQUE	$3,265,450	$22,200	$45,592	$63,595	$64,032	$65,754	$65,372
WATER LOSS REDUCTION, LA PORTE	WUG	LA PORTE	$4,509,400	$34,410	$63,940	$87,374	$86,664	$89,358	$89,194
WATER LOSS REDUCTION, LAKE JACKSON	WUG	LAKE JACKSON	$8,745,830	$47,730	$91,184	$131,061	$169,464	$212,436	$222,708
WATER LOSS REDUCTION, LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WUG	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	$9,118,290	$36,075	$78,396	$124,978	$173,880	$226,486	$272,014
WATER LOSS REDUCTION, LAKE WINDCREST WATER SYSTEM	WUG	LAKE WINDCREST WATER SYSTEM	$2,000,350	$6,660	$14,456	$25,991	$36,984	$50,018	$65,926
WATER LOSS REDUCTION, LIBERTY	WUG	LIBERTY	$77,800	$1,110	$1,112	$1,106	$1,104	$1,686	$1,662

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, MADISONVILLE	WUG	MADISONVILLE	$1,816,900	$8,880	$17,236	$25,438	$34,224	$43,836	$52,076
WATER LOSS REDUCTION, MAGNOLIA	WUG	MAGNOLIA	$1,505,770	$4,995	$11,676	$19,908	$27,600	$37,092	$49,306
WATER LOSS REDUCTION, MASON CREEK UD	WUG	MASON CREEK UD	$883,020	$8,325	$15,568	$16,037	$16,008	$16,298	$16,066
WATER LOSS REDUCTION, MEADOWS PLACE	WUG	MEADOWS PLACE	$605,390	$4,995	$10,008	$11,060	$11,040	$11,802	$11,634
WATER LOSS REDUCTION, MONT BELVIEU	WUG	MONT BELVIEU	$5,122,750	$17,205	$41,700	$71,890	$107,088	$128,136	$146,256
WATER LOSS REDUCTION, MONTGOMERY COUNTY MUD #19	WUG	MONTGOMERY COUNTY MUD #19	$266,580	$1,665	$3,336	$4,977	$5,520	$5,620	$5,540
WATER LOSS REDUCTION, MONTGOMERY COUNTY MUD #89	WUG	MONTGOMERY COUNTY MUD #89	$405,500	$2,220	$5,004	$6,636	$8,280	$8,992	$9,418
WATER LOSS REDUCTION, MONTGOMERY COUNTY WCID #1	WUG	MONTGOMERY COUNTY WCID #1	$327,730	$1,665	$3,892	$5,530	$6,624	$7,306	$7,756
WATER LOSS REDUCTION, NASSAU BAY	WUG	NASSAU BAY	$772,000	$7,215	$13,344	$13,825	$13,800	$14,612	$14,404
WATER LOSS REDUCTION, NEWPORT MUD	WUG	NEWPORT MUD	$705,360	$6,105	$12,232	$12,719	$12,696	$13,488	$13,296
WATER LOSS REDUCTION, NHCRWA	WUG	NHCRWA	$132,740,570	$877,455	$1,755,848	$2,517,256	$2,601,576	$2,738,626	$2,783,296
WATER LOSS REDUCTION, NORMANGEE	WUG	NORMANGEE	$22,210	$0	$0	$553	$552	$562	$554
WATER LOSS REDUCTION, NORTH GREEN MUD	WUG	NORTH GREEN MUD	$955,540	$5,550	$10,008	$14,378	$18,216	$21,918	$25,484
WATER LOSS REDUCTION, OLD RIVER-WINFREE	WUG	OLD RIVER-WINFREE	$361,100	$1,665	$3,336	$4,977	$7,176	$8,430	$10,526
WATER LOSS REDUCTION, ONALASKA	WUG	ONALASKA	$1,511,450	$5,550	$12,232	$20,461	$28,704	$38,216	$45,982
WATER LOSS REDUCTION, OYSTER CREEK	WUG	OYSTER CREEK	$283,260	$1,665	$3,336	$4,977	$6,072	$6,182	$6,094
WATER LOSS REDUCTION, PASADENA	WUG	PASADENA	$25,787,280	$170,940	$325,260	$463,414	$522,744	$545,140	$551,230
WATER LOSS REDUCTION, PATTON VILLAGE	WUG	PATTON VILLAGE	$222,200	$1,110	$2,224	$3,318	$4,416	$5,058	$6,094
WATER LOSS REDUCTION, PEARLAND	WUG	PEARLAND	$17,157,380	$112,665	$230,184	$302,491	$327,888	$360,804	$381,706
WATER LOSS REDUCTION, PECAN GROVE MUD #1	WUG	PECAN GROVE MUD #1	$605,310	$10,545	$10,008	$9,954	$9,936	$10,116	$9,972
WATER LOSS REDUCTION, PLANTATION MUD	WUG	PLANTATION MUD	$544,420	$3,330	$6,672	$8,848	$11,040	$12,364	$12,188
WATER LOSS REDUCTION, PLEAK	WUG	PLEAK	$155,550	$1,110	$2,224	$2,765	$2,760	$3,372	$3,324
WATER LOSS REDUCTION, PLUM GROVE	WUG	PLUM GROVE	$622,320	$2,775	$5,560	$8,295	$11,592	$15,174	$18,836
WATER LOSS REDUCTION, POINT AQUARIUS MUD	WUG	POINT AQUARIUS MUD	$433,280	$2,775	$5,004	$7,189	$8,280	$9,554	$10,526
WATER LOSS REDUCTION, PORTER SUD	WUG	PORTER SUD	$3,183,220	$12,765	$30,024	$51,429	$65,688	$75,870	$82,546
WATER LOSS REDUCTION, RICHWOOD	WUG	RICHWOOD	$438,810	$2,775	$5,560	$7,742	$8,832	$9,554	$9,418
WATER LOSS REDUCTION, RIVER PLANTATION MUD	WUG	RIVER PLANTATION MUD	$338,890	$3,330	$4,448	$4,977	$6,072	$7,306	$7,756

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, RIVERSIDE	WUG	RIVERSIDE	$183,370	$1,110	$1,668	$2,765	$3,312	$4,496	$4,986
WATER LOSS REDUCTION, ROMAN FOREST	WUG	ROMAN FOREST	$444,390	$2,220	$4,448	$7,189	$8,832	$10,116	$11,634
WATER LOSS REDUCTION, SAGEMEADOW UD	WUG	SAGEMEADOW UD	$599,840	$4,995	$9,452	$10,507	$11,040	$11,802	$12,188
WATER LOSS REDUCTION, SAN JACINTO SUD	WUG	SAN JACINTO SUD	$872,300	$4,440	$8,340	$12,166	$16,560	$20,794	$24,930
WATER LOSS REDUCTION, SAN LEON MUD	WUG	SAN LEON MUD	$488,770	$2,775	$5,560	$8,848	$9,936	$10,678	$11,080
WATER LOSS REDUCTION, SANTA FE	WUG	SANTA FE	$1,710,530	$12,210	$22,796	$32,627	$33,120	$34,844	$35,456
WATER LOSS REDUCTION, SEABROOK	WUG	SEABROOK	$1,349,560	$12,210	$23,352	$24,332	$24,288	$25,290	$25,484
WATER LOSS REDUCTION, SHENANDOAH	WUG	SHENANDOAH	$2,071,810	$9,435	$23,908	$36,498	$42,504	$46,084	$48,752
WATER LOSS REDUCTION, SHEPHERD	WUG	SHEPHERD	$1,189,020	$5,550	$11,120	$16,590	$22,632	$28,662	$34,348
WATER LOSS REDUCTION, SIMONTON	WUG	SIMONTON	$133,290	$555	$1,668	$2,212	$2,760	$2,810	$3,324
WATER LOSS REDUCTION, SOUTH HOUSTON	WUG	SOUTH HOUSTON	$4,594,760	$24,975	$47,260	$66,913	$86,112	$107,904	$126,312
WATER LOSS REDUCTION, SOUTHSIDE PLACE	WUG	SOUTHSIDE PLACE	$216,640	$1,665	$3,336	$3,871	$3,864	$4,496	$4,432
WATER LOSS REDUCTION, SPLENDORA	WUG	SPLENDORA	$155,560	$1,110	$2,224	$2,212	$2,760	$3,372	$3,878
WATER LOSS REDUCTION, SPRING VALLEY	WUG	SPRING VALLEY	$572,120	$6,105	$8,896	$9,401	$9,936	$11,240	$11,634
WATER LOSS REDUCTION, STAGECOACH	WUG	STAGECOACH	$144,510	$0	$556	$1,659	$2,208	$3,934	$6,094
WATER LOSS REDUCTION, SUGAR LAND	WUG	SUGAR LAND	$2,188,230	$31,635	$33,916	$35,392	$37,536	$39,901	$40,443
WATER LOSS REDUCTION, SUNBELT FWSD	WUG	SUNBELT FWSD	$4,778,270	$24,975	$47,260	$67,466	$88,872	$113,524	$135,730
WATER LOSS REDUCTION, SWEENY	WUG	SWEENY	$572,040	$3,885	$7,784	$10,507	$11,592	$11,802	$11,634
WATER LOSS REDUCTION, TAYLOR LAKE VILLAGE	WUG	TAYLOR LAKE VILLAGE	$466,490	$4,440	$8,340	$8,295	$8,280	$8,430	$8,864
WATER LOSS REDUCTION, TEXAS CITY	WUG	TEXAS CITY	$7,964,350	$50,505	$102,304	$149,310	$156,216	$166,914	$171,186
WATER LOSS REDUCTION, TIKI ISLAND	WUG	TIKI ISLAND	$227,690	$1,665	$3,336	$4,424	$4,416	$4,496	$4,432
WATER LOSS REDUCTION, TOMBALL	WUG	TOMBALL	$2,560,310	$21,090	$41,700	$45,899	$47,472	$49,456	$50,414
WATER LOSS REDUCTION, TRINITY	WUG	TRINITY	$1,055,570	$5,550	$11,676	$16,037	$19,320	$24,166	$28,808
WATER LOSS REDUCTION, TRINITY BAY CONSERVATION DISTRICT	WUG	TRINITY BAY CONSERVATION DISTRICT	$4,411,270	$17,760	$39,476	$64,701	$92,184	$107,342	$119,664
WATER LOSS REDUCTION, TRINITY RURAL WSC	WUG	TRINITY RURAL WSC	$2,372,330	$12,765	$25,020	$35,392	$43,608	$55,076	$65,372
WATER LOSS REDUCTION, VARNER CREEK UD	WUG	VARNER CREEK UD	$177,710	$1,665	$2,780	$3,318	$3,312	$3,372	$3,324
WATER LOSS REDUCTION, WALLER	WUG	WALLER	$61,090	$555	$1,112	$1,106	$1,104	$1,124	$1,108

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, WALLIS	WUG	WALLIS	$333,370	$1,665	$3,336	$4,424	$6,072	$7,868	$9,972
WATER LOSS REDUCTION, WEST COLUMBIA	WUG	WEST COLUMBIA	$133,280	$2,220	$2,224	$2,212	$2,208	$2,248	$2,216
WATER LOSS REDUCTION, WEST HARDIN WSC	WUG	WEST HARDIN WSC	$194,420	$555	$1,668	$2,765	$3,864	$4,496	$6,094
WATER LOSS REDUCTION, WEST UNIVERSITY PLACE	WUG	WEST UNIVERSITY PLACE	$2,443,880	$18,870	$37,808	$42,028	$44,712	$48,894	$52,076
WATER LOSS REDUCTION, WOODBRANCH	WUG	WOODBRANCH	$166,670	$555	$1,668	$2,212	$3,312	$3,934	$4,986
WATER LOSS REDUCTION, WOODLAND HILLS WATER COMPANY	WUG	WOODLAND HILLS WATER COMPANY	$6,102,020	$16,650	$42,256	$74,102	$113,160	$159,608	$204,426
WEST HARRIS COUNTY GROUNDWATER REDUCTION PLAN	WMS	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	$0	$0	$0	$0	$0	$0	$0
WHCRWA 2025 DISTRIBUTION EXPANSION	WMS	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	$288,680,000	$27,043,349	$27,043,349	$2,886,800	$2,886,800	$2,886,800	$2,886,800
WHCRWA 2035 DISTRIBUTION EXPANSION	WMS	WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	$4,610,000	$431,862	$431,862	$46,100	$46,100	$46,100	$46,100
WHCRWA/NFBWA TRANSMISSION LINE	WMS	NORTH FORT BEND WATER AUTHORITY	$292,025,993	$23,516,484	$23,516,484	$2,028,700	$2,028,700	$2,028,700	$2,028,700
		WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	$350,960,059	$28,969,755	$28,969,755	$3,145,500	$3,145,500	$3,145,500	$3,145,500
WUG INFRASTRUCTURE EXPANSION - MINING, GALVESTON COUNTY (NT)	WUG	MINING, GALVESTON	$4,869,074	$639,611	$639,611	$232,170	$232,170	$232,170	$232,170
WUG INFRASTRUCTURE EXPANSION - ANGLETON	WUG	ANGLETON	$11,681,034	$226,903	$226,903	$39,961	$39,961	$39,961	$39,961
WUG INFRASTRUCTURE EXPANSION - ARCOLA	WUG	ARCOLA	$7,391,747	$1,026,760	$1,026,760	$408,224	$408,224	$408,224	$408,224
WUG INFRASTRUCTURE EXPANSION - BENDERS LANDING WATER SYSTEM	WUG	BENDERS LANDING WATER SYSTEM	$35,813,718	$0	$0	$0	$0	$5,358,228	$5,358,228
WUG INFRASTRUCTURE EXPANSION - BRAZORIA	WUG	BRAZORIA	$5,821,493	$182,339	$182,339	$20,861	$20,861	$20,861	$20,861
WUG INFRASTRUCTURE EXPANSION - CLEAR LAKE SHORES	WUG	CLEAR LAKE SHORES	$6,493,814	$184,771	$184,771	$22,016	$22,016	$22,016	$22,016
WUG INFRASTRUCTURE EXPANSION - CLUTE	WUG	CLUTE	$8,875,677	$214,701	$214,701	$32,844	$32,844	$32,844	$32,844
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 1	WUG	COUNTY-OTHER, BRAZORIA	$43,233,140	$498,659	$498,659	$144,533	$144,533	$144,533	$144,533
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 2	WUG	COUNTY-OTHER, BRAZORIA	$47,663,880	$0	$0	$523,867	$523,867	$157,541	$157,541
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (FORT BEND MUD #149)	WUG	COUNTY-OTHER, FORT BEND	$2,151,333	$210,307	$210,307	$30,285	$30,285	$30,285	$30,285
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 1	WUG	COUNTY-OTHER, BRAZORIA	$31,278,412	$4,660,563	$4,660,563	$2,043,206	$2,043,206	$2,043,206	$2,043,206
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 2	WUG	COUNTY-OTHER, BRAZORIA	$31,429,588	$0	$0	$0	$4,683,818	$4,683,818	$2,053,811

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (B)	WUG	COUNTY-OTHER, FORT BEND	$12,067,164	$0	$1,731,071	$1,731,071	$721,299	$721,299	$721,299
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (SJ)	WUG	COUNTY-OTHER, FORT BEND	$4,295,425	$554,996	$554,996	$195,558	$195,558	$195,558	$195,558
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (SJB)	WUG	COUNTY-OTHER, FORT BEND	$18,480,477	$0	$0	$0	$2,702,194	$2,702,194	$1,155,760
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), GALVESTON COUNTY (SJB)	WUG	COUNTY-OTHER, GALVESTON	$23,737,275	$3,502,363	$3,502,363	$1,516,044	$1,516,044	$1,516,044	$1,516,044
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RICHMOND GRP - PHASE 1)	WUG	COUNTY-OTHER, FORT BEND	$10,822,195	$1,013,785	$1,013,785	$108,193	$108,193	$108,193	$108,193
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RICHMOND GRP - PHASE 2)	WUG	COUNTY-OTHER, FORT BEND	$1,742,658	$0	$161,858	$161,858	$16,034	$16,034	$16,034
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RIVERSTONE)	WUG	COUNTY-OTHER, FORT BEND	$2,400,905	$256,238	$256,238	$55,332	$55,332	$55,332	$55,332
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, BRAZORIA COUNTY (BC)	WUG	COUNTY-OTHER, BRAZORIA	$4,295,425	$0	$0	$0	$0	$0	$554,996
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, CHAMBERS COUNTY (TSJ)	WUG	COUNTY-OTHER, CHAMBERS	$23,903,282	$303,780	$303,780	$73,168	$73,168	$73,168	$73,168
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, GALVESTON COUNTY (NT)	WUG	COUNTY-OTHER, GALVESTON	$4,295,425	$554,996	$554,996	$195,558	$195,558	$195,558	$195,558
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, HARRIS COUNTY (TSJ)	WUG	COUNTY-OTHER, HARRIS	$19,545,635	$260,708	$260,708	$57,886	$57,886	$57,886	$57,886
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY - PHASE 1	WUG	COUNTY-OTHER, MONTGOMERY	$186,580,030	$27,290,780	$27,290,780	$11,677,890	$11,677,890	$11,677,890	$11,677,890
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY - PHASE 2	WUG	COUNTY-OTHER, MONTGOMERY	$390,977,830	$0	$0	$0	$58,631,370	$58,631,370	$25,914,610
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY (SJRA GRP PARTICIPANTS)	WUG	COUNTY-OTHER, MONTGOMERY	$91,487,786	$1,025,886	$1,025,886	$303,808	$303,808	$303,808	$303,808
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #116	WUG	FORT BEND COUNTY MUD #116	$2,162,299	$212,505	$212,505	$31,565	$31,565	$31,565	$31,565
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #129 - PHASE 1	WUG	FORT BEND COUNTY MUD #129	$1,985,675	$0	$191,258	$191,258	$25,098	$25,098	$25,098
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #129 - PHASE 2	WUG	FORT BEND COUNTY MUD #129	$1,951,873	$0	$0	$0	$186,059	$186,059	$22,728
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD 121	WUG	FORT BEND COUNTY MUD 121	$1,742,658	$0	$0	$0	$161,858	$161,858	$16,034
WUG INFRASTRUCTURE EXPANSION - FREEPORT	WUG	FREEPORT	$14,818,964	$236,263	$236,263	$46,147	$46,147	$46,147	$46,147
WUG INFRASTRUCTURE EXPANSION - FULSHEAR	WUG	FULSHEAR	$9,116,617	$0	$216,899	$216,899	$34,124	$34,124	$34,124
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #106	WUG	HARRIS COUNTY MUD #106	$2,256,405	$0	$232,654	$232,654	$43,840	$43,840	$43,840
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #132	WUG	HARRIS COUNTY MUD #132	$2,200,481	$0	$221,490	$221,490	$37,355	$37,355	$37,355
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #151	WUG	HARRIS COUNTY MUD #151	$2,227,101	$0	$224,361	$224,361	$37,999	$37,999	$37,999

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #152	WUG	HARRIS COUNTY MUD #152	$2,238,628	$0	$228,531	$228,531	$41,204	$41,204	$41,204
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #290	WUG	HARRIS COUNTY MUD #290	$2,167,782	$0	$213,603	$213,603	$32,204	$32,204	$32,204
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #46	WUG	HARRIS COUNTY MUD #46	$2,167,782	$0	$213,603	$213,603	$32,204	$32,204	$32,204
WUG INFRASTRUCTURE EXPANSION - INDIGO LAKE WATER SYSTEM	WUG	INDIGO LAKE WATER SYSTEM	$25,231,336	$0	$0	$0	$0	$0	$3,730,340
WUG INFRASTRUCTURE EXPANSION - IRRIGATION, FORT BEND (RICHMOND GRP)	WUG	IRRIGATION, FORT BEND	$1,742,658	$161,858	$161,858	$16,034	$16,034	$16,034	$16,034
WUG INFRASTRUCTURE EXPANSION - KEMAH	WUG	KEMAH	$11,098,636	$224,361	$224,361	$37,999	$37,999	$37,999	$37,999
WUG INFRASTRUCTURE EXPANSION - LA MARQUE	WUG	LA MARQUE	$7,695,288	$195,431	$195,431	$26,803	$26,803	$26,803	$26,803
WUG INFRASTRUCTURE EXPANSION - LAKE JACKSON	WUG	LAKE JACKSON	$18,835,530	$257,132	$257,132	$55,843	$55,843	$55,843	$55,843
WUG INFRASTRUCTURE EXPANSION - LAKE WINDCREST WATER SYSTEM	WUG	LAKE WINDCREST WATER SYSTEM	$21,247,173	$275,314	$275,314	$63,566	$63,566	$63,566	$63,566
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (B)	WUG	MANUFACTURING, FORT BEND	$8,634,738	$0	$1,208,307	$1,208,307	$485,758	$485,758	$485,758
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (SJ)	WUG	MANUFACTURING, FORT BEND	$16,692,792	$2,432,180	$2,432,180	$1,035,338	$1,035,338	$1,035,338	$1,035,338
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (SJB)	WUG	MANUFACTURING, FORT BEND	$11,875,167	$0	$1,701,837	$1,701,837	$708,131	$708,131	$708,131
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, BRAZORIA COUNTY (BC)	WUG	MANUFACTURING, BRAZORIA	$0	$0	$0	$0	$0	$0	$0
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, BRAZORIA COUNTY (SJB)	WUG	MANUFACTURING, BRAZORIA	$10,036,329	$220,916	$220,916	$37,227	$37,227	$37,227	$37,227
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, MONTGOMERY COUNTY	WUG	MANUFACTURING, MONTGOMERY	$13,351,337	$0	$0	$0	$0	$0	$232,138
WUG INFRASTRUCTURE EXPANSION - MANVEL - PHASE 1	WUG	MANVEL	$20,417,139	$0	$2,995,747	$2,995,747	$1,287,254	$1,287,254	$1,287,254
WUG INFRASTRUCTURE EXPANSION - MANVEL - PHASE 2	WUG	MANVEL	$21,911,200	$0	$0	$0	$0	$3,223,725	$3,223,725
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (B)	WUG	MINING, BRAZORIA	$7,239,977	$1,003,934	$1,003,934	$398,098	$398,098	$398,098	$398,098
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (BC)	WUG	MINING, BRAZORIA	$8,226,091	$1,148,072	$1,148,072	$459,718	$459,718	$459,718	$459,718
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (SJB)	WUG	MINING, BRAZORIA	$12,434,070	$1,786,956	$1,786,956	$746,481	$746,481	$746,481	$746,481
WUG INFRASTRUCTURE EXPANSION - MINING, GALVESTON COUNTY (SJB)	WUG	MINING, GALVESTON	$7,847,058	$1,095,239	$1,095,239	$438,602	$438,602	$438,602	$438,602
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (SJ)	WUG	MINING, HARRIS	$22,741,234	$291,326	$291,326	$68,967	$68,967	$68,967	$68,967
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (SJB)	WUG	MINING, HARRIS	$6,200,263	$183,483	$183,483	$21,305	$21,305	$21,305	$21,305

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (TSJ)	WUG	MINING, HARRIS	$5,442,723	$181,195	$181,195	$20,417	$20,417	$20,417	$20,417
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY	WUG	MONTGOMERY	$16,692,792	$0	$2,432,180	$2,432,180	$1,035,338	$1,035,338	$1,035,338
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY COUNTY MUD #19	WUG	MONTGOMERY COUNTY MUD #19	$6,493,814	$184,771	$184,771	$22,016	$22,016	$22,016	$22,016
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY COUNTY MUD #89	WUG	MONTGOMERY COUNTY MUD #89	$7,543,518	$193,345	$193,345	$25,951	$25,951	$25,951	$25,951
WUG INFRASTRUCTURE EXPANSION - OYSTER CREEK	WUG	OYSTER CREEK	$4,869,074	$171,526	$171,526	$18,225	$18,225	$18,225	$18,225
WUG INFRASTRUCTURE EXPANSION - PANORAMA VILLAGE	WUG	PANORAMA VILLAGE	$6,493,814	$888,096	$888,096	$344,698	$344,698	$344,698	$344,698
WUG INFRASTRUCTURE EXPANSION - RICHWOOD	WUG	RICHWOOD	$6,200,263	$183,483	$183,483	$21,305	$21,305	$21,305	$21,305
WUG INFRASTRUCTURE EXPANSION - RIVER PLANTATION MUD	WUG	RIVER PLANTATION MUD	$4,295,425	$0	$0	$0	$0	$0	$554,996
WUG INFRASTRUCTURE EXPANSION - ROSENBERG GRP PARTICIPANTS	WUG	COUNTY-OTHER, FORT BEND	$7,434,116	$698,062	$698,062	$75,981	$75,981	$75,981	$75,981
WUG INFRASTRUCTURE EXPANSION - SANTA FE	WUG	SANTA FE	$8,755,208	$213,603	$213,603	$32,204	$32,204	$32,204	$32,204
WUG INFRASTRUCTURE EXPANSION - SHENANDOAH	WUG	SHENANDOAH	$8,002,495	$1,116,814	$1,116,814	$447,171	$447,171	$447,171	$447,171
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (B) - PHASE 1	WUG	SIENNA PLANTATION	$2,069,409	$0	$0	$201,006	$201,006	$27,839	$27,839
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (B) - PHASE 2	WUG	SIENNA PLANTATION	$2,069,409	$0	$0	$0	$0	$201,006	$201,006
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (SJB) - PHASE 1	WUG	SIENNA PLANTATION	$2,272,237	$0	$0	$236,781	$236,781	$46,642	$46,642
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (SJB) - PHASE 2	WUG	SIENNA PLANTATION	$2,273,906	$0	$0	$0	$0	$239,890	$239,890
WUG INFRASTRUCTURE EXPANSION - SPRING CREEK UD	WUG	SPRING CREEK UD	$9,116,617	$216,899	$216,899	$34,124	$34,124	$34,124	$34,124
WUG INFRASTRUCTURE EXPANSION - STAGECOACH	WUG	STAGECOACH	$6,787,364	$933,958	$933,958	$365,996	$365,996	$365,996	$365,996
WUG INFRASTRUCTURE EXPANSION - STANLEY LAKE MUD	WUG	STANLEY LAKE MUD	$8,157,931	$0	$0	$0	$0	$1,138,390	$1,138,390
WUG INFRASTRUCTURE EXPANSION - STEAM ELECTRIC POWER, FORT BEND COUNTY (B)	WUG	STEAM ELECTRIC POWER, FORT BEND	$179,375,022	$0	$0	$0	$0	$27,126,258	$27,126,258
WUG INFRASTRUCTURE EXPANSION - STEAM ELECTRIC POWER, MONTGOMERY COUNTY	WUG	STEAM ELECTRIC POWER, MONTGOMERY	$0	$0	$0	$0	$0	$0	$0
WUG INFRASTRUCTURE EXPANSION - THE WOODLANDS, HARRIS COUNTY	WUG	THE WOODLANDS	$21,579,187	$0	$278,872	$278,872	$64,766	$64,766	$64,766
WUG INFRASTRUCTURE EXPANSION - TOMBALL	WUG	TOMBALL	$23,405,261	$298,443	$298,443	$71,368	$71,368	$71,368	$71,368
WUG INFRASTRUCTURE EXPANSION - TRAIL OF THE LAKES MUD	WUG	TRAIL OF THE LAKES MUD	$2,231,719	$0	$226,056	$226,056	$39,307	$39,307	$39,307
WUG INFRASTRUCTURE EXPANSION - WESTWOOD NORTH WSC	WUG	WESTWOOD NORTH WSC	$8,002,495	$201,006	$201,006	$27,839	$27,839	$27,839	$27,839

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 1	WUG	BEACH CITY	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 2	WUG	BEACH CITY	$1,080,966	$1,080,966	$0	$0	$218,789	$218,789	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 3	WUG	BEACH CITY	$1,324,405	$0	$0	$0	$0	$281,411	$281,411
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BENDERS LANDING WATER SYSTEM	WUG	BENDERS LANDING WATER SYSTEM	$8,909,765	$2,214,065	$2,214,065	$1,468,502	$1,468,502	$1,468,502	$1,468,502
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BLUE BELL MANOR UTILITY COMPANY	WUG	BLUE BELL MANOR UTILITY COMPANY	$2,009,915	$0	$459,128	$459,128	$290,940	$290,940	$290,940
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (B)	WUG	COUNTY-OTHER, AUSTIN	$2,719,145	$0	$0	$0	$0	$670,336	$670,336
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 1	WUG	COUNTY-OTHER, AUSTIN	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 2	WUG	COUNTY-OTHER, AUSTIN	$1,567,843	$0	$0	$0	$344,033	$344,033	$212,837
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 3	WUG	COUNTY-OTHER, AUSTIN	$1,080,966	$0	$0	$0	$0	$0	$218,789
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, FORT BEND COUNTY (BC)	WUG	COUNTY-OTHER, FORT BEND	$20,845,805	$0	$0	$0	$4,889,369	$4,889,369	$3,145,006
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, HARRIS COUNTY (SJ)	WUG	COUNTY-OTHER, HARRIS	$82,138,146	$18,047,377	$18,047,377	$11,174,098	$11,174,098	$11,174,098	$11,174,098
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, LIBERTY COUNTY (SJ)	WUG	COUNTY-OTHER, LIBERTY	$1,914,339	$0	$0	$0	$0	$430,026	$430,026
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, MADISON COUNTY (B)	WUG	COUNTY-OTHER, MADISON	$837,894	$0	$0	$0	$0	$0	$159,383
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, MONTGOMERY COUNTY	WUG	COUNTY-OTHER, MONTGOMERY	$65,596,630	$0	$0	$0	$0	$13,048,520	$13,048,520
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, WALLER COUNTY (B) - PHASE 1	WUG	COUNTY-OTHER, WALLER	$2,165,802	$0	$0	$0	$513,223	$513,223	$331,990
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, WALLER COUNTY (B) - PHASE 2	WUG	COUNTY-OTHER, WALLER	$1,962,127	$0	$0	$0	$0	$0	$444,577
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - DOBBIN-PLANTERSVILLE WSC	WUG	DOBBIN-PLANTERSVILLE WSC	$8,926,839	$1,833,503	$1,833,503	$1,086,512	$1,086,512	$1,086,512	$1,086,512

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - EL DORADO UD	WUG	EL DORADO UD	$1,202,685	$0	$250,100	$250,100	$149,460	$149,460	$149,460
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - FORT BEND COUNTY MUD #23	WUG	FORT BEND COUNTY MUD #23	$2,165,802	$0	$513,223	$513,223	$331,990	$331,990	$331,990
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - GREATWOOD	WUG	GREATWOOD	$2,111,753	$0	$493,451	$493,451	$316,741	$316,741	$316,741
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - GREEN TRAILS MUD	WUG	GREEN TRAILS MUD	$1,791,874	$0	$397,615	$397,615	$247,672	$247,672	$247,672
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #11	WUG	HARRIS COUNTY MUD #11	$1,446,124	$0	$312,722	$312,722	$191,711	$191,711	$191,711
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #119	WUG	HARRIS COUNTY MUD #119	$1,642,520	$0	$361,893	$361,893	$224,448	$224,448	$224,448
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #153	WUG	HARRIS COUNTY MUD #153	$2,258,026	$0	$539,408	$539,408	$350,458	$350,458	$350,458
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #154	WUG	HARRIS COUNTY MUD #154	$2,009,915	$0	$459,128	$459,128	$290,940	$290,940	$290,940
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #180	WUG	HARRIS COUNTY MUD #180	$1,791,874	$0	$397,615	$397,615	$247,672	$247,672	$247,672
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #189	WUG	HARRIS COUNTY MUD #189	$1,567,843	$0	$344,033	$344,033	$212,837	$212,837	$212,837
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #221	WUG	HARRIS COUNTY MUD #221	$1,717,197	$0	$379,754	$379,754	$236,060	$236,060	$236,060
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #278	WUG	HARRIS COUNTY MUD #278	$2,534,697	$0	$617,965	$617,965	$405,863	$405,863	$405,863
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #345	WUG	HARRIS COUNTY MUD #345	$2,009,915	$0	$459,128	$459,128	$290,940	$290,940	$290,940
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #400 - WEST	WUG	HARRIS COUNTY MUD #400 - WEST	$2,111,753	$0	$493,451	$493,451	$316,741	$316,741	$316,741
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #14 - PHASE 1	WUG	HARRIS COUNTY UD #14	$1,202,685	$0	$250,100	$250,100	$149,460	$149,460	$149,460
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #14 - PHASE 2	WUG	HARRIS COUNTY UD #14	$1,080,966	$0	$0	$0	$218,789	$218,789	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #15	WUG	HARRIS COUNTY UD #15	$1,717,197	$0	$379,754	$379,754	$236,060	$236,060	$236,060
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #133 - PHASE 1	WUG	HARRIS COUNTY WCID #133	$1,866,551	$0	$415,475	$415,475	$259,283	$259,283	$259,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #133 - PHASE 2	WUG	HARRIS COUNTY WCID #133	$1,080,966	$0	$0	$0	$218,789	$218,789	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #74	WUG	HARRIS COUNTY WCID #74	$2,057,703	$0	$473,680	$473,680	$301,493	$301,493	$301,493
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HEMPSTEAD	WUG	HEMPSTEAD	$1,866,551	$0	$0	$0	$0	$415,475	$415,475
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - INDIGO LAKE WATER SYSTEM	WUG	INDIGO LAKE WATER SYSTEM	$7,117,027	$0	$1,835,100	$1,835,100	$1,239,552	$1,239,552	$1,239,552

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - IRRIGATION, LIBERTY COUNTY (N)	WUG	IRRIGATION, LIBERTY	$10,840,044	$1,695,053	$1,695,053	$787,965	$787,965	$787,965	$787,965
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - IRRIGATION, LIBERTY COUNTY (SJ)	WUG	IRRIGATION, LIBERTY	$2,370,720	$366,662	$366,662	$168,282	$168,282	$168,282	$168,282
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - KATY	WUG	KATY	$10,005,218	$0	$2,497,488	$2,497,488	$1,660,258	$1,660,258	$1,660,258
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - KINGS MANOR MUD	WUG	KINGS MANOR MUD	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, CHAMBERS COUNTY (TSJ)	WUG	LIVESTOCK, CHAMBERS	$325,222	$0	$0	$0	$0	$37,758	$37,758
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (N)	WUG	LIVESTOCK, LIBERTY	$325,222	$37,758	$37,758	$10,544	$10,544	$10,544	$10,544
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (NT)	WUG	LIVESTOCK, LIBERTY	$325,222	$37,758	$37,758	$10,544	$10,544	$10,544	$10,544
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (SJ)	WUG	LIVESTOCK, LIBERTY	$325,222	$37,758	$37,758	$10,544	$10,544	$10,544	$10,544
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (T)	WUG	LIVESTOCK, LIBERTY	$544,575	$74,129	$74,129	$28,559	$28,559	$28,559	$28,559
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (TSJ)	WUG	LIVESTOCK, LIBERTY	$325,222	$37,758	$37,758	$10,544	$10,544	$10,544	$10,544
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LONGHORN TOWN UD	WUG	LONGHORN TOWN UD	$1,324,405	$0	$281,411	$281,411	$170,586	$170,586	$170,586
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MAGNOLIA	WUG	MAGNOLIA	$3,726,230	$0	$0	$932,967	$932,967	$621,159	$621,159
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, AUSTIN COUNTY (B)	WUG	MANUFACTURING, AUSTIN	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 1	WUG	MANUFACTURING, CHAMBERS	$1,717,197	$0	$379,754	$379,754	$236,060	$236,060	$236,060
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 2	WUG	MANUFACTURING, CHAMBERS	$1,717,197	$0	$0	$0	$379,754	$379,754	$236,060
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 3	WUG	MANUFACTURING, CHAMBERS	$1,324,405	$0	$0	$0	$0	$0	$281,411
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 1	WUG	MANUFACTURING, LEON	$1,567,843	$0	$344,033	$344,033	$212,837	$212,837	$212,837
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 2	WUG	MANUFACTURING, LEON	$1,567,843	$0	$0	$0	$344,033	$344,033	$212,837
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 3	WUG	MANUFACTURING, LEON	$1,080,966	$0	$0	$0	$0	$0	$218,789

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (N)	WUG	MANUFACTURING, LIBERTY	$1,202,685	$0	$250,100	$250,100	$149,460	$149,460	$149,460
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (SJ)	WUG	MANUFACTURING, LIBERTY	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (T) - PHASE 1	WUG	MANUFACTURING, LIBERTY	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (T) - PHASE 2	WUG	MANUFACTURING, LIBERTY	$1,080,966	$0	$0	$218,789	$218,789	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, MADISON COUNTY (T)	WUG	MANUFACTURING, MADISON	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, WALLER COUNTY ,BRAZOS	WUG	MANUFACTURING, WALLER	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MASON CREEK UD	WUG	MASON CREEK UD	$2,211,914	$0	$526,315	$526,315	$341,224	$341,224	$341,224
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (C)	WUG	MINING, AUSTIN	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (B)	WUG	MINING, AUSTIN	$1,324,405	$0	$281,411	$281,411	$170,586	$170,586	$170,586
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (BC)	WUG	MINING, AUSTIN	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, CHAMBERS COUNTY (TSJ)	WUG	MINING, CHAMBERS	$1,202,685	$250,100	$250,100	$149,460	$149,460	$149,460	$149,460
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LEON COUNTY (B)	WUG	MINING, LEON	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LEON COUNTY (T)	WUG	MINING, LEON	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (N)	WUG	MINING, LIBERTY	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (NT)	WUG	MINING, LIBERTY	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (SJ)	WUG	MINING, LIBERTY	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (T) - PHASE 1	WUG	MINING, LIBERTY	$1,567,843	$344,033	$344,033	$212,837	$212,837	$212,837	$212,837
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (T) - PHASE 2	WUG	MINING, LIBERTY	$1,080,966	$0	$0	$0	$0	$0	$218,789
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (TSJ)	WUG	MINING, LIBERTY	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, MADISON COUNTY (B)	WUG	MINING, MADISON	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, MADISON COUNTY (T)	WUG	MINING, MADISON	$1,866,551	$0	$415,475	$415,475	$259,283	$259,283	$259,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, SAN JACINTO COUNTY (T)	WUG	MINING, SAN JACINTO	$1,080,966	$0	$0	$218,789	$218,789	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T)	WUG	MINING, TRINITY	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONT BELVIEU - PHASE 1	WUG	MONT BELVIEU	$2,534,697	$0	$0	$617,965	$617,965	$405,863	$405,863
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONT BELVIEU - PHASE 2	WUG	MONT BELVIEU	$4,109,144	$0	$0	$0	$0	$1,027,700	$1,027,700
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONTGOMERY COUNTY MUD #15	WUG	MONTGOMERY COUNTY MUD #15	$2,211,914	$0	$526,315	$526,315	$341,224	$341,224	$341,224
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONTGOMERY COUNTY MUD #94	WUG	MONTGOMERY COUNTY MUD #94	$1,446,124	$0	$0	$312,722	$312,722	$191,711	$191,711
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MOUNT HOUSTON ROAD MUD - PHASE 1	WUG	MOUNT HOUSTON ROAD MUD	$2,009,915	$0	$459,128	$459,128	$290,940	$290,940	$290,940
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MOUNT HOUSTON ROAD MUD - PHASE 2	WUG	MOUNT HOUSTON ROAD MUD	$1,080,966	$0	$0	$0	$218,789	$218,789	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NEW CANEY MUD	WUG	NEW CANEY MUD	$1,791,874	$0	$0	$0	$397,615	$397,615	$247,672
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTH BELT UD	WUG	NORTH BELT UD	$1,446,124	$0	$312,722	$312,722	$191,711	$191,711	$191,711
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTH GREEN MUD	WUG	NORTH GREEN MUD	$1,567,843	$0	$344,033	$344,033	$212,837	$212,837	$212,837
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTHWEST PARK MUD	WUG	NORTHWEST PARK MUD	$5,130,247	$0	$1,280,322	$1,280,322	$851,026	$851,026	$851,026
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - OLD RIVER-WINFREE - PHASE 1	WUG	OLD RIVER-WINFREE	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - OLD RIVER-WINFREE - PHASE 2	WUG	OLD RIVER-WINFREE	$1,080,966	$0	$0	$0	$0	$0	$218,789
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PATTON VILLAGE	WUG	PATTON VILLAGE	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PINE ISLAND - PHASE 1	WUG	PINE ISLAND	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PINE ISLAND - PHASE 2	WUG	PINE ISLAND	$1,080,966	$0	$0	$0	$0	$0	$218,789
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PLANTATION MUD	WUG	PLANTATION MUD	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PLEAK	WUG	PLEAK	$0	$0	$0	$0	$0	$0	$0
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - POINT AQUARIUS MUD	WUG	POINT AQUARIUS MUD	$1,080,966	$0	$0	$0	$0	$218,789	$218,789

Project Name	Proj. Level	Sponsor	Capital Cost ($)	Annual Cost ($/year)					
				2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROMAN FOREST	WUG	ROMAN FOREST	$1,446,124	$0	$0	$312,722	$312,722	$191,711	$191,711
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROSENBERG GRP PARTICIPANTS - PHASE 1	WUG	COUNTY-OTHER, FORT BEND	$3,608,056	$750,300	$750,300	$448,380	$448,380	$448,380	$448,380
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROSENBERG GRP PARTICIPANTS - PHASE 2	WUG	COUNTY-OTHER, FORT BEND	$1,080,966	$0	$218,789	$218,789	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SAN FELIPE - PHASE 1	WUG	SAN FELIPE	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SAN FELIPE - PHASE 2	WUG	SAN FELIPE	$1,324,405	$0	$0	$0	$281,411	$281,411	$170,586
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SJRA GRP PARTICIPANTS	WUG	COUNTY-OTHER, MONTGOMERY	$18,541,717	$4,350,059	$4,350,059	$2,798,501	$2,798,501	$2,798,501	$2,798,501
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SPRING VALLEY - PHASE 1	WUG	SPRING VALLEY	$2,350,250	$0	$565,594	$565,594	$368,927	$368,927	$368,927
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SPRING VALLEY - PHASE 2	WUG	SPRING VALLEY	$1,080,966	$0	$0	$0	$218,789	$218,789	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 1	WUG	STEAM ELECTRIC POWER, MADISON	$1,866,551	$415,475	$415,475	$259,283	$259,283	$259,283	$259,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 2	WUG	STEAM ELECTRIC POWER, MADISON	$1,080,966	$0	$0	$218,789	$218,789	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 3	WUG	STEAM ELECTRIC POWER, MADISON	$1,324,405	$0	$0	$0	$0	$281,411	$281,411
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SUGAR LAND GRP PARTICIPANTS	WUG	COUNTY-OTHER, FORT BEND	$3,364,617	$687,678	$687,678	$406,128	$406,128	$406,128	$406,128
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE COMMONS WATER SUPPLY INC	WUG	THE COMMONS WATER SUPPLY INC	$1,567,843	$0	$344,033	$344,033	$212,837	$212,837	$212,837
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC	WUG	THE CONSOLIDATED WSC	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - TRINITY RURAL WSC	WUG	TRINITY RURAL WSC	$1,080,966	$218,789	$218,789	$128,334	$128,334	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WEST HARRIS COUNTY MUD #6	WUG	WEST HARRIS COUNTY MUD #6	$1,446,124	$0	$312,722	$312,722	$191,711	$191,711	$191,711
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WILLIS	WUG	WILLIS	$2,009,915	$0	$0	$459,128	$459,128	$290,940	$290,940
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WOODBRANCH	WUG	WOODBRANCH	$1,080,966	$0	$0	$218,789	$218,789	$128,334	$128,334
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WOODCREEK MUD	WUG	WOODCREEK MUD	$1,324,405	$0	$281,411	$281,411	$170,586	$170,586	$170,586

Table 5-A9 – Project Cost Summary (Unit Cost)

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
ALLENS CREEK RESERVOIR	WMS	$231	$231	$231	$231	$33	$33
BRA SYSTEM OPERATION PERMIT	WMS	$0	$0	$0	$0	$0	$0
BRAZOS SALTWATER BARRIER	WMS	$69	$69	$5	$5	$5	$5
BWA BRACKISH GROUNDWATER DEVELOPMENT	WMS	$600	$600	$346	$346	$346	$346
BWA CONVENTIONAL TREATMENT EXPANSION	WMS	$353	$353	$194	$194	$194	$194
CHCRWA GRP	WMS	$0	$0	$0	$0	$0	$0
CHCRWA TRANSMISSION AND INTERNAL DISTRIBUTION	WMS	$409	$409	$44	$44	$44	$44
CITY OF CONROE REUSE PROJECT	WMS	$0	$0	$0	$0	$0	$0
CITY OF HOUSTON GRP	WMS	$0	$0	$0	$0	$0	$0
CITY OF HOUSTON REUSE	WMS	$0	$0	$229	$195	$46	$40
CITY OF HOUSTON TREATMENT EXPANSION - PHASE 1	WMS	$0	$0	$386	$386	$181	$181
CITY OF HOUSTON TREATMENT EXPANSION - PHASE 2	WMS	$0	$0	$0	$0	$399	$399
CLCND WEST CHAMBERS SYSTEM	WMS	$1,354	$1,354	$617	$617	$617	$617
COH NORTHEAST WATER PURIFICATION PLANT EXPANSION	WMS	$784	$784	$489	$489	$489	$489
COH, NHCRWA, AND CHCRWA SHARED TRANSMISSION	WMS	$83	$83	$9	$9	$9	$9
CONROE BRACKISH GROUNDWATER DESALINATION	WMS	$857	$857	$323	$323	$323	$323
DOW RESERVOIR AND PUMP STATION EXPANSION PROJECT	WMS	$303	$303	$36	$36	$36	$36
EAST TEXAS TRANSFER	WMS	$0	$0	$145	$145	$15	$15
FORT BEND MUD 25 GRP	WMS	$0	$282	$282	$40	$40	$40
FORT BEND WCID 2 GRP INFRASTRUCTURE	WMS	$800	$800	$571	$343	$343	$343
FREEPORT SEAWATER DESALINATION	WMS	$0	$0	$2,454	$2,454	$1,461	$1,461
GCWA REUSE FROM COH	WMS	$187	$187	$47	$47	$47	$47
GRAND LAKES RECLAIMED WATER SYSTEM	WMS	$2,276	$2,276	$612	$612	$612	$612
GROVETON WELL DEVELOPMENT	WMS	$1,277	$1,277	$136	$136	$136	$136
LAKE LIVINGSTON TO SJRA TRANSFER	WMS	$0	$0	$0	$311	$311	$32

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
LUCE BAYOU TRANSFER	WMS	$143	$143	$23	$23	$23	$23
MISSOURI CITY GRP INFRASTRUCTURE	WMS	$329	$329	$33	$33	$33	$33
MONTGOMERY COUNTY MUDS #8 AND #9 REUSE	WMS	$1,360	$1,360	$595	$595	$595	$595
NFBWA GROUNDWATER REDUCTION PLAN	WMS	$0	$0	$0	$0	$0	$0
NFBWA PHASE 2 DISTRIBUTION SEGMENTS	WMS	$95	$95	$7	$7	$7	$7
NHCRWA DISTRIBUTION EXPANSION - 2025 PHASE	WMS	$307	$307	$31	$31	$31	$31
NHCRWA DISTRIBUTION EXPANSION - 2035 PHASE	WMS	$0	$211	$211	$19	$19	$19
NHCRWA DISTRIBUTION EXPANSION - 2045 PHASE	WMS	$0	$0	$6	$6	$1	$1
NHCRWA GROUNDWATER REDUCTION PLAN	WMS	$0	$0	$0	$0	$0	$0
NHCRWA TRANSMISSION LINES	WMS	$86	$86	$6	$6	$6	$6
OLD GALVESTON ROAD TRANSMISSION IMPROVEMENTS	WMS	$369	$369	$25	$25	$25	$25
PANORAMA AND SHENANDOAH GRP INFRASTRUCTURE	WMS	$0	$0	$399	$399	$112	$112
PEARLAND REUSE INFRASTRUCTURE	WMS	$493	$517	$406	$90	$90	$90
PEARLAND SURFACE WATER TREATMENT PLANT DEVELOPMENT	WMS	$839	$652	$379	$230	$230	$230
PORTER SUD GRP INFRASTRUCTURE	WMS	$1,250	$1,250	$426	$426	$426	$426
REGIONAL RETURN FLOWS DEVELOPMENT	WMS	$0	$0	$0	$0	$0	$0
RICHMOND GRP INFRASTUCTURE	WMS	$1,761	$1,761	$146	$146	$146	$146
RIVER PLANTATION REUSE EXPANSION	WMS	$0	$0	$0	$0	$0	$0
ROSENBERG GRP INFRASTUCTURE	WMS	$1,242	$1,242	$131	$131	$131	$131
SJRA CATAHOULA AQUIFER SUPPLIES	WMS	$213	$213	$96	$96	$96	$96
SJRA CONROE REUSE PROJECT	WMS	$0	$0	$0	$0	$0	$0
SJRA GROUNDWATER REDUCTION PLAN - 2025 PHASE	WMS	$245	$245	$28	$28	$28	$28
SJRA GROUNDWATER REDUCTION PLAN - 2035 PHASE	WMS	$0	$971	$971	$113	$113	$113
SJRA GROUNDWATER REDUCTION PLAN - 2045 PHASE	WMS	$0	$0	$594	$594	$69	$69
SJRA GROUNDWATER REDUCTION PLAN - 2055 PHASE	WMS	$0	$0	$0	$971	$971	$113
SUGAR LAND GRP	WMS	$0	$0	$0	$0	$0	$0
SUGAR LAND GRP - REUSE INFRASTRUCTURE	WMS	$1,441	$1,441	$554	$554	$554	$554

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
SUGAR LAND SURFACE WATER TREATMENT EXPANSION	WMS	$607	$607	$171	$171	$171	$171
SUGAR LAND TRANSMISSION EXPANSION	WMS	$85	$85	$8	$8	$8	$8
TRA TO COH TRANSFER	WMS	$5	$5	$5	$5	$5	$5
WEST HARRIS COUNTY GROUNDWATER REDUCTION PLAN	WMS	$0	$0	$0	$0	$0	$0
WHCRWA 2025 DISTRIBUTION EXPANSION	WMS	$294	$294	$31	$31	$31	$31
WHCRWA 2035 DISTRIBUTION EXPANSION	WMS	$5	$5	$1	$1	$1	$1
WHCRWA/NFBWA TRANSMISSION LINE	WMS	$340	$340	$34	$34	$34	$34
INDUSTRIAL CONSERVATION, AUSTIN COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, BRAZORIA COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, CHAMBERS COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, FORT BEND COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, GALVESTON COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, HARRIS COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, LBERTY COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, LEON COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, MADISON COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, MONTGOMERY COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, SAN JACINTO COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, WALKER COUNTY	WUG	$0	$0	$0	$0	$0	$0
INDUSTRIAL CONSERVATION, WALLER COUNTY	WUG	$0	$0	$0	$0	$0	$0
IRRIGATION CONSERVATION, AUSTIN COUNTY	WUG	$114	$114	$113	$113	$113	$113
IRRIGATION CONSERVATION, BRAZORIA COUNTY	WUG	$113	$113	$112	$112	$112	$112
IRRIGATION CONSERVATION, CHAMBERS COUNTY	WUG	$114	$114	$113	$113	$113	$113
IRRIGATION CONSERVATION, FORT BEND COUNTY	WUG	$114	$114	$112	$112	$112	$112
IRRIGATION CONSERVATION, GALVESTON COUNTY	WUG	$114	$114	$113	$113	$113	$113
IRRIGATION CONSERVATION, HARRIS COUNTY	WUG	$114	$114	$113	$113	$113	$113
IRRIGATION CONSERVATION, LIBERTY COUNTY	WUG	$114	$114	$113	$113	$113	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
IRRIGATION CONSERVATION, WALLER COUNTY	WUG	$112	$112	$111	$111	$111	$111
MUNICIPAL CONSERVATION, ALVIN	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, ANGLETON	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, ARCOLA	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BACLIFF MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BAILEY'S PRAIRIE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BAYOU VISTA	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BAYTOWN	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BEASLEY	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BELLAIRE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BELLVILLE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BENDERS LANDING WATER SYSTEM	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BLUE BELL MANOR UTILITY COMPANY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BOLIVAR PENINSULA SUD	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BRAZORIA	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #2	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #21	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #3	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BRAZORIA COUNTY MUD #6	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BROOKSHIRE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BROOKSIDE VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BUFFALO	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, BUNKER HILL VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CENTERVILLE	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CHIMNEY HILL MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CLEAR BROOK CITY MUD	WUG	$822	$304	$199	$150	$127	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, CLEAR LAKE SHORES	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CLEVELAND	WUG	$0	$0	$0	$150	$127	$113
MUNICIPAL CONSERVATION, CLUTE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CONCORD-ROBBINS WSC	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CONROE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - AUSTIN COUNTY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - BRAZORIA COUNTY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - CHAMBERS COUNTY	WUG	$0	$0	$0	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - FORT BEND COUNTY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - GALVESTON COUNTY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - HARRIS COUNTY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - LEON COUNTY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - MONTGOMERY COUNTY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, COUNTY-OTHER - WALLER COUNTY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CROSBY MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, CUT AND SHOOT	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, DANBURY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, DEER PARK	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, DICKINSON	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, DOBBIN-PLANTERSVILLE WSC	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, EAST PLANTATION UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, EL DORADO UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, EL LAGO	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FAIRCHILDS	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FLO COMMUNITY WSC	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #116	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #121	WUG	$822	$304	$199	$150	$127	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #129	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #23	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FORT BEND COUNTY MUD #25	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FOUNTAINVIEW SUBDIVISION	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FREEPORT	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FRIENDSWOOD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, FULSHEAR	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, G & W WSC	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, GALENA PARK	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, GALVESTON	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, GREATWOOD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, GREEN TRAILS MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, GREENWOOD UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #106	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #11	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #119	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #132	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #148 - KINGSLAKE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #151	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #152	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #153	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #154	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #158	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #180	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #189	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #221	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #278	WUG	$822	$304	$199	$150	$127	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #290	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #345	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #400 - WEST	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #46	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #49	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #5	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #50	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #55	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #8	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY MUD #96	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY UD #14	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY UD #15	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #1	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #133	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #74	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HARRIS COUNTY WCID #96	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HEDWIG VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HEMPSTEAD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HILLCREST	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HILSHIRE VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HITCHCOCK	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HOLIDAY LAKES	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HOUSTON	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HUMBLE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, HUNTERS CREEK VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, INDIGO LAKE WATER SYSTEM	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, IOWA COLONY	WUG	$822	$304	$199	$150	$127	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, JACINTO CITY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, JAMAICA BEACH	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, JERSEY VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, JEWETT	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, JONES CREEK	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, KATY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, KEMAH	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, KINGS MANOR MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, KIRKMONT MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, LA MARQUE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, LA PORTE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, LAKE JACKSON	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, LAKE WINDCREST WATER SYSTEM	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, LEAGUE CITY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, LONGHORN TOWN UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MAGNOLIA	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MANVEL	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MASON CREEK UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MEADOWS PLACE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MISSOURI CITY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONT BELVIEU	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #15	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #18	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #19	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #8	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #83	WUG	$822	$304	$199	$150	$127	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #89	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #9	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY MUD #94	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #2	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #3	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY UD #4	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MONTGOMERY COUNTY WCID #1	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, MOUNT HOUSTON ROAD MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NASSAU BAY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NEEDVILLE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NEW CANEY MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NEWPORT MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NHCRWA	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NORMANGEE	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NORTH BELT UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NORTH CHANNEL WATER AUTHORITY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NORTH FORT BEND WATER AUTHORITY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NORTH GREEN MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, NORTHWEST PARK MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, OAK RIDGE NORTH	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, OAKWOOD	WUG	$0	$0	$199	$150	$127	$113
MUNICIPAL CONSERVATION, OYSTER CREEK	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PANORAMA VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PARKWAY UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PASADENA	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PATTON VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PEARLAND	WUG	$822	$304	$199	$150	$127	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, PECAN GROVE MUD #1	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PINE ISLAND	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PINEY POINT VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PLANTATION MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PLEAK	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, POINT AQUARIUS MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PORTER SUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, PRAIRIE VIEW	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, RAYFORD ROAD MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, RICHMOND	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, RICHWOOD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, RIVER PLANTATION MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, ROMAN FOREST	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, ROSENBERG	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SAGEMEADOW UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SAN FELIPE	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SAN LEON MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SANTA FE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SEABROOK	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SEALY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SHENANDOAH	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SHOREACRES	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SIENNA PLANTATION	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SIMONTON	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SOUTH HOUSTON	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SOUTHERN MONTGOMERY COUNTY MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SOUTHSIDE PLACE	WUG	$822	$304	$199	$150	$127	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, SPLENDORA	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SPRING CREEK UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SPRING VALLEY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, STAFFORD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, STAGECOACH	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, STANLEY LAKE MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SUGAR LAND	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SUNBELT FWSD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, SWEENY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, TAYLOR LAKE VILLAGE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, TEXAS CITY	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, THE COMMONS WATER SUPPLY INC	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, THE WOODLANDS	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, TIKI ISLAND	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, TOMBALL	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, TRAIL OF THE LAKES MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, TRINITY BAY CONSERVATION DISTRICT	WUG	$0	$0	$199	$150	$127	$113
MUNICIPAL CONSERVATION, VARNER CREEK UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WALLER	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WALLIS	WUG	$0	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WEBSTER	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WEST COLUMBIA	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WEST HARRIS COUNTY MUD #6	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WEST UNIVERSITY PLACE	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WESTON LAKES	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WESTWOOD NORTH WSC	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WHCRWA	WUG	$822	$304	$199	$150	$127	$113

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
MUNICIPAL CONSERVATION, WILLIS	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WINDFERN FOREST UD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WOODBRANCH	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL CONSERVATION, WOODCREEK MUD	WUG	$822	$304	$199	$150	$127	$113
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, BRAZORIA COUNTY	WUG	$0	$289	$291	$212	$180	$161
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, CHCRWA	WUG	$0	$290	$291	$212	$180	$161
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, FORT BEND COUNTY	WUG	$0	$290	$291	$212	$180	$161
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, HARRIS COUNTY	WUG	$0	$290	$291	$212	$180	$161
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, MONTGOMERY COUNTY	WUG	$0	$290	$291	$212	$180	$161
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, NFBWA	WUG	$0	$290	$291	$212	$180	$161
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, NHCRWA	WUG	$0	$289	$290	$212	$180	$162
MUNICIPAL IRRIGATION REUSE DEVELOPMENT, WHCRWA	WUG	$0	$291	$290	$212	$179	$161
NEW / EXPANDED CONTRACT WITH BRA - COUNTY-OTHER, BRAZORIA COUNTY (BC)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BRA - MANUFACTURING, BRAZORIA COUNTY (BC)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BRA - MINING, BRAZORIA COUNTY (B)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BRA - MINING, BRAZORIA COUNTY (BC)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BRA - STEAM ELECTRIC POWER, FORT BEND COUNTY (B)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - ANGLETON	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - BRAZORIA	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - CLUTE	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - FREEPORT	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - LAKE JACKSON	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - MANUFACTURING, BRAZORIA COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH BWA - OYSTER CREEK	WUG	$0	$0	$0	$0	$0	$0

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
NEW / EXPANDED CONTRACT WITH BWA - RICHWOOD	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH CLCND - COUNTY-OTHER, CHAMBERS COUNTY (TSJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - COUNTY-OTHER, HARRIS COUNTY (TSJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - FOUNTAINVIEW SUBDIVISION	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - KIRKMONT MUD	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MANUFACTURING, HARRIS COUNTY (SJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MANUFACTURING, HARRIS COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (SJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MINING, HARRIS COUNTY (TSJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - MISSOURI CITY, HARRIS COUNTY	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - STEAM ELECTRIC POWER, HARRIS COUNTY (SJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH COH - STEAM ELECTRIC POWER, HARRIS COUNTY (SJB)	WUG	$263	$225	$44	$38	$32	$27
NEW / EXPANDED CONTRACT WITH GCWA - ARCOLA	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - CLEAR LAKE SHORES	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER - COUNTY-OTHER, FORT BEND COUTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, BRAZORIA COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, FORT BEND COUTY (B)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, FORT BEND COUTY (SJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - COUNTY-OTHER, GALVESTON COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - KEMAH	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - LA MARQUE	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (B)	WUG	$0	$0	$0	$0	$0	$0

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (SJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MANUFACTURING, FORT BEND COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MANVEL	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MINING, BRAZORIA COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MINING, GALVESTON COUNTY (SJB)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - MISSOURI CITY	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - SANTA FE	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH GCWA - SIENNA PLANTATION	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH LNVA	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH LNVA - COUNTY-OTHER, GALVESTON COUNTY (NT)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH LNVA - MINING, GALVESTON COUNTY (NT)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - BENDERS LANDING WATER SYSTEM	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - COUNTY-OTHER, MONTGOMERY COUNTY (SJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - INDIGO LAKE WATER SYSTEM	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - MANUFACTURING, MONTGOMERY COUNTY (SJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - MONTGOMERY	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - PANORAMA VILLAGE	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - RIVER PLANTATION MUD	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - SHENANDOAH	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - STAGECOACH	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - STANLEY LAKE MUD	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SJRA - STEAM ELECTRIC POWER, MONTGOMERY COUNTY (SJ)	WUG	$0	$0	$0	$0	$0	$0
NEW / EXPANDED CONTRACT WITH SUGAR LAND - FORT BEND MUD 25	WUG	$0	$0	$0	$0	$0	$0
WATER LOSS REDUCTION, ALVIN	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, AMES	WUG	$555	$556	$553	$552	$562	$554

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, ANAHUAC	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, ANGLETON	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, ARCOLA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BACLIFF MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BAILEY'S PRAIRIE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BAYTOWN	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BEASLEY	WUG	$0	$0	$0	$0	$562	$554
WATER LOSS REDUCTION, BLUE BELL MANOR UTILITY COMPANY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BOLIVAR PENINSULA SUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BRAZORIA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #2	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #3	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BRAZORIA COUNTY MUD #6	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BROOKSIDE VILLAGE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, BUNKER HILL VILLAGE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, CLEAR BROOK CITY MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, CLEAR LAKE SHORES	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, CLEVELAND	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, CLUTE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COLDSPRING	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COUNTY-OTHER - BRAZORIA COUNTY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COUNTY-OTHER - CHAMBERS COUNTY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COUNTY-OTHER - LIBERTY COUNTY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COUNTY-OTHER - MADISON COUNTY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COUNTY-OTHER - POLK COUNTY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COUNTY-OTHER - WALKER COUNTY	WUG	$555	$556	$553	$552	$562	$554

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, COUNTY-OTHER - WALLER COUNTY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, COVE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, CROSBY MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, CUT AND SHOOT	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, DAISETTA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, DANBURY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, DEER PARK	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, DICKINSON	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, DOBBIN-PLANTERSVILLE WSC	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, EL DORADO UD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, EL LAGO	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, FAIRCHILDS	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, FORT BEND COUNTY MUD #129	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, FOUNTAINVIEW SUBDIVISION	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, FREEPORT	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, GALENA PARK	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, GALVESTON	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, GROVETON	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARDIN	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARDIN WSC	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #106	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #11	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #154	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #180	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #290	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #345	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #400 - WEST	WUG	$555	$556	$553	$552	$562	$554

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, HARRIS COUNTY MUD #49	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #50	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY MUD #96	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY UD #15	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY WCID #1	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HARRIS COUNTY WCID #74	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HEMPSTEAD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HILLCREST	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HITCHCOCK	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HOUSTON	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, HUMBLE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, INDIGO LAKE WATER SYSTEM	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, IOWA COLONY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, KEMAH	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, KENEFICK	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, KIRKMONT MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, LA MARQUE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, LA PORTE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, LAKE JACKSON	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, LAKE WINDCREST WATER SYSTEM	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, LIBERTY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, MADISONVILLE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, MAGNOLIA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, MASON CREEK UD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, MEADOWS PLACE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, MONT BELVIEU	WUG	$555	$556	$553	$552	$562	$554

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, MONTGOMERY COUNTY MUD #19	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, MONTGOMERY COUNTY MUD #89	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, MONTGOMERY COUNTY WCID #1	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, NASSAU BAY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, NEWPORT MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, NHCRWA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, NORMANGEE	WUG	$0	$0	$553	$552	$562	$554
WATER LOSS REDUCTION, NORTH GREEN MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, OLD RIVER-WINFREE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, ONALASKA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, OYSTER CREEK	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, PASADENA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, PATTON VILLAGE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, PEARLAND	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, PECAN GROVE MUD #1	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, PLANTATION MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, PLEAK	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, PLUM GROVE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, POINT AQUARIUS MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, PORTER SUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, RICHWOOD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, RIVER PLANTATION MUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, RIVERSIDE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, ROMAN FOREST	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SAGEMEADOW UD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SAN JACINTO SUD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SAN LEON MUD	WUG	$555	$556	$553	$552	$562	$554

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, SANTA FE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SEABROOK	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SHENANDOAH	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SHEPHERD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SIMONTON	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SOUTH HOUSTON	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SOUTHSIDE PLACE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SPLENDORA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SPRING VALLEY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, STAGECOACH	WUG	$0	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SUGAR LAND	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SUNBELT FWSD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, SWEENY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, TAYLOR LAKE VILLAGE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, TEXAS CITY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, TIKI ISLAND	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, TOMBALL	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, TRINITY	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, TRINITY BAY CONSERVATION DISTRICT	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, TRINITY RURAL WSC	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, VARNER CREEK UD	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, WALLER	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, WALLIS	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, WEST COLUMBIA	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, WEST HARDIN WSC	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, WEST UNIVERSITY PLACE	WUG	$555	$556	$553	$552	$562	$554
WATER LOSS REDUCTION, WOODBRANCH	WUG	$555	$556	$553	$552	$562	$554

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WATER LOSS REDUCTION, WOODLAND HILLS WATER COMPANY	WUG	$555	$556	$553	$552	$562	$554
WUG INFRASTRUCTURE EXPANSION - MINING, GALVESTON COUNTY (NT)	WUG	$9,137	$8,416	$2,797	$2,580	$2,418	$2,254
WUG INFRASTRUCTURE EXPANSION - ANGLETON	WUG	$228	$228	$40	$39	$38	$38
WUG INFRASTRUCTURE EXPANSION - ARCOLA	WUG	$102,676	$7,778	$2,219	$1,752	$1,490	$1,300
WUG INFRASTRUCTURE EXPANSION - BENDERS LANDING WATER SYSTEM	WUG	$0	$0	$0	$0	$1,136	$1,133
WUG INFRASTRUCTURE EXPANSION - BRAZORIA	WUG	$1,042	$1,042	$119	$119	$119	$119
WUG INFRASTRUCTURE EXPANSION - CLEAR LAKE SHORES	WUG	$836	$829	$106	$108	$111	$112
WUG INFRASTRUCTURE EXPANSION - CLUTE	WUG	$369	$361	$54	$52	$50	$50
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 1	WUG	$35	$33	$9	$9	$9	$9
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (BWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 2	WUG	$0	$0	$34	$34	$10	$10
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (FORT BEND MUD #149)	WUG	$370	$377	$55	$55	$55	$55
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 1	WUG	$6,648	$2,064	$515	$350	$255	$202
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), BRAZORIA COUNTY (SJB) - PHASE 2	WUG	$0	$0	$0	$802	$585	$203
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (B)	WUG	$0	$3,142	$3,142	$1,309	$1,309	$652
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (SJ)	WUG	$14,231	$14,231	$5,014	$5,014	$5,014	$0
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), FORT BEND COUTY (SJB)	WUG	$0	$0	$0	$5,147	$2,241	$632
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (GCWA CUSTOMERS), GALVESTON COUNTY (SJB)	WUG	$1,756	$1,621	$660	$621	$584	$551
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RICHMOND GRP - PHASE 1)	WUG	$5,364	$2,125	$215	$188	$167	$150
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RICHMOND GRP - PHASE 2)	WUG	$0	$339	$321	$28	$25	$22
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER (RIVERSTONE)	WUG	$179	$128	$28	$28	$28	$28
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, BRAZORIA COUNTY (BC)	WUG	$0	$0	$0	$0	$0	$55,500
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, CHAMBERS COUNTY (TSJ)	WUG	$108	$108	$26	$26	$26	$26
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, GALVESTON COUNTY (NT)	WUG	$138,749	$79,285	$27,937	$19,556	$16,297	$13,968

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, HARRIS COUNTY (TSJ)	WUG	$167	$152	$30	$30	$28	$27
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY - PHASE 1	WUG	$5,997	$4,939	$579	$298	$222	$160
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY - PHASE 2	WUG	$0	$0	$0	$1,494	$1,115	$354
WUG INFRASTRUCTURE EXPANSION - COUNTY-OTHER, MONTGOMERY COUNTY (SJRA GRP PARTICIPANTS)	WUG	$217	$142	$31	$28	$25	$24
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #116	WUG	$1,221	$542	$69	$62	$56	$51
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #129 - PHASE 1	WUG	$0	$1,039	$594	$57	$49	$49
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD #129 - PHASE 2	WUG	$0	$0	$0	$426	$361	$45
WUG INFRASTRUCTURE EXPANSION - FORT BEND COUNTY MUD 121	WUG	$0	$0	$0	$161,858	$3,444	$171
WUG INFRASTRUCTURE EXPANSION - FREEPORT	WUG	$227	$210	$38	$35	$31	$31
WUG INFRASTRUCTURE EXPANSION - FULSHEAR	WUG	$0	$437	$387	$55	$52	$49
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #106	WUG	$0	$107	$120	$22	$22	$22
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #132	WUG	$0	$149	$172	$29	$29	$30
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #151	WUG	$0	$133	$152	$26	$26	$26
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #152	WUG	$0	$122	$138	$25	$25	$24
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #290	WUG	$0	$206	$229	$34	$34	$33
WUG INFRASTRUCTURE EXPANSION - HARRIS COUNTY MUD #46	WUG	$0	$195	$226	$35	$35	$35
WUG INFRASTRUCTURE EXPANSION - INDIGO LAKE WATER SYSTEM	WUG	$0	$0	$0	$0	$0	$1,514
WUG INFRASTRUCTURE EXPANSION - IRRIGATION, FORT BEND (RICHMOND GRP)	WUG	$10,116	$4,905	$486	$486	$486	$486
WUG INFRASTRUCTURE EXPANSION - KEMAH	WUG	$396	$262	$43	$42	$41	$40
WUG INFRASTRUCTURE EXPANSION - LA MARQUE	WUG	$785	$546	$87	$89	$86	$83
WUG INFRASTRUCTURE EXPANSION - LAKE JACKSON	WUG	$168	$161	$33	$30	$27	$27
WUG INFRASTRUCTURE EXPANSION - LAKE WINDCREST WATER SYSTEM	WUG	$376	$335	$61	$47	$36	$27
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (B)	WUG	$0	$2,087	$2,021	$806	$952	$1,151
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (SJ)	WUG	$2,945	$1,419	$600	$601	$649	$701
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING (GCWA CUSTOMERS), FORT BEND COUNTY (SJB)	WUG	$0	$1,579	$1,554	$650	$768	$922

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, BRAZORIA COUNTY (BC)	WUG	$0	$0	$0	$0	$0	$0
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, BRAZORIA COUNTY (SJB)	WUG	$2	$2	$0	$0	$0	$0
WUG INFRASTRUCTURE EXPANSION - MANUFACTURING, MONTGOMERY COUNTY	WUG	$0	$0	$0	$0	$0	$180
WUG INFRASTRUCTURE EXPANSION - MANVEL - PHASE 1	WUG	$0	$6,089	$2,271	$571	$384	$273
WUG INFRASTRUCTURE EXPANSION - MANVEL - PHASE 2	WUG	$0	$0	$0	$0	$961	$683
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (B)	WUG	$9,044	$6,924	$2,288	$1,933	$1,659	$1,422
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (BC)	WUG	$5,573	$4,316	$1,432	$1,210	$1,035	$882
WUG INFRASTRUCTURE EXPANSION - MINING, BRAZORIA COUNTY (SJB)	WUG	$4,285	$3,185	$1,083	$898	$762	$643
WUG INFRASTRUCTURE EXPANSION - MINING, GALVESTON COUNTY (SJB)	WUG	$4,012	$3,751	$1,362	$1,264	$1,179	$1,105
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (SJ)	WUG	$111	$112	$27	$27	$27	$28
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (SJB)	WUG	$1,043	$1,048	$123	$125	$126	$127
WUG INFRASTRUCTURE EXPANSION - MINING, HARRIS COUNTY (TSJ)	WUG	$1,224	$1,233	$143	$145	$145	$147
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY	WUG	$0	$4,778	$3,155	$1,015	$797	$593
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY COUNTY MUD #19	WUG	$884	$915	$111	$112	$111	$111
WUG INFRASTRUCTURE EXPANSION - MONTGOMERY COUNTY MUD #89	WUG	$721	$716	$95	$89	$81	$78
WUG INFRASTRUCTURE EXPANSION - OYSTER CREEK	WUG	$2,416	$2,228	$214	$192	$170	$170
WUG INFRASTRUCTURE EXPANSION - PANORAMA VILLAGE	WUG	$46,742	$68,315	$8,838	$4,596	$2,480	$549
WUG INFRASTRUCTURE EXPANSION - RICHWOOD	WUG	$1,191	$1,184	$135	$128	$121	$121
WUG INFRASTRUCTURE EXPANSION - RIVER PLANTATION MUD	WUG	$0	$0	$0	$0	$0	$15,000
WUG INFRASTRUCTURE EXPANSION - ROSENBERG GRP PARTICIPANTS	WUG	$1,538	$1,492	$162	$162	$161	$160
WUG INFRASTRUCTURE EXPANSION - SANTA FE	WUG	$361	$381	$59	$57	$53	$50
WUG INFRASTRUCTURE EXPANSION - SHENANDOAH	WUG	$11,058	$2,615	$6,576	$3,388	$1,825	$1,141
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (B) - PHASE 1	WUG	$0	$0	$985	$453	$42	$32
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (B) - PHASE 2	WUG	$0	$0	$0	$0	$303	$229
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (SJB) - PHASE 1	WUG	$0	$0	$375	$312	$84	$106
WUG INFRASTRUCTURE EXPANSION - SIENNA PLANTATION (SJB) - PHASE 2	WUG	$0	$0	$0	$0	$101	$75

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION - SPRING CREEK UD	WUG	$420	$394	$60	$55	$50	$49
WUG INFRASTRUCTURE EXPANSION - STAGECOACH	WUG	$155,660	$84,905	$10,457	$5,229	$2,882	$1,619
WUG INFRASTRUCTURE EXPANSION - STANLEY LAKE MUD	WUG	$0	$0	$0	$0	$10,349	$2,300
WUG INFRASTRUCTURE EXPANSION - STEAM ELECTRIC POWER, FORT BEND COUNTY (B)	WUG	$0	$0	$0	$0	$48,964	$1,030
WUG INFRASTRUCTURE EXPANSION - STEAM ELECTRIC POWER, MONTGOMERY COUNTY	WUG	$0	$0	$0	$0	$0	$0
WUG INFRASTRUCTURE EXPANSION - THE WOODLANDS, HARRIS COUNTY	WUG	$0	$266	$132	$29	$27	$27
WUG INFRASTRUCTURE EXPANSION - TOMBALL	WUG	$332	$161	$28	$27	$27	$26
WUG INFRASTRUCTURE EXPANSION - TRAIL OF THE LAKES MUD	WUG	$0	$127	$146	$25	$26	$26
WUG INFRASTRUCTURE EXPANSION - WESTWOOD NORTH WSC	WUG	$715	$681	$85	$77	$71	$63
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 1	WUG	$2,188	$2,188	$642	$642	$367	$367
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 2	WUG	$10,810	$0	$0	$1,094	$625	$367
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BEACH CITY - PHASE 3	WUG	$0	$0	$0	$0	$804	$804
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BENDERS LANDING WATER SYSTEM	WUG	$22,825	$1,851	$602	$404	$9,009	$9,236
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - BLUE BELL MANOR UTILITY COMPANY	WUG	$0	$2,701	$1,481	$892	$841	$801
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (B)	WUG	$0	$0	$0	$0	$838	$838
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 1	WUG	$0	$2,188	$2,188	$428	$428	$321
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 2	WUG	$0	$0	$0	$1,147	$1,147	$532
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, AUSTIN COUNTY (BC) - PHASE 3	WUG	$0	$0	$0	$0	$0	$547
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, FORT BEND COUNTY (BC)	WUG	$0	$0	$0	$3,083	$1,072	$346
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, HARRIS COUNTY (SJ)	WUG	$2,243	$2,248	$1,137	$1,105	$1,076	$1,045
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, LIBERTY COUNTY (SJ)	WUG	$0	$0	$0	$0	$1,323	$1,323
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, MADISON COUNTY (B)	WUG	$0	$0	$0	$0	$0	$6,375
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, MONTGOMERY COUNTY	WUG	$0	$0	$0	$0	$3,603	$1,305

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, WALLER COUNTY (B) - PHASE 1	WUG	$0	$0	$0	$1,026	$1,026	$391
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - COUNTY-OTHER, WALLER COUNTY (B) - PHASE 2	WUG	$0	$0	$0	$0	$0	$523
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - DOBBIN-PLANTERSVILLE WSC	WUG	$11,984	$5,607	$1,906	$1,221	$813	$563
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - EL DORADO UD	WUG	$0	$4,168	$2,405	$1,495	$1,573	$1,661
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - FORT BEND COUNTY MUD #23	WUG	$0	$1,228	$1,183	$738	$709	$680
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - GREATWOOD	WUG	$0	$1,137	$1,186	$780	$790	$792
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - GREEN TRAILS MUD	WUG	$0	$2,651	$1,578	$1,003	$1,019	$1,032
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #11	WUG	$0	$3,861	$2,157	$1,313	$1,270	$1,229
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #119	WUG	$0	$2,721	$1,660	$1,034	$1,025	$1,011
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #153	WUG	$0	$1,665	$1,001	$671	$689	$704
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #154	WUG	$0	$2,331	$1,366	$868	$851	$829
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #180	WUG	$0	$2,687	$1,535	$987	$1,015	$1,041
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #189	WUG	$0	$3,373	$1,922	$1,157	$1,114	$1,075
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #221	WUG	$0	$2,990	$1,742	$1,059	$1,040	$1,009
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #278	WUG	$0	$1,398	$914	$616	$630	$643
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #345	WUG	$0	$2,166	$1,290	$841	$856	$871
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY MUD #400 - WEST	WUG	$0	$2,145	$1,175	$723	$715	$718
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #14 - PHASE 1	WUG	$0	$3,678	$2,017	$1,075	$952	$804
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #14 - PHASE 2	WUG	$0	$0	$0	$1,574	$1,394	$690
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY UD #15	WUG	$0	$3,361	$1,673	$1,031	$1,000	$1,013
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #133 - PHASE 1	WUG	$0	$2,402	$1,399	$810	$743	$673

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #133 - PHASE 2	WUG	$0	$0	$0	$684	$627	$333
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HARRIS COUNTY WCID #74	WUG	$0	$2,322	$1,301	$822	$806	$787
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - HEMPSTEAD	WUG	$0	$0	$0	$0	$1,385	$1,385
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - INDIGO LAKE WATER SYSTEM	WUG	$0	$5,335	$1,961	$702	$414	$488
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - IRRIGATION, LIBERTY COUNTY (N)	WUG	$195	$195	$91	$91	$91	$91
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - IRRIGATION, LIBERTY COUNTY (SJ)	WUG	$198	$198	$91	$91	$91	$91
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - KATY	WUG	$0	$931	$744	$493	$489	$486
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - KINGS MANOR MUD	WUG	$72,930	$6,435	$2,175	$2,037	$1,860	$1,758
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, CHAMBERS COUNTY (TSJ)	WUG	$0	$0	$0	$0	$378	$378
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (N)	WUG	$378	$378	$105	$105	$105	$105
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (NT)	WUG	$378	$378	$105	$105	$105	$105
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (SJ)	WUG	$378	$378	$105	$105	$105	$105
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (T)	WUG	$247	$247	$95	$95	$95	$95
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LIVESTOCK, LIBERTY COUNTY (TSJ)	WUG	$378	$378	$105	$105	$105	$105
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - LONGHORN TOWN UD	WUG	$0	$3,518	$2,085	$1,292	$1,312	$1,333
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MAGNOLIA	WUG	$0	$0	$8,482	$2,819	$912	$505
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, AUSTIN COUNTY (B)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 1	WUG	$0	$1,519	$1,519	$472	$472	$363
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 2	WUG	$0	$0	$0	$760	$760	$363
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, CHAMBERS COUNTY (T) - PHASE 3	WUG	$0	$0	$0	$0	$0	$433
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 1	WUG	$0	$1,720	$1,720	$532	$532	$426
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 2	WUG	$0	$0	$0	$860	$860	$426

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LEON COUNTY (T) - PHASE 3	WUG	$0	$0	$0	$0	$0	$438
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (N)	WUG	$0	$2,001	$2,001	$1,196	$1,196	$1,196
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (SJ)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (T) - PHASE 1	WUG	$2,188	$2,188	$642	$642	$642	$642
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, LIBERTY COUNTY (T) - PHASE 2	WUG	$0	$0	$1,094	$1,094	$642	$642
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, MADISON COUNTY (T)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MANUFACTURING, WALLER COUNTY ,BRAZOS	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MASON CREEK UD	WUG	$0	$1,737	$1,020	$685	$704	$721
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (C)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (B)	WUG	$0	$1,876	$1,876	$1,137	$1,137	$1,137
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, AUSTIN COUNTY (BC)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, CHAMBERS COUNTY (TSJ)	WUG	$2,001	$2,001	$1,196	$1,196	$1,196	$1,196
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LEON COUNTY (B)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LEON COUNTY (T)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (N)	WUG	$2,188	$2,188	$1,283	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (NT)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (SJ)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (T) - PHASE 1	WUG	$1,720	$1,720	$1,064	$1,064	$1,064	$709
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (T) - PHASE 2	WUG	$0	$0	$0	$0	$0	$729
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, LIBERTY COUNTY (TSJ)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, MADISON COUNTY (B)	WUG	$0	$2,188	$2,188	$1,283	$1,283	$1,283

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, MADISON COUNTY (T)	WUG	$0	$1,385	$1,385	$864	$864	$864
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, SAN JACINTO COUNTY (T)	WUG	$0	$0	$2,188	$2,188	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T)	WUG	$2,188	$2,188	$1,283	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONT BELVIEU - PHASE 1	WUG	$0	$0	$883	$883	$193	$193
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONT BELVIEU - PHASE 2	WUG	$0	$0	$0	$0	$489	$489
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONTGOMERY COUNTY MUD #15	WUG	$0	$30,960	$6,266	$1,972	$1,073	$650
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MONTGOMERY COUNTY MUD #94	WUG	$0	$0	$6,654	$3,191	$1,206	$1,206
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MOUNT HOUSTON ROAD MUD - PHASE 1	WUG	$0	$2,342	$1,251	$726	$685	$660
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MOUNT HOUSTON ROAD MUD - PHASE 2	WUG	$0	$0	$0	$546	$515	$291
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NEW CANEY MUD	WUG	$0	$0	$0	$13,711	$3,106	$983
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTH BELT UD	WUG	$0	$3,437	$2,005	$1,237	$1,206	$1,176
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTH GREEN MUD	WUG	$0	$3,156	$1,870	$1,237	$1,298	$1,356
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - NORTHWEST PARK MUD	WUG	$0	$1,429	$819	$527	$506	$484
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - OLD RIVER-WINFREE - PHASE 1	WUG	$2,188	$2,188	$1,283	$1,283	$1,283	$642
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - OLD RIVER-WINFREE - PHASE 2	WUG	$0	$0	$0	$0	$0	$1,094
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PATTON VILLAGE	WUG	$0	$218,789	$14,586	$4,010	$2,213	$1,426
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PINE ISLAND - PHASE 1	WUG	$2,188	$2,188	$1,283	$1,283	$1,283	$642
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PINE ISLAND - PHASE 2	WUG	$0	$0	$0	$0	$0	$1,094
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PLANTATION MUD	WUG	$0	$2,256	$2,668	$1,782	$1,887	$1,915
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - PLEAK	WUG	$0	$0	$0	$0	$0	$0
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - POINT AQUARIUS MUD	WUG	$0	$0	$0	$0	$36,465	$3,907
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROMAN FOREST	WUG	$0	$0	$62,544	$8,019	$2,061	$1,183
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROSENBERG GRP PARTICIPANTS - PHASE 1	WUG	$2,919	$2,689	$1,520	$1,437	$1,363	$1,277

Project Name	Proj. Level	Annual Cost ($/year)					
		2020	2030	2040	2050	2060	2070
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - ROSENBERG GRP PARTICIPANTS - PHASE 2	WUG	$0	$784	$742	$411	$390	$366
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SAN FELIPE - PHASE 1	WUG	$2,188	$2,188	$1,283	$513	$513	$513
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SAN FELIPE - PHASE 2	WUG	$0	$0	$0	$1,126	$1,126	$682
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SJRA GRP PARTICIPANTS	WUG	$783	$543	$548	$1,623	$1,396	$0
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SPRING VALLEY - PHASE 1	WUG	$0	$1,801	$977	$591	$543	$497
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SPRING VALLEY - PHASE 2	WUG	$0	$0	$0	$351	$322	$173
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 1	WUG	$1,385	$1,385	$648	$648	$471	$471
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 2	WUG	$0	$0	$547	$547	$233	$233
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - STEAM ELECTRIC POWER, MADISON COUNTY (T) - PHASE 3	WUG	$0	$0	$0	$0	$512	$512
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - SUGAR LAND GRP PARTICIPANTS	WUG	$10,419	$10,419	$6,153	$6,153	$6,153	$6,153
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE COMMONS WATER SUPPLY INC	WUG	$0	$3,215	$1,850	$1,132	$1,126	$1,120
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC	WUG	$2,188	$2,188	$1,283	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - TRINITY RURAL WSC	WUG	$2,188	$2,188	$1,283	$1,283	$1,283	$1,283
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WEST HARRIS COUNTY MUD #6	WUG	$0	$3,127	$1,829	$1,108	$1,102	$1,095
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WILLIS	WUG	$0	$0	$13,913	$4,833	$1,406	$795
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WOODBRANCH	WUG	$0	$0	$43,758	$8,415	$2,213	$1,323
WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - WOODCREEK MUD	WUG	$0	$3,655	$2,233	$1,398	$1,422	$1,422

Table 5-A10 – WWP and WUG Contractual Commitments and Expansions

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
BOLIVAR PENINSULA SUD							
COUNTY-OTHER, GALVESTON	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	4	7	7	10	12	14
MINING, GALVESTON	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	70	76	83	90	96	103
BRAZOS RIVER AUTHORITY							
COUNTY-OTHER, BRAZORIA	ALLENS CREEK LAKE/RESERVOIR	0	0	0	0	0	10
GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	6,875	11,841	13,364	16,238	19,795	23,184
MANUFACTURING, BRAZORIA	ALLENS CREEK LAKE/RESERVOIR	13,736	16,849	19,839	22,768	25,636	28,442
	BRA SYSTEM OPERATION PERMIT	25,033	24,939	24,855	24,764	24,666	24,549
	FREEPORT DESALINATION	0	0	11,200	11,200	11,200	11,200
MINING, BRAZORIA	BRA SYSTEM OPERATION PERMIT	317	411	495	586	684	801
NRG	ALLENS CREEK LAKE/RESERVOIR	0	0	0	0	554	26,343
PECAN GROVE MUD #1	ALLENS CREEK LAKE/RESERVOIR	0	1	2	4	5	6
RICHMOND	ALLENS CREEK LAKE/RESERVOIR	0	170	313	519	783	1,049
ROSENBERG	ALLENS CREEK LAKE/RESERVOIR	0	65	130	233	467	746
BRAZOSPORT WATER AUTHORITY							
ANGLETON	BRAZOS RUN-OF-RIVER, BRAZORIA	994	997	1,001	1,026	1,063	1,063
BRAZORIA	BRAZOS RUN-OF-RIVER, BRAZORIA	175	175	175	175	175	175
CLUTE	BRAZOS RUN-OF-RIVER, BRAZORIA	582	594	604	626	657	657
COUNTY-OTHER, BRAZORIA	BRAZOS RUN-OF-RIVER, BRAZORIA	12,916	13,842	14,212	14,536	14,714	15,314
	GULF COAST AQUIFER, BRAZORIA	1,147	1,063	1,003	937	865	800
FREEPORT	BRAZOS RUN-OF-RIVER, BRAZORIA	1,039	1,126	1,217	1,337	1,483	1,483
LAKE JACKSON	BRAZOS RUN-OF-RIVER, BRAZORIA	1,532	1,595	1,709	1,865	2,049	2,049
MANUFACTURING, BRAZORIA	BRAZOS RUN-OF-RIVER, BRAZORIA	849	349	347	280	280	280
OYSTER CREEK	BRAZOS RUN-OF-RIVER, BRAZORIA	71	77	85	95	107	107
RICHWOOD	BRAZOS RUN-OF-RIVER, BRAZORIA	154	155	158	166	176	176

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
CHAMBERS-LIBERTY COUNTIES NAVIGATION DISTRICT							
COUNTY-OTHER, CHAMBERS	TRINITY RUN-OF-RIVER, CHAMBERS	2,800	2,800	2,800	2,800	2,800	2,800
CONROE							
PORTER SUD	CONROE REUSE PERMIT	2,240	2,240	2,240	2,240	2,299	2,623
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	2,667	2,193	1,761	1,354	905	421
COUNTY-OTHER, FORT BEND							
MISSOURI CITY	GULF COAST AQUIFER, FORT BEND	534	369	353	342	334	326
DOW CHEMICAL USA							
BRAZOSPORT WATER AUTHORITY	BRAZOS RUN-OF-RIVER, BRAZORIA	8,569	8,569	8,569	8,569	8,569	8,569
MANUFACTURING, BRAZORIA	BRAZOS RUN-OF-RIVER, BRAZORIA	143,827	143,827	143,827	143,827	142,420	140,007
FORT BEND COUNTY WCID #2							
MISSOURI CITY	BRAZOS RUN-OF-RIVER, FORT BEND	932	1,640	1,622	1,613	1,610	1,608
STAFFORD	BRAZOS RUN-OF-RIVER, FORT BEND	2,428	5,080	5,098	5,107	5,110	5,112
GALVESTON COUNTY WCID #1							
DICKINSON	ALLENS CREEK LAKE/RESERVOIR	252	245	238	232	225	218
GULF COAST WATER AUTHORITY							
ARCOLA	COH REUSE	10	132	184	233	274	314
BACLIFF MUD	ALLENS CREEK LAKE/RESERVOIR	880	857	833	810	787	763
BAYOU VISTA	ALLENS CREEK LAKE/RESERVOIR	95	93	90	88	85	82
CLEAR LAKE SHORES	COH REUSE	221	223	208	204	199	196
COUNTY-OTHER, BRAZORIA	COH REUSE	701	2,258	3,969	5,837	8,008	10,125
COUNTY-OTHER, FORT BEND	COH REUSE	39	551	0	525	1,206	2,936
COUNTY-OTHER, GALVESTON	COH REUSE	1,994	2,160	2,297	2,440	2,597	2,752
GALVESTON	ALLENS CREEK LAKE/RESERVOIR	0	0	586	3,743	3,964	3,846
	COH REUSE	4,435	4,317	3,614	339	0	0
GALVESTON COUNTY WCID #1	ALLENS CREEK LAKE/RESERVOIR	252	245	238	232	225	218
HITCHCOCK	ALLENS CREEK LAKE/RESERVOIR	317	309	300	292	283	275

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
KEMAH	COH REUSE	567	855	875	901	923	941
LA MARQUE	COH REUSE	587	571	556	540	525	509
LEAGUE CITY	ALLENS CREEK LAKE/RESERVOIR	422	411	400	389	377	367
MANUFACTURING, FORT BEND	COH REUSE	826	3,371	3,419	3,414	3,027	2,667
MANUFACTURING, GALVESTON	ALLENS CREEK LAKE/RESERVOIR	0	0	0	0	3,620	7,409
	COH REUSE	12,904	12,559	12,213	11,872	7,912	1,342
MANVEL	COH REUSE	0	492	1,319	2,253	3,353	4,718
MINING, BRAZORIA	COH REUSE	417	561	689	831	980	1,161
MINING, GALVESTON	COH REUSE	273	292	322	347	372	397
MISSOURI CITY	COH REUSE	3,683	3,592	3,499	3,407	3,731	5,009
PEARLAND	ALLENS CREEK LAKE/RESERVOIR	72	3,136	3,136	3,136	3,136	3,136
	COH REUSE	3,064	0	0	0	0	0
PECAN GROVE MUD #1	ALLENS CREEK LAKE/RESERVOIR	400	389	377	366	355	343
SAN LEON MUD	ALLENS CREEK LAKE/RESERVOIR	376	367	358	347	337	327
SANTA FE	COH REUSE	591	560	548	569	605	645
STAFFORD	ALLENS CREEK LAKE/RESERVOIR	1,785	1,734	1,683	1,632	1,580	1,530
SUGAR LAND	ALLENS CREEK LAKE/RESERVOIR	0	2,084	3,206	3,108	3,011	2,914
	COH REUSE	3,400	1,218	0	0	0	0
TEXAS CITY	ALLENS CREEK LAKE/RESERVOIR	2,200	2,142	2,084	2,025	1,967	1,908
TIKI ISLAND	ALLENS CREEK LAKE/RESERVOIR	76	74	73	70	68	66
HARRIS COUNTY MUD #106							
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	916	663	670	675	679
HARRIS COUNTY MUD #132							
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	623	444	444	445	445
HARRIS COUNTY MUD #151							
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	706	505	504	505	505

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
HARRIS COUNTY MUD #152							
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	778	560	564	568	572
HARRIS COUNTY MUD #290							
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	435	315	318	321	324
HARRIS COUNTY MUD #46							
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	459	327	326	326	326
HOUSTON							
BLUE BELL MANOR UTILITY COMPANY	GULF COAST AQUIFER, HARRIS	0	170	310	326	346	363
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	HOUSTON LAKE/RESERVOIR	0	323	1,240	1,153	1,114	1,093
	REGIONAL RETURN FLOWS	4,682	4,359	3,442	3,529	3,568	3,589
COUNTY-OTHER, HARRIS	GULF COAST AQUIFER, HARRIS	8,047	8,028	9,832	10,116	10,389	10,694
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,564	1,718	1,914	1,959	2,041	2,131
EL DORADO UD	GULF COAST AQUIFER, HARRIS	0	60	104	100	95	90
FOUNTAINVIEW SUBDIVISION	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	50	93	118	116	115	115
GREEN TRAILS MUD	GULF COAST AQUIFER, HARRIS	0	150	252	247	243	240
GULF COAST WATER AUTHORITY	COH REUSE	33,712	33,712	33,712	33,712	33,712	33,712
HARRIS COUNTY MUD #11	GULF COAST AQUIFER, HARRIS	0	81	145	146	151	156
HARRIS COUNTY MUD #119	GULF COAST AQUIFER, HARRIS	0	133	218	217	219	222
HARRIS COUNTY MUD #153	GULF COAST AQUIFER, HARRIS	0	324	539	522	509	498
HARRIS COUNTY MUD #154	GULF COAST AQUIFER, HARRIS	0	197	336	335	342	351
HARRIS COUNTY MUD #189	GULF COAST AQUIFER, HARRIS	0	102	179	184	191	198
HARRIS COUNTY MUD #221	GULF COAST AQUIFER, HARRIS	0	127	218	223	227	234
HARRIS COUNTY MUD #278	GULF COAST AQUIFER, HARRIS	0	442	676	659	644	631
HARRIS COUNTY MUD #345	GULF COAST AQUIFER, HARRIS	0	212	356	346	340	334
HARRIS COUNTY MUD #400 - WEST	GULF COAST AQUIFER, HARRIS	0	230	420	438	443	441
HARRIS COUNTY UD #14	GULF COAST AQUIFER, HARRIS	0	68	124	139	157	186
HARRIS COUNTY UD #15	GULF COAST AQUIFER, HARRIS	0	113	227	229	236	233

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
HARRIS COUNTY WCID #133	GULF COAST AQUIFER, HARRIS	0	173	297	320	349	385
HARRIS COUNTY WCID #74	GULF COAST AQUIFER, HARRIS	0	204	364	367	374	383
KIRKMONT MUD	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	6
LONGHORN TOWN UD	GULF COAST AQUIFER, HARRIS	0	80	135	132	130	128
MANUFACTURING, HARRIS	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	785	3,444	7,868	2,579	145
MASON CREEK UD	GULF COAST AQUIFER, HARRIS	0	303	516	498	485	473
MINING, HARRIS	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	2,946	2,927	2,875	2,843	2,818	2,798
MISSOURI CITY	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	393	545
MOUNT HOUSTON ROAD MUD	GULF COAST AQUIFER, HARRIS	0	196	367	401	425	441
NORTH BELT UD	GULF COAST AQUIFER, HARRIS	0	91	156	155	159	163
NORTH FORT BEND WATER AUTHORITY	COH REUSE	0	0	14,223	12,228	11,352	11,778
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	23,076	45,478	35,590	34,326	33,868	32,868
	REGIONAL RETURN FLOWS	10,280	9,068	12,683	15,942	17,276	17,850
NORTH GREEN MUD	GULF COAST AQUIFER, HARRIS	0	109	184	172	164	157
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	COH REUSE	0	0	52,629	59,520	63,681	68,171
	HOUSTON LAKE/RESERVOIR	1,741	34,804	31,238	30,093	28,928	27,793
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	48,323	49,861	31,137	29,506	29,286	28,771
	REGIONAL RETURN FLOWS	24,330	31,277	28,356	24,241	21,465	18,625
NORTHWEST PARK MUD	GULF COAST AQUIFER, HARRIS	0	896	1,564	1,614	1,682	1,760
SPRING VALLEY	GULF COAST AQUIFER, HARRIS	0	314	579	624	679	742
STEAM ELECTRIC POWER, HARRIS	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	1,060	4,111	7,016	7,977	9,328	10,624
	REGIONAL RETURN FLOWS	0	0	1,465	5,832	10,975	17,396
THE COMMONS WATER SUPPLY INC	GULF COAST AQUIFER, HARRIS	0	107	186	188	189	190
WEST HARRIS COUNTY MUD #6	GULF COAST AQUIFER, HARRIS	0	100	171	173	174	175
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	COH REUSE	0	0	38,360	42,693	46,410	50,669
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	31,547	50,292	31,377	29,605	29,173	28,366
	REGIONAL RETURN FLOWS	15,738	22,169	22,159	19,598	16,313	12,861
WOODCREEK MUD	GULF COAST AQUIFER, HARRIS	0	77	126	122	120	120

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
HUNTSVILLE							
MONTGOMERY COUNTY MUD #8	HUNTSVILLE EFFLUENT	677	677	677	677	677	677
MONTGOMERY COUNTY MUD #9	HUNTSVILLE EFFLUENT	677	677	677	677	677	677
LOWER NECHES VALLEY AUTHORITY							
IRRIGATION, CHAMBERS	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	0	0	25,000	25,000	25,000	25,000
IRRIGATION, LIBERTY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	0	0	25,000	25,000	25,000	25,000
MISSOURI CITY							
COUNTY-OTHER, FORT BEND	BRAZOS RUN-OF-RIVER, FORT BEND	568	558	555	553	552	552
FORT BEND COUNTY MUD #129	BRAZOS RUN-OF-RIVER, FORT BEND	0	184	322	437	515	509
FORT BEND COUNTY MUD #23	GULF COAST AQUIFER, FORT BEND	0	418	434	450	468	488
SIENNA PLANTATION	BRAZOS RUN-OF-RIVER, FORT BEND	0	0	836	1,947	3,047	3,192
	COH REUSE	0	0	0	0	0	863
MONTGOMERY COUNTY MUD #19							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	418	419	421	421	421	420
MONTGOMERY COUNTY MUD #89							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	701	701	700	695	688	685
MONTGOMERY COUNTY WCID #1							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	23	22	19	14	8	2
NORTH FORT BEND WATER AUTHORITY							
FULSHEAR	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	496	561	616	662	703
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY							
THE WOODLANDS	HOUSTON LAKE/RESERVOIR	0	1,050	2,107	2,262	2,369	2,441
TOMBALL	HOUSTON LAKE/RESERVOIR	899	1,856	2,570	2,616	2,663	2,707
NRG							
STEAM ELECTRIC POWER, FORT BEND	ALLENS CREEK LAKE/RESERVOIR	0	0	0	0	554	26,343
OAK RIDGE NORTH							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	100	98	93	90	89	88

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
RAYFORD ROAD MUD							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	199	195	182	166	148	142
RICHMOND							
COUNTY-OTHER, FORT BEND	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	189	477	504	576	648	719
FORT BEND COUNTY MUD #116	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	174	392	460	512	565	619
FORT BEND COUNTY MUD #121	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	0	0	0	1	47	94
IRRIGATION, FORT BEND	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	16	33	33	33	33	33
RIVER PLANTATION MUD							
EAST PLANTATION UD	DIRECT REUSE, RIVER PLANTATION MUD	0	65	65	65	65	65
ROSENBERG							
COUNTY-OTHER, FORT BEND	BRAZOS RIVER AUTHORITY MAIN STEM LAKE/RESERVOIR SYSTEM	454	468	469	470	473	475
	GULF COAST AQUIFER, FORT BEND	257	279	295	312	329	351
SABINE RIVER AUTHORITY							
HOUSTON	TOLEDO BEND LAKE/RESERVOIR	0	0	250,000	250,000	250,000	250,000
SAN JACINTO RIVER AUTHORITY							
BENDERS LANDING WATER SYSTEM	GULF COAST AQUIFER, MONTGOMERY	97	1,196	2,440	3,631	163	159
BENDERS LANDING WATER SYSTEM	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	4,717	4,729
CONROE	CONROE LAKE/RESERVOIR	2,045	3,940	5,666	7,295	9,091	10,828
COUNTY-OTHER, MONTGOMERY	CONROE LAKE/RESERVOIR	5,359	8,837	25,946	22,686	17,446	13,039
	GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	3,920	3,920	3,920	3,920	3,920	3,920
	GULF COAST AQUIFER, MONTGOMERY	5,553	8,007	5,106	1,724	2,005	0
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	23,542	43,304	37,613
	REGIONAL RETURN FLOWS	0	0	0	0	0	31,422
EAST PLANTATION UD	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	5	16

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
INDIGO LAKE WATER SYSTEM	GULF COAST AQUIFER, MONTGOMERY	0	344	936	1,767	2,993	2,540
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	2,464
KINGS MANOR MUD	GULF COAST AQUIFER, MONTGOMERY	3	34	59	63	69	73
LAKE WINDCREST WATER SYSTEM	CONROE LAKE/RESERVOIR	733	821	1,038	1,345	1,775	2,378
MAGNOLIA	GULF COAST AQUIFER, MONTGOMERY	0	0	110	331	681	1,229
MANUFACTURING, HARRIS	REGIONAL RETURN FLOWS	22,054	21,308	20,617	19,957	19,224	18,452
	SJRA REUSE PERMIT	3,205	3,951	4,642	5,302	6,035	6,807
MANUFACTURING, MONTGOMERY	CONROE LAKE/RESERVOIR	266	487	701	881	1,077	0
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	1,287
MONTGOMERY	CONROE LAKE/RESERVOIR	0	509	771	0	0	0
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	1,020	1,294	1,730
MONTGOMERY COUNTY MUD #15	GULF COAST AQUIFER, MONTGOMERY	0	17	84	173	318	525
MONTGOMERY COUNTY MUD #18	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	403
MONTGOMERY COUNTY MUD #19	CONROE LAKE/RESERVOIR	209	202	198	196	198	199
MONTGOMERY COUNTY MUD #89	CONROE LAKE/RESERVOIR	268	270	273	293	322	332
MONTGOMERY COUNTY MUD #94	GULF COAST AQUIFER, MONTGOMERY	0	0	47	98	159	159
MONTGOMERY COUNTY WCID #1	CONROE LAKE/RESERVOIR	9	15	24	44	67	94
NEW CANEY MUD	GULF COAST AQUIFER, MONTGOMERY	0	0	0	29	128	252
OAK RIDGE NORTH	CONROE LAKE/RESERVOIR	73	81	102	113	119	120
PANORAMA VILLAGE	CONROE LAKE/RESERVOIR	19	13	39	0	0	0
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	75	139	225
PATTON VILLAGE	GULF COAST AQUIFER, MONTGOMERY	0	1	15	32	58	90
POINT AQUARIUS MUD	GULF COAST AQUIFER, MONTGOMERY	0	0	0	0	6	56
RAYFORD ROAD MUD	CONROE LAKE/RESERVOIR	153	170	222	285	357	384
RIVER PLANTATION MUD	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	0	37
ROMAN FOREST	GULF COAST AQUIFER, MONTGOMERY	0	0	5	39	93	162

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
SHENANDOAH	CONROE LAKE/RESERVOIR	101	427	68	0	0	0
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	132	245	392
SOUTHERN MONTGOMERY COUNTY MUD	CONROE LAKE/RESERVOIR	21	24	24	28	36	47
SPRING CREEK UD	CONROE LAKE/RESERVOIR	516	551	572	618	681	702
STAGECOACH	CONROE LAKE/RESERVOIR	6	11	35	0	0	0
	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	70	127	226
STANLEY LAKE MUD	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	0	0	0	110	495
STEAM ELECTRIC POWER, MONTGOMERY	GULF COAST AQUIFER (CATAHOULA FORMATION), MONTGOMERY	3,920	3,920	3,920	3,920	3,920	3,920
THE WOODLANDS	CONROE LAKE/RESERVOIR	3,940	4,856	5,811	7,006	8,828	11,067
WESTWOOD NORTH WSC	CONROE LAKE/RESERVOIR	281	295	328	361	394	441
WILLIS	GULF COAST AQUIFER, MONTGOMERY	0	0	33	95	207	366
WOODBRANCH	GULF COAST AQUIFER, MONTGOMERY	0	0	5	26	58	97
SOUTHERN MONTGOMERY COUNTY MUD							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	69	68	68	67	65	62
SPRING CREEK UD							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	516	507	502	490	475	470
SUGAR LAND							
COUNTY-OTHER, FORT BEND	BRAZOS RUN-OF-RIVER, FORT BEND	1,432	2,008	2,008	2,008	2,008	2,008
	DIRECT REUSE, SUGAR LAND	4,480	4,480	4,480	4,480	4,480	4,480
	GULF COAST AQUIFER, FORT BEND	66	66	66	66	66	66
FORT BEND COUNTY MUD #25	BRAZOS RUN-OF-RIVER, FORT BEND	0	560	560	560	560	560
GREATWOOD	GULF COAST AQUIFER, FORT BEND	0	434	416	406	401	400
PLANTATION MUD	GULF COAST AQUIFER, FORT BEND	0	97	82	72	68	67
THE WOODLANDS							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	4,637	4,408	4,169	3,870	3,414	2,855

Contract Relationship	Source	Contractual Volume (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
TRAIL OF THE LAKES MUD							
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	GULF COAST AQUIFER, HARRIS	0	739	526	527	528	529
TRINITY RIVER AUTHORITY							
HOUSTON	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	150,000	150,000	150,000	150,000	150,000	150,000
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY							
HARRIS COUNTY MUD #106	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	1,255	1,282	1,298	1,307	1,312
HARRIS COUNTY MUD #132	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	865	841	834	826	820
HARRIS COUNTY MUD #151	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	983	967	953	945	938
HARRIS COUNTY MUD #152	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	1,089	1,099	1,106	1,112	1,116
HARRIS COUNTY MUD #180	GULF COAST AQUIFER, HARRIS	0	148	259	251	244	238
HARRIS COUNTY MUD #290	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	602	618	628	635	638
HARRIS COUNTY MUD #46	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	636	617	603	596	589
KATY	GULF COAST AQUIFER, HARRIS	0	2,682	3,356	3,370	3,393	3,416
TRAIL OF THE LAKES MUD	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	0	1,042	1,027	1,016	1,009	1,004
WESTWOOD NORTH WSC							
SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER, MONTGOMERY	281	277	269	261	253	241

Table 5-A11 – WUG Management Supply Factors

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
ALVIN	1.0	1.1	1.1	1.1	1.1	1.1
AMES	1.1	1.1	1.2	1.2	1.3	1.3
ANAHUAC	4.2	4.3	4.4	4.5	4.4	4.4
ANGLETON	1.6	1.7	1.8	1.8	1.9	1.8
ARCOLA	1.0	1.0	1.0	1.0	1.0	1.0
BACLIFF MUD	3.8	3.9	4.0	3.9	3.8	3.7
BAILEY'S PRAIRIE	1.0	1.1	1.1	1.1	1.1	1.1
BAYOU VISTA	1.9	2.0	2.0	2.0	2.0	2.0
BAYTOWN	1.3	1.4	1.4	1.4	1.4	1.3
BEACH CITY	1.2	1.1	1.2	1.0	1.2	1.0
BEASLEY	1.0	1.0	1.0	1.0	1.0	1.0
BELLAIRE	1.0	1.0	1.0	1.0	1.1	1.1
BELLVILLE	1.0	1.0	1.0	1.0	1.0	1.0
BENDERS LANDING WATER SYSTEM	1.1	1.0	1.0	1.0	1.0	1.0
BLUE BELL MANOR UTILITY COMPANY	1.0	1.0	1.0	1.0	1.0	1.0
BOLIVAR PENINSULA SUD	29.9	25.3	21.4	18.0	15.2	12.8
BRAZORIA	1.6	1.7	1.7	1.8	1.8	1.7
BRAZORIA COUNTY MUD #2	1.0	1.1	1.1	1.1	1.2	1.2
BRAZORIA COUNTY MUD #21	1.0	1.0	1.0	1.1	1.1	1.1
BRAZORIA COUNTY MUD #3	1.0	1.1	1.1	1.1	1.1	1.1
BRAZORIA COUNTY MUD #6	1.0	1.1	1.1	1.1	1.1	1.1
BROOKSHIRE	1.0	1.0	1.0	1.0	1.0	1.0
BROOKSIDE VILLAGE	1.0	1.1	1.1	1.1	1.1	1.1
BUFFALO	1.0	1.0	1.0	1.0	1.0	1.0
BUNKER HILL VILLAGE	1.0	1.0	1.1	1.1	1.1	1.1
CENTERVILLE	1.0	1.0	1.0	1.0	1.0	1.0
CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	2.2	1.9	1.7	1.6	1.6	1.6
CHIMNEY HILL MUD	1.0	1.0	1.0	1.1	1.1	1.1
CLEAR BROOK CITY MUD	1.9	1.9	1.8	1.8	1.7	1.7
CLEAR LAKE SHORES	1.0	1.0	1.0	1.0	1.0	1.0
CLEVELAND	1.0	1.1	1.1	1.1	1.1	1.2
CLUTE	1.4	1.4	1.4	1.4	1.4	1.4
COLDSPRING	1.0	1.0	1.0	1.1	1.1	1.1
CONCORD-ROBBINS WSC	1.0	1.0	1.0	1.0	1.0	1.0
CONROE	1.4	1.4	1.3	1.3	1.3	1.3
COUNTY-OTHER, AUSTIN	1.0	1.0	1.0	1.0	1.1	1.0

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, BRAZORIA	1.7	1.5	1.4	1.3	1.2	1.1
COUNTY-OTHER, CHAMBERS	3.8	3.4	3.1	2.8	2.6	2.4
COUNTY-OTHER, FORT BEND	1.3	1.1	1.1	1.0	1.0	1.0
COUNTY-OTHER, GALVESTON	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, HARRIS	2.6	2.2	2.0	2.0	1.9	1.8
COUNTY-OTHER, LEON	1.1	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, LIBERTY	1.0	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, MADISON	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, MONTGOMERY	1.3	1.1	1.1	1.1	1.0	1.0
COUNTY-OTHER, POLK	1.1	1.1	1.1	1.1	1.2	1.2
COUNTY-OTHER, SAN JACINTO	1.2	1.2	1.1	1.1	1.1	1.1
COUNTY-OTHER, TRINITY	1.9	1.9	1.9	2.0	2.0	1.9
COUNTY-OTHER, WALKER	1.9	2.0	2.0	2.0	2.0	1.9
COUNTY-OTHER, WALLER	1.0	1.0	1.1	1.1	1.1	1.0
COUNTY-OTHER, POLK	1.1	1.1	1.1	1.1	1.2	1.2
COVE	1.0	1.0	1.0	1.0	1.1	1.0
CROSBY MUD	3.4	3.4	3.3	3.3	3.3	3.2
CUT AND SHOOT	2.0	2.0	1.8	1.6	1.3	1.1
DAISETTA	1.1	1.1	1.2	1.2	1.2	1.3
DANBURY	1.0	1.1	1.1	1.1	1.1	1.1
DAYTON	1.0	1.0	1.0	1.0	1.0	1.0
DEER PARK	1.0	1.1	1.1	1.1	1.1	1.1
DICKINSON	1.3	1.3	1.3	1.2	1.2	1.2
DOBBIN-PLANTERSVILLE WSC	1.0	1.0	1.0	1.0	1.0	1.0
EAST PLANTATION UD	1.1	1.4	1.3	1.1	1.0	1.0
EL DORADO UD	1.0	1.0	1.0	1.0	1.0	1.0
EL LAGO	1.1	1.2	1.2	1.2	1.2	1.2
FAIRCHILDS	1.0	1.0	1.0	1.1	1.1	1.1
FLO COMMUNITY WSC	1.0	1.0	1.0	1.0	1.0	1.0
FORT BEND COUNTY MUD #116	1.0	1.0	1.0	1.0	1.0	1.0
FORT BEND COUNTY MUD #121	1.6	1.2	1.1	1.0	1.0	1.0
FORT BEND COUNTY MUD #129	1.2	1.0	1.0	1.0	1.0	1.0
FORT BEND COUNTY MUD #23	1.0	1.0	1.0	1.0	1.0	1.0
FORT BEND COUNTY MUD #25	1.0	1.4	1.4	1.4	1.4	1.4
FOUNTAINVIEW SUBDIVISION	1.0	1.0	1.0	1.0	1.0	1.0
FREEPORT	2.3	2.4	2.4	2.5	2.5	2.4
FRIENDSWOOD	2.1	1.9	1.8	1.7	1.6	1.5

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
FULSHEAR	1.0	1.0	1.0	1.0	1.0	1.0
G & W WSC	1.0	1.0	1.0	1.0	1.0	1.0
GALENA PARK	1.2	1.3	1.3	1.4	1.4	1.3
GALVESTON	1.5	1.5	1.4	1.4	1.3	1.3
GREATWOOD	1.0	1.0	1.0	1.0	1.0	1.0
GREEN TRAILS MUD	1.0	1.0	1.0	1.0	1.0	1.0
GREENWOOD UD	1.0	1.0	1.0	1.0	1.1	1.1
GROVETON	6.6	6.4	6.6	6.9	6.6	6.4
HARDIN	1.1	1.1	1.2	1.2	1.2	1.3
HARDIN WSC	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #106	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #11	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #119	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #132	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #148 - KINGSLAKE	1.0	1.0	1.0	1.0	1.1	1.1
HARRIS COUNTY MUD #151	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #152	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #153	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #154	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #158	1.0	1.0	1.0	1.0	1.1	1.1
HARRIS COUNTY MUD #180	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #189	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #221	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #278	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #290	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #345	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #400 - WEST	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #46	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY MUD #49	1.3	1.0	1.1	1.1	1.1	1.1
HARRIS COUNTY MUD #5	1.0	1.0	1.0	1.0	1.1	1.1
HARRIS COUNTY MUD #50	2.8	2.6	2.4	2.4	2.4	2.4
HARRIS COUNTY MUD #55	3.4	3.1	2.9	2.8	2.6	2.4
HARRIS COUNTY MUD #8	1.0	1.0	1.0	1.0	1.1	1.1
HARRIS COUNTY MUD #96	1.0	1.0	1.1	1.1	1.1	1.1
HARRIS COUNTY UD #14	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY UD #15	1.1	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY WCID #1	2.0	1.8	1.6	1.6	1.5	1.5

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
HARRIS COUNTY WCID #133	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY WCID #74	1.0	1.0	1.0	1.0	1.0	1.0
HARRIS COUNTY WCID #96	1.0	1.0	1.0	1.0	1.1	1.1
HEDWIG VILLAGE	1.0	1.0	1.0	1.0	1.1	1.1
HEMPSTEAD	1.0	1.0	1.1	1.1	1.1	1.0
HILLCREST	1.0	1.1	1.1	1.2	1.2	1.2
HILSHIRE VILLAGE	1.0	1.0	1.0	1.1	1.1	1.1
HITCHCOCK	1.8	1.6	1.5	1.4	1.4	1.3
HOLIDAY LAKES	1.0	1.0	1.0	1.1	1.1	1.1
HOUSTON	1.3	1.1	1.7	1.7	1.6	1.6
HUMBLE	1.0	1.1	1.1	1.1	1.1	1.2
HUNTERS CREEK VILLAGE	1.0	1.0	1.0	1.0	1.1	1.1
HUNTSVILLE	2.5	2.4	2.4	2.3	2.3	2.2
INDIGO LAKE WATER SYSTEM	1.0	1.0	1.0	1.0	1.0	1.0
IOWA COLONY	1.0	1.1	1.1	1.1	1.1	1.1
IRRIGATION, AUSTIN	1.5	1.5	1.5	1.5	1.5	1.5
IRRIGATION, BRAZORIA	0.6	0.6	0.6	0.5	0.5	0.5
IRRIGATION, CHAMBERS	1.9	1.9	2.2	2.2	2.2	2.2
IRRIGATION, FORT BEND	1.2	1.2	1.2	1.2	1.2	1.2
IRRIGATION, GALVESTON	0.3	0.3	0.3	0.3	0.3	0.3
IRRIGATION, HARRIS	1.9	1.9	1.9	1.9	1.9	1.9
IRRIGATION, LEON	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, LIBERTY	1.3	1.3	1.7	1.7	1.7	1.7
IRRIGATION, MADISON	11.6	11.6	11.6	11.6	11.6	11.6
IRRIGATION, MONTGOMERY	2.4	2.4	2.4	2.4	2.4	2.4
IRRIGATION, SAN JACINTO	1.2	1.2	1.2	1.2	1.2	1.2
IRRIGATION, WALKER	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, WALLER	1.4	1.4	1.4	1.4	1.4	1.4
JACINTO CITY	1.4	1.4	1.4	1.4	1.4	1.4
JAMAICA BEACH	1.0	1.0	1.0	1.0	1.0	1.0
JERSEY VILLAGE	1.2	1.0	1.0	1.0	1.1	1.1
JEWETT	1.0	1.0	1.0	1.0	1.0	1.0
JONES CREEK	1.0	1.0	1.0	1.1	1.1	1.1
KATY	1.0	1.0	1.0	1.0	1.0	1.0
KEMAH	1.0	1.0	1.0	1.0	1.0	1.0
KENEFICK	1.1	1.1	1.2	1.2	1.3	1.3
KINGS MANOR MUD	1.2	1.3	1.3	1.3	1.3	1.3

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
KIRKMONT MUD	1.2	1.2	1.1	1.1	1.0	1.0
LA MARQUE	1.1	1.1	1.1	1.1	1.1	1.1
LA PORTE	1.6	1.6	1.7	1.7	1.7	1.7
LAKE JACKSON	1.4	1.4	1.4	1.4	1.4	1.4
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	1.5	1.5	1.5	1.5	1.5	1.5
LAKE WINDCREST WATER SYSTEM	1.0	1.0	1.1	1.1	1.1	1.1
LEAGUE CITY	2.0	1.8	1.7	1.6	1.6	1.6
LIBERTY	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, AUSTIN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, BRAZORIA	0.9	0.8	0.7	0.7	0.6	0.6
LIVESTOCK, CHAMBERS	1.0	1.0	1.0	1.0	1.1	1.0
LIVESTOCK, FORT BEND	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, GALVESTON	0.1	0.1	0.1	0.1	0.1	0.1
LIVESTOCK, HARRIS	0.6	0.4	0.2	0.2	0.2	0.2
LIVESTOCK, LEON	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, LIBERTY	1.3	1.3	1.3	1.3	1.3	1.3
LIVESTOCK, MADISON	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MONTGOMERY	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, POLK	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, SAN JACINTO	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, TRINITY	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, WALKER	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, WALLER	1.0	1.0	1.0	1.0	1.0	1.0
LIVINGSTON	2.2	2.0	1.8	1.7	1.7	1.6
LONGHORN TOWN UD	1.0	1.0	1.0	1.0	1.0	1.0
MADISONVILLE	1.0	1.0	1.0	1.1	1.1	1.1
MAGNOLIA	1.2	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, AUSTIN	1.0	1.8	1.7	1.6	1.5	1.4
MANUFACTURING, BRAZORIA	1.6	1.5	1.4	1.4	1.3	1.3
MANUFACTURING, CHAMBERS	3.0	2.8	2.6	2.5	2.4	2.2
MANUFACTURING, FORT BEND	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, GALVESTON	1.2	1.2	1.2	1.2	1.2	1.1
MANUFACTURING, HARRIS	1.1	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, LEON	1.0	1.1	1.0	1.1	1.0	1.0
MANUFACTURING, LIBERTY	1.1	1.4	1.4	1.3	1.2	1.1
MANUFACTURING, MADISON	1.0	1.3	1.3	1.2	1.1	1.0
MANUFACTURING, MONTGOMERY	1.0	1.0	1.0	1.0	1.0	1.0

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
MANUFACTURING, SAN JACINTO	1.0	1.0	1.0	1.1	1.1	1.1
MANUFACTURING, WALKER	2.1	2.1	2.1	2.1	2.1	2.2
MANUFACTURING, WALLER	1.0	1.6	1.5	1.4	1.3	1.2
MANVEL	1.0	1.0	1.0	1.0	1.0	1.0
MASON CREEK UD	1.0	1.0	1.0	1.0	1.0	1.0
MEADOWS PLACE	1.4	1.2	1.2	1.2	1.2	1.2
MINING, AUSTIN	1.0	1.5	1.9	2.5	3.6	4.9
MINING, BRAZORIA	1.0	1.0	1.0	1.0	1.0	1.0
MINING, CHAMBERS	1.0	1.0	1.0	1.0	1.0	1.0
MINING, FORT BEND	7.5	7.0	8.5	10.8	15.0	20.9
MINING, GALVESTON	1.0	1.0	1.0	1.0	1.0	1.0
MINING, HARRIS	1.0	1.0	1.0	1.0	1.0	1.0
MINING, LEON	1.0	1.0	1.1	1.1	1.2	1.3
MINING, LIBERTY	1.3	1.9	1.9	1.8	1.7	1.8
MINING, MADISON	1.0	1.0	1.3	1.7	2.2	3.1
MINING, MONTGOMERY	1.0	1.1	1.3	1.6	1.8	2.0
MINING, POLK	1.0	1.3	1.4	1.7	2.5	4.6
MINING, SAN JACINTO	1.0	1.0	12.0	12.0	12.0	12.0
MINING, TRINITY	20.0	20.0	20.0	20.0	20.0	20.0
MINING, WALKER	1.0	1.0	1.0	1.0	1.0	1.0
MINING, WALLER	1.0	1.0	1.0	1.0	1.0	1.0
MINING, POLK	1.0	1.3	1.4	1.7	2.5	4.6
MISSOURI CITY	1.9	1.4	1.2	1.1	1.0	1.0
MONT BELVIEU	1.0	1.0	1.2	1.0	1.2	1.0
MONTGOMERY	1.0	1.0	1.0	1.0	1.0	1.0
MONTGOMERY COUNTY MUD #15	1.0	1.0	1.0	1.0	1.0	1.0
MONTGOMERY COUNTY MUD #18	1.7	1.4	1.3	1.2	1.1	1.0
MONTGOMERY COUNTY MUD #19	1.0	1.0	1.1	1.1	1.1	1.1
MONTGOMERY COUNTY MUD #8	4.3	4.1	3.8	3.5	3.2	2.6
MONTGOMERY COUNTY MUD #83	1.5	1.5	1.5	1.4	1.4	1.4
MONTGOMERY COUNTY MUD #89	1.0	1.0	1.1	1.1	1.1	1.1
MONTGOMERY COUNTY MUD #9	3.6	3.5	3.1	2.8	2.6	2.1
MONTGOMERY COUNTY MUD #94	1.0	1.0	1.0	1.0	1.0	1.0
MONTGOMERY COUNTY UD #2	2.0	2.1	2.0	1.9	1.8	1.6
MONTGOMERY COUNTY UD #3	2.2	2.0	2.1	2.0	1.6	1.0
MONTGOMERY COUNTY UD #4	1.6	1.5	1.6	1.5	1.2	1.0
MONTGOMERY COUNTY WCID #1	1.0	1.0	1.1	1.1	1.1	1.1

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
MOUNT HOUSTON ROAD MUD	1.0	1.0	1.0	1.0	1.0	1.0
NASSAU BAY	2.2	2.2	2.2	2.2	2.2	2.2
NEEDVILLE	1.0	1.0	1.0	1.0	1.0	1.0
NEW CANEY MUD	1.1	1.1	1.0	1.0	1.0	1.0
NEW WAVERLY	1.0	1.0	1.0	1.0	1.0	1.0
NEWPORT MUD	1.7	1.4	1.2	1.2	1.2	1.2
NORMANGEE	1.0	1.0	1.0	1.0	1.0	1.0
NORTH BELT UD	1.0	1.0	1.0	1.0	1.0	1.0
NORTH CHANNEL WATER AUTHORITY	1.1	1.1	1.1	1.1	1.1	1.1
NORTH FORT BEND WATER AUTHORITY	1.5	1.3	1.2	1.1	1.1	1.1
NORTH GREEN MUD	1.0	1.0	1.0	1.0	1.0	1.0
NORTH HARRIS COUNTY REGIONAL WATER AUTHORITY	1.6	1.6	1.5	1.5	1.5	1.5
NORTHWEST PARK MUD	1.0	1.0	1.0	1.0	1.0	1.0
OAK RIDGE NORTH	1.0	1.0	1.0	1.0	1.0	1.0
OAKWOOD	1.0	1.0	1.0	1.0	1.0	1.0
OLD RIVER-WINFREE	1.6	1.5	1.3	1.2	1.1	1.3
ONALASKA	1.0	1.1	1.1	1.1	1.1	1.1
OYSTER CREEK	1.3	1.3	1.3	1.3	1.3	1.3
PANORAMA VILLAGE	1.0	1.0	1.0	1.0	1.0	1.0
PARKWAY UD	1.0	1.0	1.0	1.0	1.1	1.1
PASADENA	1.9	1.9	1.9	1.9	1.9	1.9
PATTON VILLAGE	1.0	1.0	1.0	1.0	1.0	1.0
PEARLAND	2.0	2.0	1.9	1.8	1.7	1.6
PECAN GROVE MUD #1	3.9	3.7	3.8	3.8	3.8	3.8
PINE ISLAND	1.6	1.5	1.3	1.2	1.1	1.4
PINEY POINT VILLAGE	1.0	1.0	1.0	1.0	1.1	1.1
PLANTATION MUD	1.0	1.0	1.0	1.0	1.0	1.0
PLEAK	1.0	1.0	1.0	1.0	1.0	1.0
PLUM GROVE	1.1	1.1	1.2	1.2	1.2	1.3
POINT AQUARIUS MUD	1.2	1.2	1.1	1.1	1.0	1.0
POINT BLANK	1.0	1.0	1.0	1.0	1.0	1.0
PORTER SUD	1.8	1.5	1.3	1.1	1.0	1.0
PRAIRIE VIEW	1.0	1.0	1.0	1.0	1.0	1.0
RAYFORD ROAD MUD	1.0	1.0	1.0	1.0	1.0	1.0
RICHMOND	1.5	1.0	1.0	1.0	1.0	1.0
RICHWOOD	1.4	1.4	1.4	1.4	1.4	1.4
RIVER PLANTATION MUD	1.6	1.6	1.4	1.2	1.0	1.0

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
RIVERSIDE	1.0	1.0	1.0	1.0	1.0	1.0
RIVERSIDE WSC	1.2	1.2	1.2	1.2	1.1	1.1
ROMAN FOREST	1.0	1.1	1.0	1.0	1.0	1.0
ROSENBERG	1.3	1.0	1.0	1.0	1.0	1.0
SAGEMEADOW UD	1.3	1.3	1.3	1.3	1.2	1.2
SAN FELIPE	1.3	1.2	1.0	1.4	1.2	1.0
SAN JACINTO SUD	2.2	2.2	2.2	2.2	2.1	2.1
SAN LEON MUD	5.4	4.9	4.6	4.4	4.1	3.9
SANTA FE	1.0	1.0	1.0	1.0	1.0	1.0
SEABROOK	1.1	1.2	1.2	1.2	1.2	1.2
SEALY	1.0	1.0	1.0	1.0	1.0	1.0
SHENANDOAH	1.0	1.0	1.0	1.0	1.0	1.0
SHEPHERD	1.0	1.1	1.1	1.1	1.1	1.2
SHOREACRES	1.2	1.2	1.2	1.3	1.2	1.2
SIENNA PLANTATION	1.5	1.1	1.0	1.0	1.0	1.0
SIMONTON	1.0	1.0	1.0	1.1	1.1	1.1
SOUTH HOUSTON	2.4	2.4	2.5	2.5	2.4	2.4
SOUTHERN MONTGOMERY COUNTY MUD	1.0	1.0	1.0	1.0	1.0	1.0
SOUTHSIDE PLACE	1.0	1.0	1.1	1.1	1.1	1.1
SPLENDORA	3.6	3.4	2.9	2.5	2.1	1.7
SPRING CREEK UD	1.0	1.0	1.0	1.0	1.0	1.0
SPRING VALLEY	1.0	1.0	1.0	1.0	1.0	1.0
STAFFORD	2.0	2.2	2.2	2.1	2.1	2.0
STAGECOACH	1.0	1.0	1.0	1.0	1.0	1.0
STANLEY LAKE MUD	1.6	1.7	1.4	1.2	1.0	1.0
STEAM ELECTRIC POWER, CHAMBERS	8.8	7.5	6.4	5.4	4.6	4.1
STEAM ELECTRIC POWER, FORT BEND	1.9	1.6	1.4	1.2	1.0	1.0
STEAM ELECTRIC POWER, HARRIS	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, MADISON	1.3	1.1	1.2	1.0	1.2	1.0
STEAM ELECTRIC POWER, MONTGOMERY	2.4	2.0	1.7	1.4	1.2	1.0
SUGAR LAND	1.8	1.4	1.3	1.3	1.3	1.2
SUNBELT FWSD	1.3	1.1	1.1	1.1	1.2	1.2
SWEENY	1.0	1.1	1.1	1.1	1.1	1.1
TARKINGTON SUD	1.0	1.0	1.0	1.0	1.0	1.0
TAYLOR LAKE VILLAGE	2.8	2.8	2.8	2.9	2.9	2.8
TEXAS CITY	1.7	1.6	1.6	1.5	1.5	1.4
THE COMMONS WATER SUPPLY INC	1.0	1.0	1.0	1.0	1.0	1.0

WUG*	Management Supply Factor					
	2020	2030	2040	2050	2060	2070
THE CONSOLIDATED WSC	6.5	6.1	5.8	5.6	5.3	5.1
THE WOODLANDS	1.1	1.1	1.1	1.1	1.1	1.1
TIKI ISLAND	1.7	1.7	1.7	1.7	1.7	1.7
TOMBALL	1.0	1.0	1.0	1.0	1.0	1.0
TRAIL OF THE LAKES MUD	1.0	1.0	1.0	1.0	1.0	1.0
TRINITY	3.6	3.5	3.6	3.8	3.6	3.5
TRINITY BAY CONSERVATION DISTRICT	1.6	1.5	1.5	1.4	1.4	1.3
TRINITY RURAL WSC	1.1	1.1	1.1	1.2	1.2	1.1
VARNER CREEK UD	1.0	1.1	1.1	1.1	1.1	1.1
WALKER COUNTY SUD	1.0	1.0	1.0	1.0	1.0	1.0
WALLER	1.0	1.0	1.0	1.0	1.0	1.0
WALLIS	1.0	1.0	1.1	1.1	1.1	1.1
WEBSTER	2.4	2.3	2.2	2.2	2.1	2.1
WEST COLUMBIA	1.0	1.0	1.1	1.1	1.1	1.1
WEST HARDIN WSC	1.0	1.1	1.2	1.2	1.2	1.3
WEST HARRIS COUNTY MUD #6	1.0	1.0	1.0	1.0	1.0	1.0
WEST HARRIS COUNTY REGIONAL WATER AUTHORITY	1.8	1.7	1.7	1.6	1.6	1.6
WEST UNIVERSITY PLACE	1.0	1.0	1.1	1.1	1.1	1.1
WESTON LAKES	1.0	1.0	1.0	1.0	1.0	1.0
WESTWOOD NORTH WSC	1.0	1.0	1.0	1.0	1.0	1.0
WILLIS	1.0	1.0	1.0	1.0	1.0	1.0
WINDFERN FOREST UD	1.0	1.0	1.0	1.0	1.1	1.1
WOODBRANCH	1.1	1.1	1.0	1.0	1.0	1.0
WOODCREEK MUD	1.0	1.0	1.0	1.0	1.0	1.0
WOODLAND HILLS WATER COMPANY	1.1	1.1	1.2	1.2	1.2	1.3

*Reflects only the portions of split WUGs within Region H.

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APPENDIX 5-B

PROJECT TECHNICAL MEMORANDA

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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDA

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Project	Memorandum
City of Rosenberg GRP	GWRP-005
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Fort Bend County WCID 2 GRP	GWRP-008
NFBWA GRP	GWRP-009
NHCRWA GRP	GWRP-010
Panorama Village and Shenandoah GRP	GWRP-011
Porter SUD GRP	GWRP-012
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City of Houston Reuse	REUS-002
City of Pearland Reuse	REUS-003
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Dow Expansion to Harris Reservoir	SWDV-003
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City of Houston Treatment Expansion	TRET-002
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Northeast Water Purification Plant Expansion	TRET-004
Pearland Surface Water Treatment Plant	TRET-005
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Brazos Saltwater Barrier	OTHR-001

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Industrial Conservation
Project ID:	CNSV-001
Project Type:	Conservation
Potential Supply Quantity (Rounded):	9,281-65,261 ac-ft/yr (8.3-58.3 mgd)
Implementation Decade:	2020
Development Timeline:	Varies based on technology
Project Capital Cost:	Varies based on industry and technology
Unit Water Cost (Rounded):	Varies based on industry and technology

PROJECT DESCRIPTION

In Southeast Texas, manufacturing water use represents the greatest non-municipal demand center for water. Almost 97 percent of this demand is centered in Brazoria, Galveston, and Harris Counties where substantial infrastructure has been constructed to provide large volumes of surface water for industrial use. Conservation projects have the benefit of not only enhancing the ability to meet needs through the creation of less developed water but also provides an opportunity to offset expansion of these costly raw water conveyances that are required to deliver these supplies.

The Texas Water Development Board (TWDB) created the Water Conservation Implementation Task Force to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the state. The Water Conservation Implementation Task Force consists of a volunteer group of persons with experience in and commitment to using water more efficiently. The task force developed TWDB Report 362 – Water Conservation Best Management Practices Guide, which outlines specific water conservation best management practices (BMPs) for various water uses. Industrial water conservation MBPs, discussed in the TWDB Water Conservation BMP Guide, include the following:

- Industrial Water Audit
- Industrial Water Waste Reduction
- Industrial Submetering
- Cooling Towers
- Cooling Systems (other than cooling towers)
- Industrial Alternative Sources and Reuse of Process Water
- Rinsing/Cleaning BMP
- Water Treatment

- Boiler and Steam Systems
- Refrigeration (including chilled water)
- Once Through Cooling
- Management and Employee Programs
- Industrial Landscape
- Industrial Site Specific Conservation

PROJECT ANALYSES

The project analyses for Industrial Conservation include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The nature of industrial demands makes the estimation of water demands a difficult task; this only makes the projection of potential conservation savings that much more problematic. The actual level of water use by industry is related directly to the product produced and the process employed in this manufacture. Accordingly, information regarding water use is often seen as highly proprietary information. Furthermore, detailed information regarding how water is used at each facility is ultimately required to prescribe specific conservation practices. The reality of water use by industry makes the assignment of specific approaches and savings virtually impossible. However, it is obvious that, over time, conservation will be employed by industry as it becomes cost-effective. This is especially true as the cost of water is expected to rise over the coming decades.

In order to estimate conservation savings in Region H, a high-level approach was developed based on historic water use records collected by TWDB. For the purpose of developing the 2016 Region H Regional Water Plan (RWP), data from 1955 to 2008 was provided by TWDB and presented according to each industry reporting. The data integrity varies over time with a general trend of increasing levels of reporting over time. For the sake of this analysis, the analysis focused on a 10-year period of record from 1999 through 2008.

Each record in the dataset was analyzed to identify industries that reliable reported water usage over the 1999 through 2008 period. It was determined that 400 industries consistently provided date over this time out of a total 1,296 industries reporting over the entire 53-year period. This reporting performance is a direct result of the consistency of reporting by industry and the fact that industries may stop producing or being reporting under a separate name over time. Regardless, the records that were considered valid were found to represent approximately 48-50 percent of the overall reported water use over the period of 1999 to 2008.

The records that were identified as valid, as defined above, were analyzed to produce an aggregate level of water use over time. Applying an exponential growth pattern to this trend, it was determined that overall water use by these 400 industries was found to reduce at a rate of approximately 0.124 percent annually. Although it is difficult to directly correlate this level of use with level of output, this reduction was recognized over a period of increasing industrial capacity and demand in the greater-Houston area. This was determined to be a conservative representation of conservation across industries in Region H. Over time, this results in an increased level of industrial efficiency when applied on an annual basis. *Table 1*, below represents this increase in efficiency over time. By applying these factors to the manufacturing Water User Groups (WUGs) on a county and basis, the project can be assumed to provide conservation savings at the levels depicted in *Table 2*, below.

Table 1 – Projected Industrial Efficiency Factors and Water Savings

		2020	2030	2040	2050	2060	2070
Efficiency	Factor	0.988	0.976	0.963	0.952	0.940	0.928
	% Savings	1.23%	2.45%	3.65%	4.84%	6.01%	7.17%

Table 2 – Potential Industrial Conservation Savings by County (Ac-Ft/Yr)

COUNTY	2020	2030	2040	2050	2060	2070
Austin	1	3	5	6	9	11
Brazoria	3,055	6,553	10,486	14,845	19,623	24,811
Chambers	136	292	467	657	877	1,124
Fort Bend	110	228	350	472	555	627
Galveston	695	1,409	2,142	2,896	3,669	4,464
Harris	5,234	11,001	17,193	23,567	28,790	33,764
Liberty	6	13	21	31	42	55
Leon	10	23	40	58	78	101
Madison	3	6	10	14	19	24
Montgomery	26	58	96	139	187	242
San Jacinto	0	0	0	1	1	1
Walker	4	7	12	15	19	22
Waller	1	4	6	8	12	15
TOTAL	**9,281**	**19,597**	**30,828**	**42,709**	**53,881**	**65,261**

Environmental Considerations

Due to the nature of the project, industrial conservation will occur on an as-appropriate basis in undetermined ways across the region. Actual impacts may result from the way these projects are implemented. However, these projects will generally be employed on existing plant sites and not impact habitat. The most likely impact, if any, from these projects, will be the result for reduced return flows. However, since the project will offset only a small portion of the overall demand growth projected for Region H, there will continue to be an overall net increase in return flows associated with industrial water demand despite the conservation measures represented here.

Permitting and Development

There are not permitting issues related to the implementation of these projects aside from those that may be related to the implementation of new production technologies.

Cost Analysis

Due to the lack of specificity in how individual industries will choose to implement water conservation measure, it is not possible to determine an overall cost for the project. However, as the preference for conservation is generally driven by market-based factors, it is generally assumed that industrial conservation will be implemented in situations where the cost of implementation is found to be less than the cost for new water supplies. In Region H, the cost of these raw water supplies has traditionally been low but is expected to increase over time as additional projects are required to meet future demands.

PROJECT EVALUATION

Based on the analysis provided above, the Industrial Conservation project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Low cost compared to other regional projects but will be required to compete with the generally low cost of raw water in the region.
Location	5	Conservation is applied at point of water use.
Water Quality	3	No known impacts to water quality.
Environmental Land and Habitat	5	Virtually no opportunity for land or habitat impacts on existing industrial sites.
Environmental Flows	3	Conservation may reduce return flows in the near-term but is offset by growth of industrial demands over the long-term.
Local Preference	4	Local support for conservation projects as they become economically viable.
Institutional Constraints	5	Limited identified permitting obstacles.
Development Timeline	5	Projects can be implemented quickly.
Sponsorship	3	Projects may be sponsored by individual industries but interest level varies and is uncertain.
Vulnerability	5	Very limited risk to developed infrastructure.
Impacts on Other Projects	3	No known impacts to other projects.

WATER USER GROUP APPLICATION

The Irrigation Conservation project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project availability in the same location as industrial use throughout Region H.
Size	The nature of this project makes its yield relative to the size of industrial operations.
Water Quality	This project does not produce new water but reduces need by conservation of other supplies.
Unit Cost	The unit cost for this project depends on technology employed and will depend on the cost for alternative water supplies.
Other Factors	This project is suited only to industrial demand. Actual implementation of projects will be performed by manufacturers.

REFERENCES

Texas Water Development Board Report 362 – Water Conservation Best Management Practices Guide, November 2004.

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Irrigation Conservation
Project ID:	CNSV-002
Project Type:	Conservation
Potential Supply Quantity (Rounded):	86,123 ac-ft/yr (76.9 mgd)
Implementation Decade:	2020
Development Timeline:	1-3 years
Project Capital Cost:	$1,155,709 for canal lining projects only (Sept. 2013)
Unit Water Cost (Rounded):	$113 per ac-ft (during loan period) $112 per ac-ft (after loan period)

PROJECT DESCRIPTION

In Southeast Texas, including Region H, irrigated agriculture is dominated by rice production. Although rice is a water-intensive crop, this high demand for water makes it an ideal opportunity for implementation of water conservation practices.

The Texas Water Development Board (TWDB) created the Water Conservation Implementation Task Force to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the state. The Water Conservation Implementation Task Force consists of a volunteer group of persons with experience in and commitment to using water more efficiently. The task force developed TWDB Report 362 – Water Conservation Best Management Practices Guide, which outlines specific water conservation best management practices (BMPs) for various water uses. Various BMPs from this report are discussed and outlined in this project.

To supplement the TWDB Report 362, report "Potential Rice Irrigation Water Conservation Measures, Water Planning Group - Region H," James W. Stansel of Texas A&M University (TAMU) proposes several conservation methods to reduce irrigation water demand. The study first addresses on-farm conservation practices. Specifically covered are the benefits of land leveling to reduce the water required for each flush, multiple field inlets to reduce overfilling of the higher cuts, reduced levee spacing to reduce the water required for each flush and replacing irrigation ditches with pipes to reduce seepage and evaporation losses. The study also addresses off-farm conservation, through the lining of irrigation canals to reduce losses.

Eight Region H counties have notable irrigation demands related to rice irrigation. This project analyzes the potential for implementation of conservation measures and identifies reasonable quantities of water savings and the associated cost of the project.

PROJECT ANALYSES

The project analyses for Irrigation Conservation include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The first step in identifying potential supply volumes associated conservation practices was to determine the volume of water demand and associated acreage for rice production in each Region H county. Data collected and compiled by TWDB in the development of water demands and application rates for agriculture were used to determine the percentage of the overall demand attributable to rice which could then be used with application rate to determine the number of acres in production.

A Geographic Information System (GIS) was created containing data on crop locations as well as aerial imagery. CropScape data from the National Agricultural Statistics Service (NASS) was used to identify locations in Region H that are used for rice production. Data from 2010 through 2012 was used for this purpose as rice acreage is rotted over a number of years. Year 2012 imagery from the National Agriculture Imagery Program (NAIP) was used to investigate areas identified as being active for rice irrigation. Visual inspection was used to determine if fields in the vicinity demonstrated characteristics of conservation practices (laser leveling, reduced levee intervals, etc.) or appeared to be unimproved. Farm lands of both varieties were outlined with polygons identifying them as improved or unimproved.

Once a review of Region H rice producing counties was completed, the resulting polygons were analyzed to determine the percentage of rice production acreage in each county and basin that has already received some level of improvement and would not be considered viable for application of additional conservation projects.

On-farm savings were applied to the annual active acreage estimated from the demand projections for the percentage assumed to be unimproved at a rate of 1.4 ac-ft/ac. On-farm techniques were applied assuming a canal length of 16.5 feet per active acre and a savings of 38.0 ac-ft/mile of canal. *Table 1*, below demonstrates the resulting savings identified for each county in every decade of the planning cycle. Note that the potential savings are level over time, which is consistent with the level nature of irrigation demands.

Table 1 – Potential Irrigation Conservation Savings by County (Ac-Ft/Yr)

COUNTY	2020	2030	2040	2050	2060	2070
Austin	3,035	3,035	3,035	3,035	3,035	3,035
Brazoria	24,816	24,816	24,816	24,816	24,816	24,816
Chambers	20,733	20,733	20,733	20,733	20,733	20,733
Fort Bend	11,222	11,222	11,222	11,222	11,222	11,222
Galveston	1,743	1,743	1,743	1,743	1,743	1,743
Harris	1,179	1,179	1,179	1,179	1,179	1,179
Liberty	14,822	14,822	14,822	14,822	14,822	14,822
Waller	8,573	8,573	8,573	8,573	8,573	8,573
TOTAL	**86,123**	**86,123**	**86,123**	**86,123**	**86,123**	**86,123**

Environmental Considerations

Due to the nature of the project, project implementation will occur in areas that are already disturbed through use in rice production or that have already been developed for the use of water conveyance to production land. The reduction in overall application of irrigation water may result in a reduction of return flows when fields are drained prior to harvest. These flushes may occur twice a year after the first and second (ratoon) crops and may beneficially impact downstream habitat during the dry, summer season. However, these potential impacts are offset by the reduced diversion of water for irrigation purposes.

Greater potential for impacts may exist for improvements made to conveyance channels depending on the specifics of the project application. *Table 2* lists the threatened and endangered species of Harris, Fort Bend, Austin, Waller, Brazoria, Galveston, Chambers, and Liberty Counties as well as other species of concern.

Table 2 – Threatened and Endangered Species of Austin, Brazoria, Chambers, Fort Bend Counties, Galveston, and Liberty Counties

AMPHIBIANS		FEDERAL STATUS	STATE STATUS
Houston toad	*Anaxyrus houstonensis*	LE	E

BIRDS		FEDERAL STATUS	STATE STATUS
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	
Attwater's Greater Prairie-Chicken	*Tympanuchus cupido attwateri*	LE	E
Bachman's Sparrow	*Aimophila aestivalis*		T
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Black Rail	*Laterallus jamaicensis*		
Brown Pelican	*Pelecanus occidentalis*	DL	
Eskimo Curlew	*Numenius borealis*	LE	E
Henslow's Sparrow	*Ammodramus henslowii*		
Interior Least Tern	*Sterna antillarum athalassos*	LE	E
Mountain Plover	*Charadrius montanus*		
Peregrine Falcon	*Falco peregrinus*	DL	T
Piping Plover	*Charadrius melodus*	LT	T
Red-cockaded Woodpecker	*Picoides borealis*	LE	E
Reddish Egret	*Egretta rufescens*		T
Snowy Plover	*Charadrius alexandrinus*		
Sooty Tern	*Sterna fuscata*		
Southeastern Snowy Plover	*Charadrius alexandrinus tenuirostris*		
Sprague's Pipit	*Anthus spragueii*	C	
Western Burrowing Owl	*Athene cunicularia hypugaea*		
Western Snowy Plover	*Charadrius alexandrines nivosus*		
White-faced Ibis	*Plegadis chihi*		T
White-tailed Hawk	*Buteo albicaudatus*		T
Whooping Crane	*Grus americana*	LE	E

BIRDS		FEDERAL STATUS	STATE STATUS
Wood Stork	*Mycteria americana*		T

FISHES		FEDERAL STATUS	STATE STATUS
American eel	*Anguilla rostrata*		
Creek chubsucker	*Erimyzon oblongus*		T
Paddlefish	*Polyodon spathula*		T
Smalltooth sawfish	*Pristis pectinata*	LE	E
Sharpnose shiner	*Notropis oxyrhynchus*	C	

INSECTS		FEDERAL STATUS	STATE STATUS
A mayfly	*Pseudocentroptiloides morihari*		
Gulf Coast Clubtail	*Gomphus modestus*		

MAMMALS		FEDERAL STATUS	STATE STATUS
Black bear	*Ursus americanus*	T/SA;NL	T
Jaguarundi	*Herpailurus yaguarondi*	LE	E
Louisiana black bear	*Ursus americanus luteolus*	LT	T
Ocelot	*Leopardus pardalis*	LE	E
Plains spotted skunk	*Spilogale putorius interrupta*		
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*		T
Red wolf	*Canis rufus*	LE	E
Southeastern myotis bat	*Myotis austroriparius*		
West Indian Manatee	*Trichechus manatus*	LE	E

MOLLUSKS		FEDERAL STATUS	STATE STATUS
Creeper (squawfoot)	*Strophitus undulates*		T
False spike mussel	*Quadrula mitchelli*		T
Fawnsfoot	*Truncilla donaciformis*		
Little spectaclecase	*Villosa lienosa*		
Louisiana pigtoe	*Pleurobema riddellii*		T
Sand pocketbook	*Lampsilis satura*		T
Smooth pimpleback	*Quadrula houstonensis*	C	T
Texas fawnsfoot	*Truncilla macrodon*	C	T
Texas heelsplitter	*Potamilus amphichaenus*		T
Texas pigtoe	*Fusconaia askewi*		T
Wabash pigtoe	*Fusconaia flava*		

REPTILES		FEDERAL STATUS	STATE STATUS
Alligator snapping turtle	*Macrochelys temminckii*		T
Atlantic hawkbill sea turtle	*Eretmochelys imbricate*	LE	E
Green sea turtle	*Chelonia mydas*	LT	T
Gulf Saltmarsh snake	*Nerodia clarkia*		
Kemp's Ridley sea turtle	*Lepidochelys kempii*	LE	E
Leatherback sea turtle	*Dermochelys coriacea*	LE	E
Loggerhead sea turtle	*Caretta caretta*	LT	T
Louisiana pine snake	*Pituophis ruthveni*	C	T
Northern scarlet snake	*Cemophora coccinea copei*		T
Smooth green snake	*Liochlorophis vernalis*		T
Texas diamondback terrabin	*Malaclemys terrapin littoralis*		
Texas horned lizard	*Phrynosoma cornutum*		T
Texas/Canebrake rattlesnake	*Crotalus horridus*		T

PLANTS		FEDERAL STATUS	STATE STATUS
Coastal gay-feather	*Liatris bracteata*		
Correll's false dragon-head	*Physostegia correlli*		
Florida ladies-tresses	*Spiranthes brevilabris var. floridana*		
Giant sharpstem umbrella-sedge	*Cyperus cephalanthus*		
Grand Prairie evening primrose	*Oenothera pilosella eep sessilis*		
Houston daisy	*Rayjacksonia aurea*		
Neglected coneflower	*Echinacea paradoxa var. neglecta*		
Panicled indigobush	*Amorpha paniculata*		
Shinner's sunflower	*Helianthus occidentalis ssp plantagineus*		
Texas ladies'-tresses	*Spiranthes brevilabris var. brevilabris*		
Texas meadow-rue	*Thalictrum texanum*		
Texas prairie dawn	*Hymenoxys texana*	LE	E
Texas windmill-grass	*Chloris texensis*		
Threeflower broomweed	*Thurovia triflora*		

LE, LT - Federally Listed Endangered/Threatened; SAE, SAT - Federally Listed Endangered/Threatened by Similarity of Appearance; C - Federal Candidate for Listing; DL, PDL - Federally Delisted/Proposed for Delisting; NL - Not Federally Listed; E, T - State Listed Endangered/Threatened; "blank" - Rare, but with no regulatory listing status.

Permitting and Development

No significant permitting issues related to project development. Based on a preliminary desktop review, the following environmental permits and permitting activities may potentially apply to projects other than on-farm practices:

- U.S. Army Corps of Engineers (USACE) Section 404 Permit – All proposed pipeline rights-of-way (ROW), temporary workspace, and access road locations should be delineated for waters of the U.S., including wetlands. The proposed pipeline construction would likely be permitted under Nationwide Permit (NWP) 12-Utility Line Activities either with or without a Pre-construction Notification (PCN) to the USACE depending on the amount of impacts to waters of the U.S. If pipelines are placed within irrigation canals that are channelized streams (waters of the U.S.), construction would likely be permitted under NWP 12 with a PCN or Section 404 Individual Permit (IP) depending on the amount of impacts to waters of the U.S. If channel lining occurs within irrigation canals that are channelized streams (waters of the U.S.), construction would likely be permitted under NWP 3-Maintenance with or without a PCN or Section 404 IP depending on the amount of impacts to waters of the U.S.

- Texas Historical Commission (THC) Coordination - Projects sponsored by public entities that affect a cumulative area greater than five acres or that disturb more than 5,000 cubic yards require advance consultation with the Texas Antiquities Committee according to Section 191.0525 (d) of the Antiquities Code of Texas. Because the proposed pipeline and/or irrigation canal lining may exceed these thresholds, coordination with the THC would be required. The THC may determine that archeological and/or historical surveys are needed.
- Threatened and Endangered Species – All proposed pipeline ROW, temporary workspace, and access road locations as well as lining projects within channelized streams (waters of the U.S.) should be surveyed for potential threatened and endangered species habitat. If preferred habitat for threatened or endangered species is present, presence/absence surveys for the species would be required.

Cost Analysis

Costs for on-farm conservation measures and canal lining were taken from the Stansel (2000) and scaled to September 2103 costs using the Engineering News Record (ENR) Construction Cost Index (CCI). Overall Costs for Region H are shown in *Table 3* below.

Table 3 – Irrigation Conservation Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					December 10, 2013
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$829,544	$829,544
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$290,340	$290,340
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$35,824	$35,824
	PROJECT CAPITAL COST				$1,155,709

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$96,709	$96,709	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$8,295	$8,295	$8,295	$8,295	$8,295	$8,295
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
5	ON-FARM CONSERVATION MEASURES	$9,667,134	$9,667,134	$9,667,134	$9,667,134	$9,667,134	$9,667,134
	TOTAL ANNUAL COST	$9,772,138	$9,772,138	$9,675,429	$9,675,429	$9,675,429	$9,675,429

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$9,772,139	$9,772,139	$9,675,429	$9,675,429	$9,675,429	$9,675,429
2	YIELD	86,123	86,123	86,123	86,123	86,123	86,123
3	UNIT COST	$113	$113	$112	$112	$112	$112
	TOTAL UNIT COST						$113

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	1	LS	$829,544	$829,544
	PROJECT COST				$829,544

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	1.0	%	$829,544	$8,295
	ANNUAL OPERATION AND MAINTENANCE COST				$8,295

PROJECT EVALUATION

Based on the analysis provided above, the Irrigation Conservation project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Low cost compared to other regional projects but may be prohibitive compared to the current cost of water for agriculture.
Location	5	Conservation is applied at point of water use.
Water Quality	3	No known impacts to water quality.
Environmental Land and Habitat	4	Minimal impacts above existing agricultural operations.
Environmental Flows	3	Conservation may reduce return flows at the end of growing seasons but also reduces the necessary diversions for irrigation use.
Local Preference	3	Support by some proactive growers and those that own their own property and can invest in long-term improvements.
Institutional Constraints	5	Limited identified permitting obstacles.
Development Timeline	5	Projects can be implemented quickly and even off-farm methods have relatively short timelines.
Sponsorship	3	Projects may be sponsored by local farmers and irrigation water providers but interest level varies and is uncertain.
Vulnerability	5	Very limited risk to developed infrastructure.
Impacts on Other Projects	3	No known impacts to other projects.

WATER USER GROUP APPLICATION

The Irrigation Conservation project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	The project availability in the same location as irrigation water use for rice production and focused in Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, and Waller Counties.
Size	The nature of this project makes its yield relative to the size of irrigation operations.

CRITERIA	WUG SUITABILITY
Water Quality	This project does not produce new water but reduces need by conservation of other supplies.
Unit Cost	The unit cost for this project is relatively expensive for irrigation use but is one of the most cost-competitive alternatives for agriculture.
Other Factors	This project is suited only to irrigation demand. Actual implementation of projects will be performed by growers or water suppliers. This process is complicated by the predominance of rice production in Region H being performed on land leased by the producer, often discouraging the long-term investment necessary to implement these programs.

REFERENCES

Texas Water Development Board Report 362 – Water Conservation Best Management Practices Guide, November 2004.

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

Texas Water Development Board Report 347 - Surveys of Irrigation in Texas 1958, 1964, 1969, 1974, 1979, 1984, 1989, 1994, and 2000, August 2001.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Austin, Accessed January 9, 2014.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Brazoria, Accessed January 9, 2014.

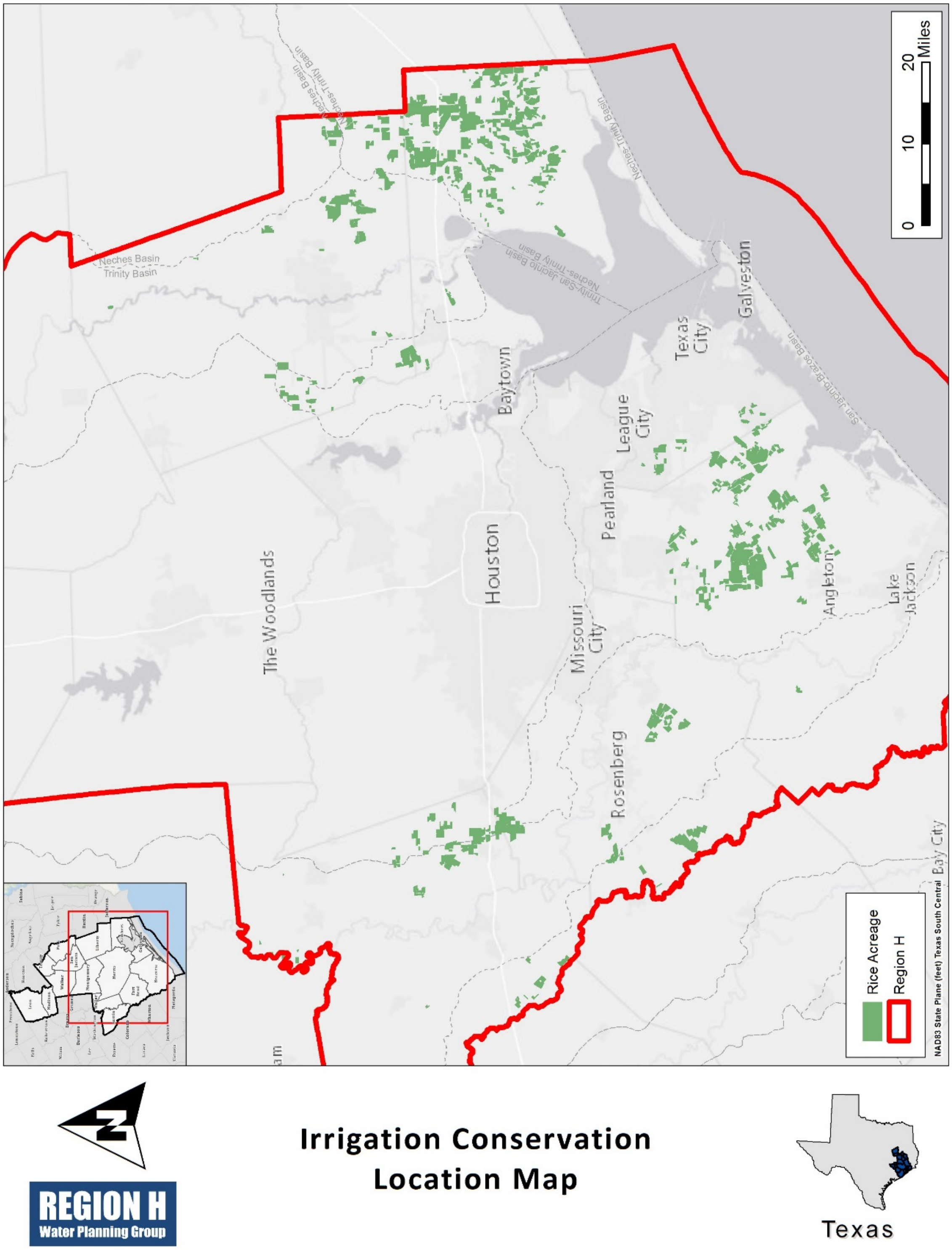
Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Fort Bend, Accessed January 9, 2014.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Galveston, Accessed January 9, 2014.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Harris, Accessed January 9, 2014.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Liberty, Accessed January 9, 2014.

LOCATION MAP



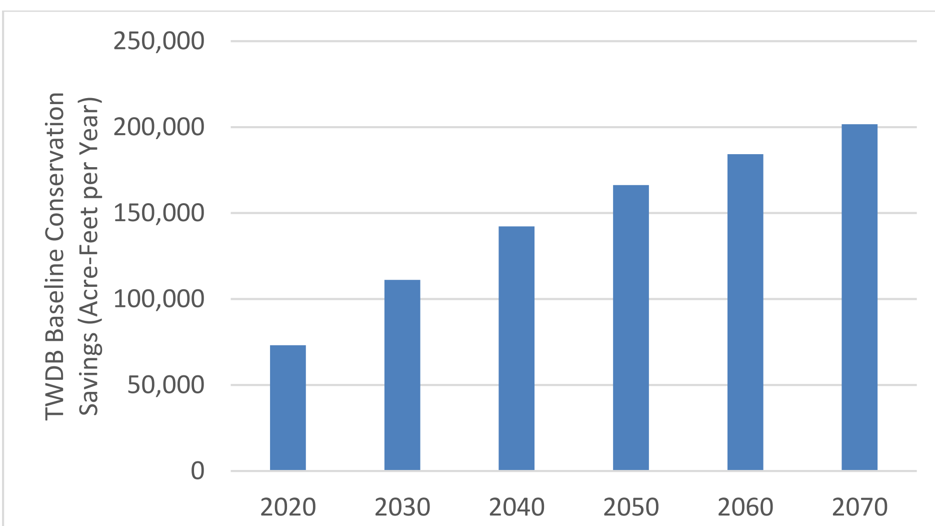
REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Municipal Conservation
Project ID:	CNSV-003
Project Type:	Conservation
Potential Supply Quantity (Rounded):	150,660 ac-ft/yr (134.5 mgd)
Implementation Decade:	2020 with ongoing annual expenditures
Development Timeline:	1 years
Project Capital Cost:	$1,699,918,210 over planning horizon (Sept. 2013)
Unit Water Cost (Rounded):	$171 per ac-ft (Advanced Conservation) $555 per ac-ft (Water Loss Reduction)

PROJECT DESCRIPTION

Water conservation is a demand management project that pro-actively causes a decrease of future water needs. Conservation facilitates more efficient use of existing water supplies by allowing existing supplies to serve demands for a longer period of time and/or to delay the need to develop new supplies. The current Region H water demands have an embedded quantity of conservation savings. This quantity has been determined based on the assumption that water will be saved as a result of anticipated future, natural installation of plumbing fixtures and appliances as detailed in relevant legislation. These savings were included in the demand figures developed by TWDB. Their resulting savings in Region H are described below in *Figure 1* and amount to as much as 9.6 percent of the annual, total (prior to reductions applied by TWDB) municipal water demand.

Figure 1 – TWDB-Applied Baseline Conservation



The use of water conservation projects will accomplish a higher degree of conservation than is already contained within the current demand projections. This technical memorandum illustrates the application of water conservation to Municipal and Municipal County-Other WUGs throughout Region H. These projects are recommended for all municipal WUGs and have, therefore been applied for even WUGs that do not demonstrate a need throughout the planning period.

For the 2016 round of regional planning, the Region H Water Planning Group (RHWPG) approached the issue of municipal water conservation in two ways. First, the RHWPG reviewed the results of the 2010 Water Loss Audit Report developed by TWDB. At the time of the preparation of the 2016 Regional Water Plan (RWP), this dataset represented the most current statewide water loss audit report until the release of the 2015 audit anticipated in 2016. Specific measures for combatting water loss vary from system to system. However, in Region H, the City of Houston has benefitted from the installation of smart metering systems that can detect patterns in water use and recognize potential leaks on both the service and customer sides of the system. This, in conjunction with a line replacement program, has reduced water loss in the City's treated water system.

Second, the RHWPG benefited from the Goldwater Project conducted by Averitt & Associates and the Texas Water Foundation. The project aimed to quantify and measure water conservation efforts in Region H and work with stakeholders to identify gaps in attaining and recommend projects for meeting the recommended conservation goals in the 2011 RWP. These practices include:

- Efficient residential irrigation controllers,
- Efficient meter installations,
- Tank-type ultra-low-flow toilet rebates,
- Efficient commercial dishwashers,
- Efficient commercial spray-rinse valves,
- Efficient commercial steamers,
- Efficient commercial cooling towers,
- Large landscape surveys for single-family residences,
- Large landscape water budgets for single-family residences,
- Large landscape irrigation controllers for single-family residences.

Results from the study of current and required practices for meeting the goals in the 2011 RWP were adapted into potential projects for all Region H counties with the exception of those that could conserve a considerable amount of water (approaching the recommended projects in the 2011 RWP) through water loss reduction alone.

PROJECT ANALYSES

The project analyses for Municipal Conservation include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Estimates of potential savings as a result of water loss reduction were developed using data from the 2010 Water Loss Audit Report prepared by TWDB. This report identified, by utility, the estimates losses of various types calculated from production and sales records. *Figure 2* summarizes the data for the entirety of Region H from this report and divides losses into categories of both real and apparent loss. For the sake of this analysis, real losses were used as a basis of estimating potential savings.

Figure 2 – Region H Summary from 2010 Water Loss Audit Report

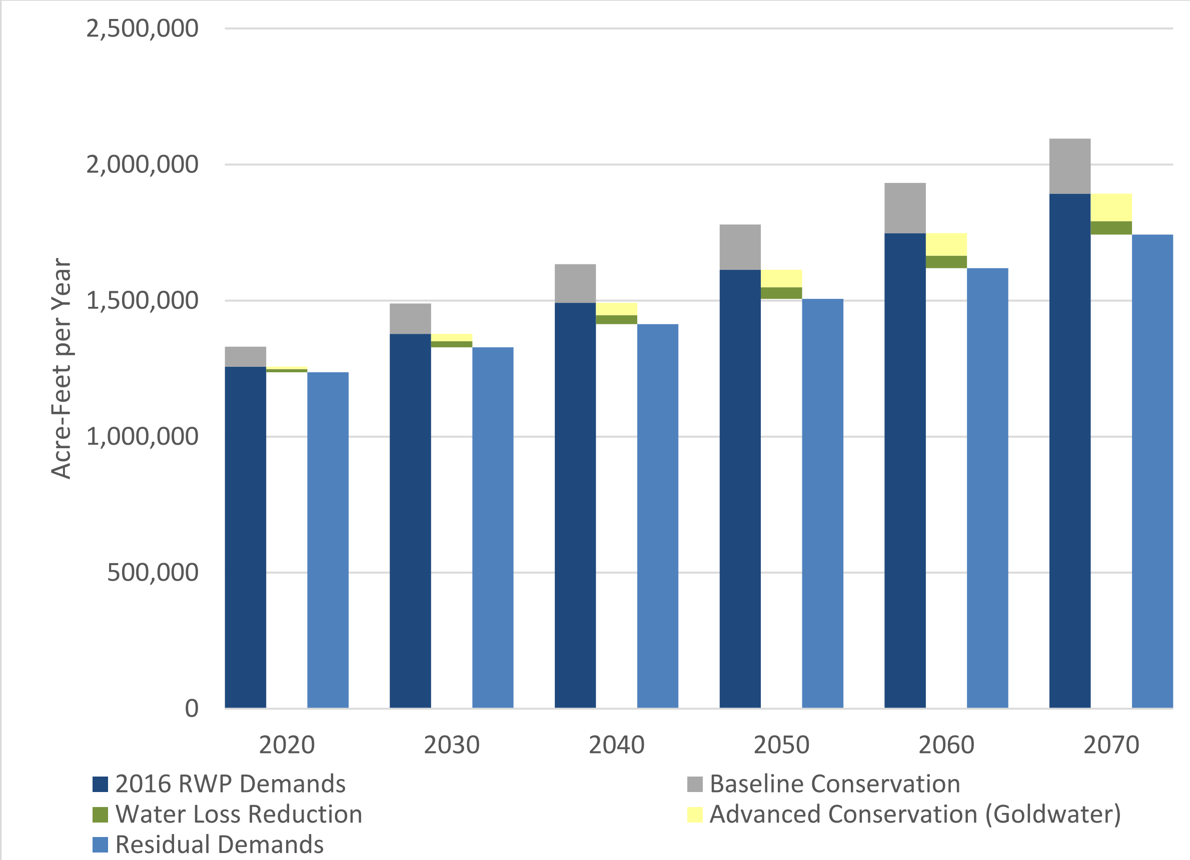
<table>
<tr><td rowspan="8">Region H
665 Audits Submitted</td><td rowspan="8">System Input Volume
702,498,747,696</td><td rowspan="4">Authorized Consumption
570,527,434,739
81.2%</td><td rowspan="2">Billed Consumption
555,838,304,896
79.1%</td><td>Billed Metered
555,609,659,853
79.1%</td><td rowspan="2">Revenue Water
555,838,304,896
79.1%</td></tr>
<tr><td>Billed Unmetered
228,645,043
0.0%</td></tr>
<tr><td rowspan="2">Unbilled Consumption
14,689,129,843
2.1%</td><td>Unbilled Metered
7,758,976,293
1.1%</td><td rowspan="6">Non-revenue Water
146,904,342,195
20.9%</td></tr>
<tr><td>Unbilled Unmetered
6,930,153,550
1.0%</td></tr>
<tr><td rowspan="4">Water Loss
132,372,265,647
18.8%</td><td rowspan="3">Apparent Loss
23,989,517,923
3.4%</td><td>Unauthorized Consumption
1,679,121,648
0.2%</td></tr>
<tr><td>Customer Meter Accuracy Loss
22,006,209,101
3.1%</td></tr>
<tr><td>Systematic Data Handling Discrepency
304,187,174
0.0%</td></tr>
<tr><td>Real Loss
109,059,675,934
15.5%</td><td>Reported Breaks and Leaks
11,712,207,418
1.7%
Unreported Loss
99,795,102,209
14.2%</td></tr>
</table>

The utilities identified in the report were associated with either named Municipal WUGs or Municipal County-Other WUGs to develop estimates. On a WUG-basis, totals of utility real losses and total system input volume were developed. These totals could then be used to calculate the real loss identified for each unit of system input volume. For WUGs with no identified utility records, assumed values were developed based on results within the WUG county.

Real losses were examined by WUG and WUGs with real losses exceeding 10 percent were targeted for potential project savings. These WUGs exceeding the 10 percent real loss threshold were assumed to reduce their real losses by 1 percent annually throughout the planning period or until they reached the threshold level of 10 percent real loss.

Projections for methods beyond baseline conservation applied by TWDB and the savings associated with water loss reduction were prescribed based on estimates prepared by Averitt and Associates. Estimates were prepared on a county-wide basis and intended to represent a reasonable, low level of projected conservation. This is intended to provide a conservative estimate of potential feasibility of such projects. These county-wide projections were then allocated to WUGs based on their overall demand. Although actual implementation will vary based on mode complex factors than demand alone, this approach is intended to be a high-level solution to the issue of assigning specific conservation targets based on county-wide projections. The resulting savings are shown in *Figure 3* below.

Figure 3 – Municipal Conservation in the 2016 Region H RWP



Combined, the water saved through water loss reduction and the advanced methods prescribed by Goldwater represent eight percent of the year 2070 demand demonstrated in the Region H RWP. However, this demand is already reduced by 9.6 percent based on baseline conservation methods applied by TWDB. In total, the effective demand for the region is reduced by a total of 16.8 percent in 2070 compared against the total demand which is represented by the population demand of Region H prior to application of baseline reductions by TWDB. This information is presented in *Table 1*, below.

Table 1 – Summary of Conservation Savings by Decade

Conservation Metric	Basis	2020	2030	2040	2050	2060	2070
Baseline Conservation	% of Total Demand	5.5%	7.5%	8.7%	9.3%	9.5%	9.6%
Water Loss Reduction	% of RWP Net Demand	0.9%	1.6%	2.2%	2.6%	2.6%	2.6%
Advanced Conservation		0.7%	2.0%	3.0%	4.0%	4.8%	5.3%
Total Additional Conservation (Water Loss + Advanced)		*1.6%*	*3.6%*	*5.3%*	*6.6%*	*7.4%*	*8.0%*
Total Conservation Methods (Baseline + Water Loss + Advanced	**% of Total Demand**	**7.0%**	**10.8%**	**13.5%**	**15.4%**	**16.2%**	**16.8%**

Environmental Considerations

Generally, there are no significant negative environmental impacts associated with the conservation projects outlined herein or that may results from implementation of the conservation management project. Large-scale structural modifications (constructing physical facilities) are not necessary to implement the water conservation management project. Therefore, the resultant type of construction impacts is not anticipated. However, conservation may create various types of social impacts. It is noteworthy that conservation measures do change the pattern of return flows introduced to streams. Municipal effluent is a critical and substantial component to baseflows in the Houston area and conservation measures, particularly those associated with in-house methods, will reduce these flows below the level that would occur without conservation in place. However, the reduction in return flows in the demand basin due to conservation would, theoretically, be more than offset by the reduced diversions of water from the source basins.

Permitting and Development

Accomplishing the water conservation demand reductions, as described herein, requires pro-active implementation. Identification of an appropriate utility or political subdivision to manage or legislate use of the conservation measures to the municipal WUGs is one of the critical issues facing the success of this project.

It should be noted that some of the WUGs are collections of small systems either publicly or privately owned. These systems are the least likely to have any type of coordinated effort to reduce water consumption. Certainly, the individual systems themselves will have varying attitudes toward conservation with some moving forward with conservation plans and others concerned solely with revenue generated to support system operations.

The implementation of conservation measures for collective groupings of small systems is problematic from the fact that there is no single point of accountability. These savings may or may not accrue, depending upon the efforts or lack thereof of many different utilities. For these systems, there is no leverage to encourage conservation, there is no incentive for them to implement and pay for conservation education, and there is no economic incentive for them to reduce billings as it reduces the potential sale value of their systems.

Cost Analysis

Costs for additional conservation projects were developed based on information developed as part of the ongoing Goldwater study. This information was adapted from the Alliance for Water Efficiency (AWE) Water Conservation Tool. *Table 2* lists the total capital costs and annual cost shares throughout the planning period for Advanced Conservation. Note that these unit costs vary over the decades as the residual impacts of conservation programs initiated in earlier decades are continued through the planning period. These comprehensive, regional costs were developed by application of program cost factors for communities of different sizes across the entirety of the region. Summaries of cost-benefit data for all of these model communities are included as attachments to this memorandum.

Actual costs will vary by WUG. These values represent regional costs that are evenly distributed over participating utilities. Generally, unit costs for implementation in smaller communities is more costly.

However, these efforts may be made part of a more regional approach that can be accomplished in a more cost-effective manner.

Table 2 – Advanced Conservation Project Cost

OPINION OF PROBABLE CONSTRUCTION COST							January 22, 2015
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY							
1	PROGRAM COST			1	LS	$564,424,030	$564,424,030
	PROJECT CAPITAL COST						$564,424,030
ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$7,440,744	$8,255,424	$9,006,342	$9,750,000	$10,553,954	$11,435,939
2	YIELD	9,052	27,156	45,258	65,000	83,102	101,203
3	UNIT COST	$822	$304	$199	$150	$127	$113
	TOTAL UNIT COST						$171

Information related to costs of programs to reduce water loss were also adapted from the AWE tool. These costs were found to differ between communities with population greater than 50,000 and those with smaller populations. Costs were applied to WUGs based on their size and then compiled to develop costs at the regional level to be applied evenly back to WUGs. The results of this analysis are shown in *Table 3*.

Table 3 – Water Loss Reduction Project Costs

OPINION OF PROBABLE CONSTRUCTION COST							January 22, 2015
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY							
1	PROGRAM COST			1	LS	$1,135,494,180	$1,135,494,180
	PROJECT CAPITAL COST						$1,135,494,180
ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$6,278,160	$12,499,436	$18,350,752	$23,218,224	$25,803,668	$27,399,178
2	YIELD	11,312	22,481	33,184	42,062	45,914	49,457
3	UNIT COST	$555	$556	$553	$552	$562	$554
	TOTAL UNIT COST						$555

It should be noted that the costs demonstrated here for municipal water conservation programs represent a total cost for offsetting a unit volume of water at the point of delivery. This sets conservation programs apart from other strategies employed in the RWPs. In other cases, a comprehensive approach to delivering water to an end-user may include one project that provides for development of raw water, one or more raw water transmission project, a treatment project, and one or more treated water transmission projects to finally deliver water to the demand center. In addition, there are also costs associated with distribution of this water to retail customers which is outside of the scope of the RWP. A comprehensive summation of all of these projects in a layered manner are required to provide the same utility as a conservation program. Therefore, the additive nature of these costs must be considered when they are compared with and contrasted against conservation programs.

PROJECT EVALUATION

Based on the analysis provided above, the Municipal Conservation project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	Water conservation approaches consistently achieve high scores related to cost. This is particularly affordable considering these projects offset the cost of treated, municipal supply.
Location	5	Conservation measures generally benefit the WUGs in which they are implemented without need for conveyance but conservation in one WUG may also allow for water to be used by other customers after the demand level is reduced.
Water Quality	3	No known issues related to water quality.
Environmental Land and Habitat	5	No impacts to landform associated with conservation projects.
Environmental Flows	3	No impacts to instream flows. Typically, reductions in return flows are also associated with reduced diversions.
Local Preference	4	No opposition to conservation efforts although local support varies from utility to utility,
Institutional Constraints	5	No permits required for implementation of conservation measures.
Development Timeline	5	Conservation programs can be implemented in a relatively short period of time
Sponsorship	3	Although sponsors are identified, commitment to implementation varies considerably.
Vulnerability	5	Conservation has no identifiable risk from natural or man-made disasters.
Impacts on Other Projects	2	Conservation may negatively impact the availability of return flows for development into indirect reuse projects.

WATER USER GROUP APPLICATION

The Municipal Conservation project was evaluated on a basis of several criteria to determine the

Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

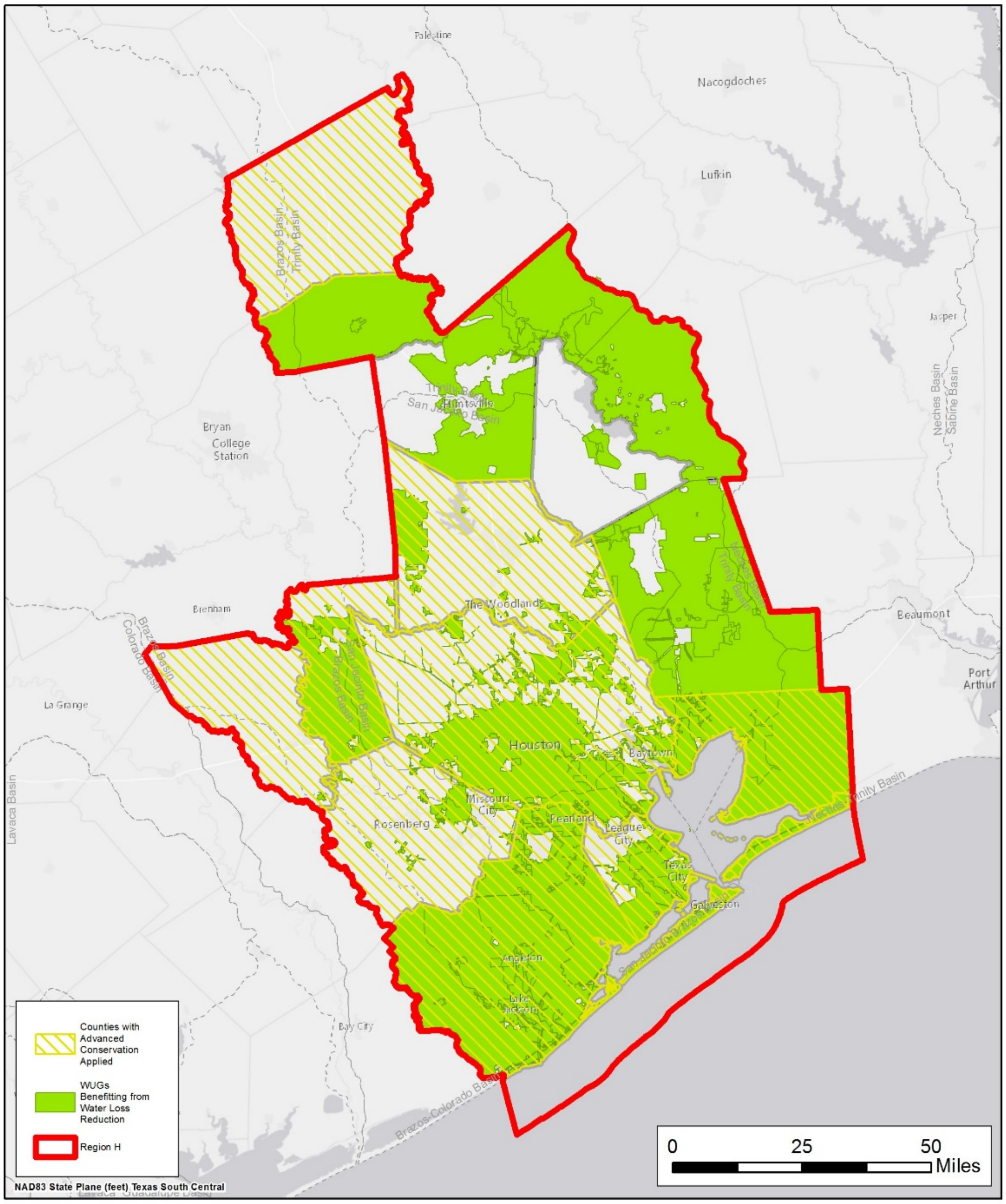
CRITERIA	WUG SUITABILITY
Proximity	Conservation projects do not produce water and only reduce total demand. Therefore, proximity of source and demand is not an issue for implementation.
Size	Conservation projects can generally be scaled to fit the WUG and the need. However, there are limits to how much of the total future need can be offset through conservation alone.
Water Quality	The measure produces no water and only reduces demand. Therefore, water quality of the supply is
Unit Cost	The unit cost for this project makes it an attractive option for most WUGs aside from those that are already achieving a very low level of per-capita municipal demand.
Other Factors	Successful implementation will ultimately depend on the dedication of individual WUGs to a conservation approach.

REFERENCES

2010 Water Loss Audit Dataset. Texas Water Development Board.

Goldwater Project First Year Report. Averitt & Associates and Texas Water Foundation. May 2014.

LOCATION MAP



Municipal Conservation Location Map

REGION H
Water Planning Group

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	TRA to Houston Transfer
Project ID:	CNTR-001
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	150,000 ac-ft/yr (134 mgd)
Implementation Decade:	2020
Development Timeline:	Less than 5 years
Project Capital Cost:	$0 (Sept. 2013)
Unit Water Cost (Rounded):	$5 per ac-ft

PROJECT DESCRIPTION

The City of Houston (COH) owns 940,080 acre-feet per year of water rights in Lake Livingston which is intended to meet near- to medium-term demands of COH and its customers. However, growth in the service are within and surrounding Harris County will require additional supply to meet future needs. COH has provided a Letter of Intent to the Trinity River Authority (TRA) indicating an interest in purchasing up to 300,000 acre-feet annually from the remaining TRA share of Lake Livingston described in Certificate of Adjudication (COA) 08-4248.

PROJECT ANALYSES

The project analyses for TRA to Houston include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The identified supply of 150,000 acre-feet per year is allocated out of TRA's existing rights associated with Lake Livingston and the Wallisville Saltwater Barrier. This total supply of 403,200 acre-feet per year was determined to be firm in the context of the Region H Plan and available for use by TRA.

COH currently has adequate infrastructure to convey the identified supply westward to raw water customers and the three COH Water Purification Plants (WPPs) serving the COH treated water service area.

Environmental Considerations

The interbasin transfer of water from one basin to another is always associated with potential impacts to water resources and the potential for transmission of species. Consideration must be given to impacts to both the source and receiving basins in developing a viable project.

Permitting and Development

Although a water right permit exists for the development of the TRA supply, additional permitting will be required to make the supply available in the San Jacinto River Basin.

Cost Analysis

The majority of cost for this project are generally associated with the cost of water purchase which must be determined through negotiations between COH and TRA. It is assumed that existing infrastructure will be adequate for diversion and transmission of this additional supply as capacity will be made available in the CWA Main Canal due to the development of the Luce Bayou project. The costs presented in this memorandum do not include the purchase cost of water. Costs included in *Table 1* cover additional pumping energy costs associated with the supply.

Table 1 – TRA to Houston Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					February 15, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$0	$0
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$0	$0
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$0	$0
	PROJECT CAPITAL COST				$0

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$0	$0	$0	$0
3	PUMPING ENERGY COSTS	$766,047	$766,047	$766,047	$766,047	$766,047	$766,047
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$766,047	$766,047	$766,047	$766,047	$766,047	$766,047

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$766,047	$766,047	$766,047	$766,047	$766,047	$766,047
2	YIELD	150,000	150,000	150,000	150,000	150,000	150,000
3	UNIT COST	$5	$5	$5	$5	$5	$5
	TOTAL UNIT COST						$5

PROJECT EVALUATION

Based on the analysis provided above, the TRA to Houston project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Low-cost project utilizing existing infrastructure.
Location	2	Project development requires IBT.
Water Quality	3	No known impacts to water quality.
Environmental Land and Habitat	5	No changes to land form required for implementation.
Environmental Flows	2	Project will reduce flows within the Trinity Basin in the terms of existing permit but will provide increased return flows in the San Jacinto Basin.
Local Preference	3	No identified support or opposition to the project.
Institutional Constraints	3	Permits required for use of water in the San Jacinto River Basin.
Development Timeline	5	Project may be implemented in a short time period and without construction of infrastructure.
Sponsorship	5	COH is currently pursuing the opportunity with TRA.
Vulnerability	4	Slight risk from natural or man-made disasters related to existing infrastructure.
Impacts on Other Projects	4	This project takes advantage of existing water sources by making them available to demand centers.

WATER USER GROUP APPLICATION

The TRA to Houston project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project will allow for service of water to current and future customers of the COH raw and treated water systems.
Size	The magnitude of this project provides for a significant additional supply to the COH service area. When provided to a point at the COH WPPs, it may serve a large, and flexible demand base throughout the county.
Water Quality	Project provides raw water but this may be treated by COH or others for municipal use.

CRITERIA	WUG SUITABILITY
Unit Cost	Low-cost project utilizing existing infrastructure.
Other Factors	Project is sponsored by COH and will benefit COH and its customers.

REFERENCES

City of Houston. 2013. Letter of Intent to Purchase Water from Trinity River Authority. Correspondence.

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Central Harris County Regional Water Authority Transmission and Distribution Expansion
Project ID:	CONV-001
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	4,682 ac-ft/yr (4.18 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	<10 years
Project Capital Cost:	$23,207,659 (Sept. 2013)
Unit Water Cost (Rounded):	$409 per ac-ft (during loan period) $44 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the Central Harris County Regional Water Authority (CHCRWA) has contracted with the City of Houston (COH) to receive treated surface water. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, CHCRWA is developing expansions to its transmission and distribution infrastructure.

PROJECT ANALYSES

The project analyses for the CHCRWA Transmission and Distribution Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The CHCRWA will continue to deliver surface water to certain districts within the Authority to meet the requirements of its Groundwater Reduction Plan (GRP). The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its GRP program. The Authority has increased its supply reservation from COH from an original reservation of 2.12 mgd (2,374ac-ft/yr) currently applied in the Regional Plan as existing supply to 6.3 mgd (7,056 ac-ft/yr). CHCRWA is developing expanded transmission infrastructure to convey supplies from a proposed shared pipeline with COH and North Harris County Regional Water Authority (NHCRWA). Transmission facilities include a connection to a NHCRWA pipeline along Hardy Toll Road and another connection along TC Jester Blvd. CHCRWA is also developing an expansion of the infrastructure network through which it supplies its member districts.

Environmental Considerations

Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the GRP is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

CHCRWA is subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Development of expanded distribution infrastructure will cause some degree of surface disturbance, which may require permitting and mitigation. Infrastructure development is also likely to require acquisition of additional easements or property.

Cost Analysis

Planning-level capital cost estimates for the CHCRWA Transmission and Distribution Expansion project were provided by the Authority’s engineering consultant. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Specific capital components for engineering and legal fees, contingency, land acquisition, surveying, environmental studies and mitigation were not called out separately and were assumed for the Regional Plan to be part of the capital costs provided. Other cost components not included in the GRP, such as interest during construction, annualized debt service, and annualized operations and maintenance costs, were assumed using standard Regional Planning costing assumptions. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1.*

Table 1 – CHCRWA Transmission and Distribution Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$20,800,000	$20,800,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$0	$0
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$2,407,659	$2,407,659
	PROJECT COST				$23,207,659

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$1,707,660	$1,707,660	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$208,000	$208,000	$208,000	$208,000	$208,000	$208,000
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$1,915,660	$1,915,660	$208,000	$208,000	$208,000	$208,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$1,915,660	$1,915,660	$208,000	$208,000	$208,000	$208,000
2	YIELD	4,682	4,682	4,682	4,682	4,682	4,682
3	UNIT COST	$409	$409	$44	$44	$44	$44
	TOTAL UNIT COST						$166

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$20,800,000	$20,800,000
	PROJECT COST				$20,800,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$20,800,000	$208,000
	ANNUAL OPERATION AND MAINTENANCE COST				$208,000

PROJECT EVALUATION

Based on the analysis provided above, the CHCRWA Transmission and Distribution Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	The CHCRWA Transmission and Distribution Expansion, while not directly generating supply, allow conveyance with small additional cost.
Location	4	Reflects conveyance infrastructure from major transmission pipelines to demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The CHCRWA Treatment and Distribution Expansion project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the project will only serve CHCRWA, its wholesale customers, and GRP participants.

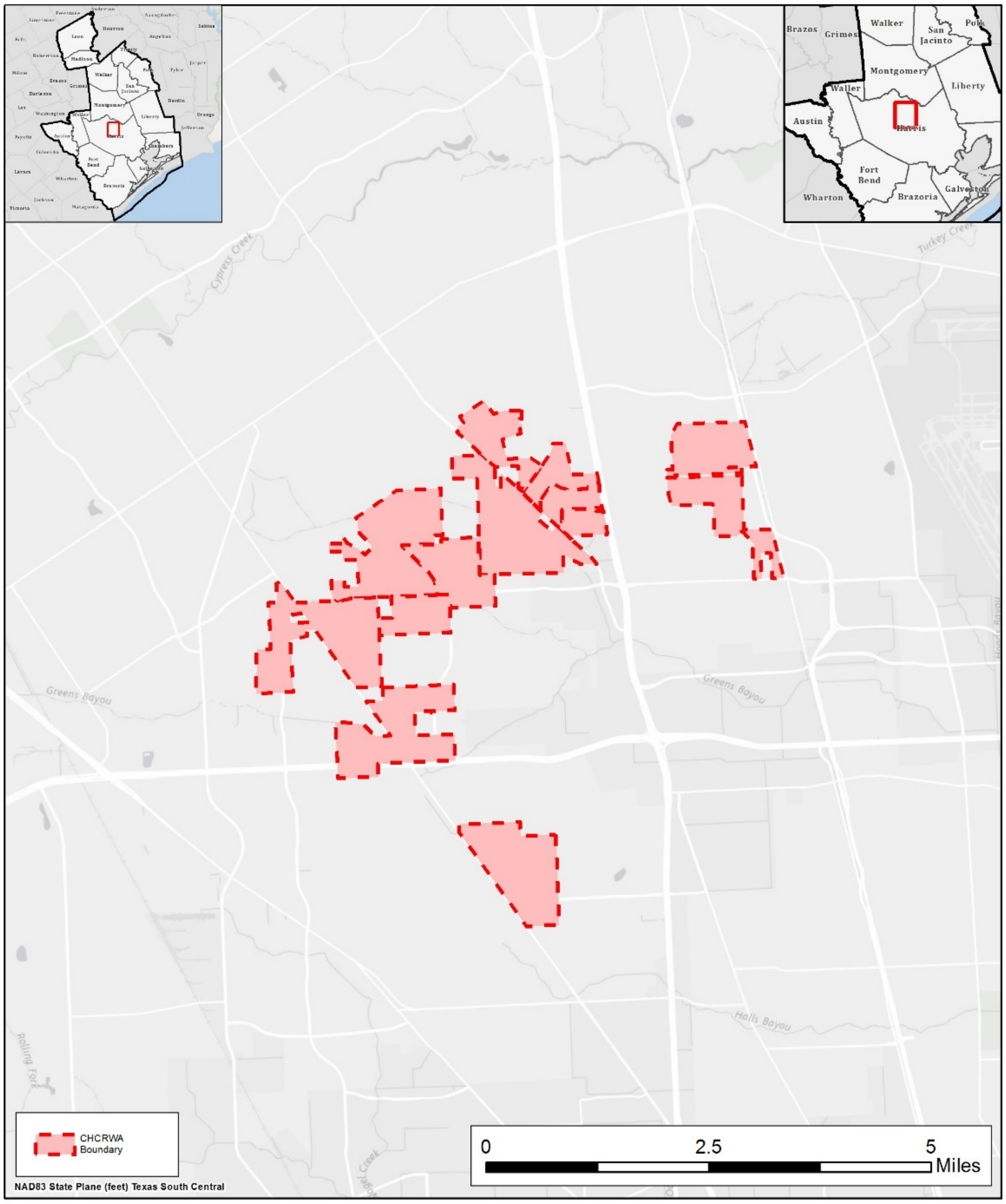
CRITERIA	WUG SUITABILITY
Proximity	Conveyance infrastructure from major transmission pipelines to demand centers.
Size	Conveyance is sized to convey the requisite amount of source water.
Water Quality	Conveys treated water of quality appropriate for municipal use.

CRITERIA	WUG SUITABILITY
Unit Cost	Adds small amount to unit cost of CHCRWA’s surface water conversion process.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013.

LOCATION MAP



REGION H Water Planning Group

CHCRWA Transmission and Distribution Expansion Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	COH, NHCRWA, and CHCRWA Shared Transmission
Project ID:	CONV-002
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	148,042 ac-ft/yr (132.2 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	<10 years
Project Capital Cost:	$150,325,381 (Sept. 2013)
Unit Water Cost (Rounded):	$83 per ac-ft (during loan period) $9 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, City of Houston (COH), North Harris County Regional Water Authority (NHCRWA), and Central Harris County Regional Water Authority (CHCRWA) are developing a large shared pipeline to convey treated surface water from the COH Northeast Water Purification Plant (NEWPP), which is anticipated to be significantly expanded.

PROJECT ANALYSES

The project analyses for the COH, NHCRWA, and CHCRWA Shared Transmission project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The project sponsors have already developed transmission and distribution infrastructure to meet their initial obligations for reducing groundwater demand and are utilizing COH treated surface water, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the sponsors have continued implementation of their Groundwater Reduction Plan (GRP) programs, including plans for increased surface water treatment capacity and expansions to transmission and distribution systems. In order to utilize future expanded treated water supply in order to meet future required phases of conversion, COH, NHCRWA, and CHCRWA are jointly developing a major pipeline to convey NEWPP supplies westward. The pipeline follows the same corridor as an existing 84-inch shared COH and NHCRWA pipeline until reaching Old

Humble Rod, after which it continues along a rout primarily between Beltway 8 and Aldine Bender Road to a point slightly west of Interstate 45. NHCRWA and CHCRWA are developing additional transmission from this pipeline to their own distribution networks.

Environmental Considerations

Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the project is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

NHCRWA and CHCRWA are subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Development of expanded transmission infrastructure will cause some degree of surface disturbance, which may require permitting and mitigation. Infrastructure development is also likely to require acquisition of additional easements or property.

Cost Analysis

Planning level cost estimates were developed for the Region H Plan based on available information from NHCRWA and CHCRWA. CHCRWA's share of the project capital cost was estimated as the total projected transmission development cost for NHCRWA less the estimated cost for NHCRWA's future transmission pipelines which will connect from the shard pipeline to NHCRWA's distribution network. CHCRWA provided an estimate of shared cost. COH's cost was assumed to be equal to that listed in the NHCRWA GRP for the existing COH and NHCRWA shared pipeline. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Other cost components not included in the GRP, such as interest during construction, annualized debt service, and annualized operations and maintenance costs, were assumed using standard Regional Planning costing assumptions. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – COH, NHCRWA, CHCRWA Shared Transmission Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$126,470,000	$126,470,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$2,200,000	$2,200,000
3	LAND AND EASEMENTS	1	LS	$6,060,000	$6,060,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$15,595,381	$15,595,381
	PROJECT COST				$150,325,381

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$11,061,205	$11,061,205	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,264,700	$1,264,700	$1,264,700	$1,264,700	$1,264,700	$1,264,700
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$12,325,905	$12,325,905	$1,264,700	$1,264,700	$1,264,700	$1,264,700

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$12,325,905	$12,325,905	$1,264,700	$1,264,700	$1,264,700	$1,264,700
2	YIELD	148,042	148,042	148,042	148,042	148,042	148,042
3	UNIT COST	$83	$83	$9	$9	$9	$9
	TOTAL UNIT COST						$33

PROJECT EVALUATION

Based on the analysis provided above, the COH, NHCRWA, and CHCRWA Shared Transmission project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	The shared transmission pipeline, while not directly generating supply, allow conveyance with small additional cost.
Location	4	Reflects conveyance infrastructure from major transmission pipelines to demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.

CRITERIA	RATING	EXPLANATION
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The COH, NHCRWA, and CHCRWA Shared Transmission project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

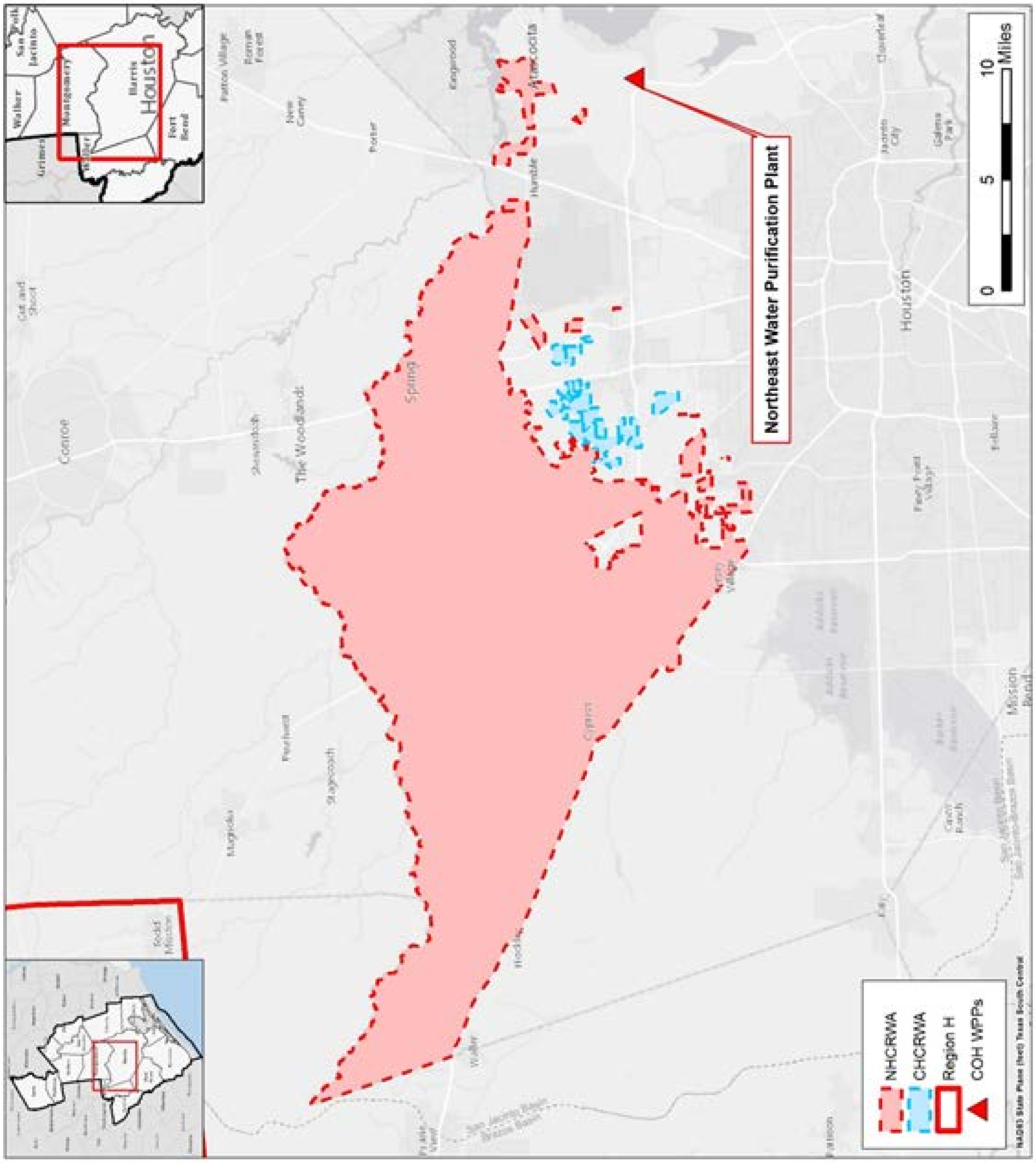
CRITERIA	WUG SUITABILITY
Proximity	Conveyance infrastructure from major transmission pipelines to demand centers.
Size	Conveyance is sized to convey the requisite amount of source water.
Water Quality	Conveys treated water of quality appropriate for municipal use.
Unit Cost	Adds small amount to unit cost of surface water conversion process.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

AECOM. *2014 North Harris County Regional Water Authority Groundwater Reduction Plan*, prepared for NHCRWA, June 2014.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013..

LOCATION MAP



REGION H
Water Planning Group

COH/NHCRWA/CHCRWA
Second Source Pipeline
Location Map

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	East Texas Interbasin Transfer
Project ID:	CONV-003
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	250,000 ac-ft/yr (223 mgd)
Implementation Decade:	2040
Development Timeline:	20 years
Project Capital Cost:	$388,064,210 (Sept. 2013)
Unit Water Cost (Rounded):	$145 per ac-ft (during loan period) $15 per ac-ft (after loan period)

PROJECT DESCRIPTION

After the development of identified, in-region projects throughout Region H, additional needs are identified that will require water from a newly developed or transmitted source. Development of water supplies within the Region H basins becomes increasingly difficult as competing water supply interests along with environmental uses make use of the remaining, developable supplies. This is particularly true for the western basins across Texas but specifically points to additional difficulty in developing new supplies within the Brazos River Basin.

An alternative to this is the transfer and use of supplies that have already been developed in the eastern basins in the state. Specifically, developed water supplies in Toledo Bend Reservoir in the Sabine River Basin present a viable alternative for meeting future needs in Region H. Conveyance of these to the Trinity River Basin allows for the use of this water through existing conveyance infrastructure. There are additional challenges in utilizing these supplies in the western portion of Region H where routes of transmission are inhibited by the development of the greater-Houston area.

This memorandum summarizes a high-level concept for the transmission of water from East Texas through canal and pipeline conveyance to diversion points in the Trinity and Brazos River Basins. The strategy, as applied in the 2016 Regional Water Plan (RWP) focuses on conveyance to the Trinity River. Information related to conveyance from the Trinity River to the Brazos River is included for informational purposes.

PROJECT ANALYSES

The project analyses for East Texas Interbasin Transfer include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

A review of existing project concepts was conducted in order to develop the concept for transmission from Toledo Bend Reservoir to Region H. This includes studies by the Sabine River Authority of Texas (SRA-TX) and Lower Neches Valley Authority (LNVA) as well as the existing Trans-Texas Water Program and a recent study developed for the Gulf Coast Water Authority (GCWA). The conveyance route was divided into three distinct segments for consideration in this project.

- Sabine to Neches – Utilize an improved Gulf Coast Pump Station to convey water released from Toledo Bend to the Neches River Basin.
- Neches to Trinity – Utilize two connections to convey water diverted from the Neches River from the LNVA Canal to the Devers Canal and then on to the Trinity River near the Coastal Water Authority (CWA) Trinity River Pump Station.
- Trinity to Brazos – Develop a pipeline conveyance from Lake Livingston to convey water to the Brazos River Basin. This route will require a repump station that is located near the existing Lake Conroe Dam which allows for this conveyance to serve needs in the San Jacinto River Basin as well.

In order to execute the full scope of this project, water conveyed from eastern basins will be exchanged with water that will be conveyed further west. For instance, water entering the Trinity at the Trinity River Pump Station will be utilized in lieu of water released from Lake Livingston in order for that water to be moved to the west and into the San Jacinto and Brazos River Basins. This arrangement requires not only significant infrastructure to accomplish but also cooperation of large water rights holders such as the City of Houston in order to make the exchanges possible.

Environmental Considerations

Any project of this magnitude will include environmental challenges to be resolved during planning, design, and construction. To the extent possible, existing canal conveyances are utilized in order to prevent the disturbance of surrounding habitat. Specific environmental obstacles would be identified during routing studies of the proposed alignments.

Particular focus was given to the Trinity to Brazos River segment as is crosses a section of the Sam Houston National Forest. Preliminary discussions with the United Stated Forest Service (USFS) indicate that there are opportunities to utilize existing corridors in the area in order to develop a project with minimal impacts. As with other segments, further study in the routing phase of the project will better identify the potential obstacles and approaches to mitigation in order to make this project successful.

Environmental flows will be impacted through the movement of water from one basin to another. Actual impacts will be determined during the permitting process for the interbasin transfer of water outside of the terms currently granted under permit.

Permitting and Development

Although water rights are currently held for the storage and appropriation of water in the Sabine River Basin, amendments to these permits are required to allow for conveyance to western basins. Furthermore, additional, unappropriated flows may also be permitted in excess of these supplies and conveyed out of the basin for purpose of this project. These steps will require a permit process with the Texas Commission on Environmental Quality (TCEQ) to make water available for the project.

Additional environmental permitting will also be required for the development of infrastructure critical to project development. This includes but is not limited to:

- U.S. Army Corps of Engineers Section 404 Permit and mitigation plan
- National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS)
- Cultural Resources Survey and National Register of Historic Places (NRHP) testing
- Ancillary studies as directed by Texas Parks and Wildlife (TPWD) and U.S. Fish and Wildlife Service (USFWS)

Cost Analysis

Costs were developed for the Sabine to Neches and Neches to Trinity segments of the project. These planning-level estimates are shown below in *Table 1*. It should be noted that these costs do not include the cost of purchasing the water since it is subject to negotiation between the seller (SRA) and future buyers. Informal discussions indicate that the pricing of water will be based on "replacement cost" of alternative water supplies.

Table 1 – East Texas Interbasin Transfer Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					February 18, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$272,476,173	$272,476,173
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$95,366,660	$95,366,660
3	LAND AND EASEMENTS	1	LS	$4,287,127	$4,287,127
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$3,905,116	$3,905,116
5	INTEREST DURING CONSTRUCTION	1	LS	$12,029,134	$12,029,134
	PROJECT CAPITAL COST				$388,064,210

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$32,472,953	$32,472,953	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$2,862,037	$2,862,037	$2,862,037	$2,862,037
3	PUMPING ENERGY COSTS	$0	$0	$830,351	$830,351	$830,351	$830,351
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$36,165,341	$36,165,341	$3,692,388	$3,692,388

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$36,165,341	$36,165,341	$3,692,388	$3,692,388
2	YIELD	-	-	250,000	250,000	250,000	250,000
3	UNIT COST	$0	$0	$145	$145	$15	$15
	TOTAL UNIT COST						$80

PROJECT EVALUATION

Based on the analysis provided above, the East Texas Interbasin Transfer project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	The project would have a low overall unit cost.
Location	1	Considerable interbasin transfer required to convey water from outside of Region H.
Water Quality	3	No known water quality issues identified.
Environmental Land and Habitat	2	Some environmental issues anticipated but may be mitigated through adequate planning and design.
Environmental Flows	2	Project alters environmental flows patterns in each basin although these impacts will be limited through prescribed environmental flows standards.
Local Preference	3	Currently no significant local support or opposition to the project.
Institutional Constraints	1	Significant challenges to pursue permits and acquire required right-of-way.
Development Timeline	3	Estimated development timeline of 20 years.
Sponsorship	3	Sponsors identified based on needs and the required mechanics of the project. Currently, these stakeholders are not actively committed to development.
Vulnerability	2	Substantial risk to infrastructure related to natural disasters along the Gulf Coast that may impact any portion of the project from the Sabine River Basin to Region H.
Impacts on Other Projects	4	Project enables the use of existing water supplies and may be combined with other projects such as TRA to SJRA Transfer to achieve comprehensive, regional goals.

WATER USER GROUP APPLICATION

The East Texas Interbasin Transfer project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

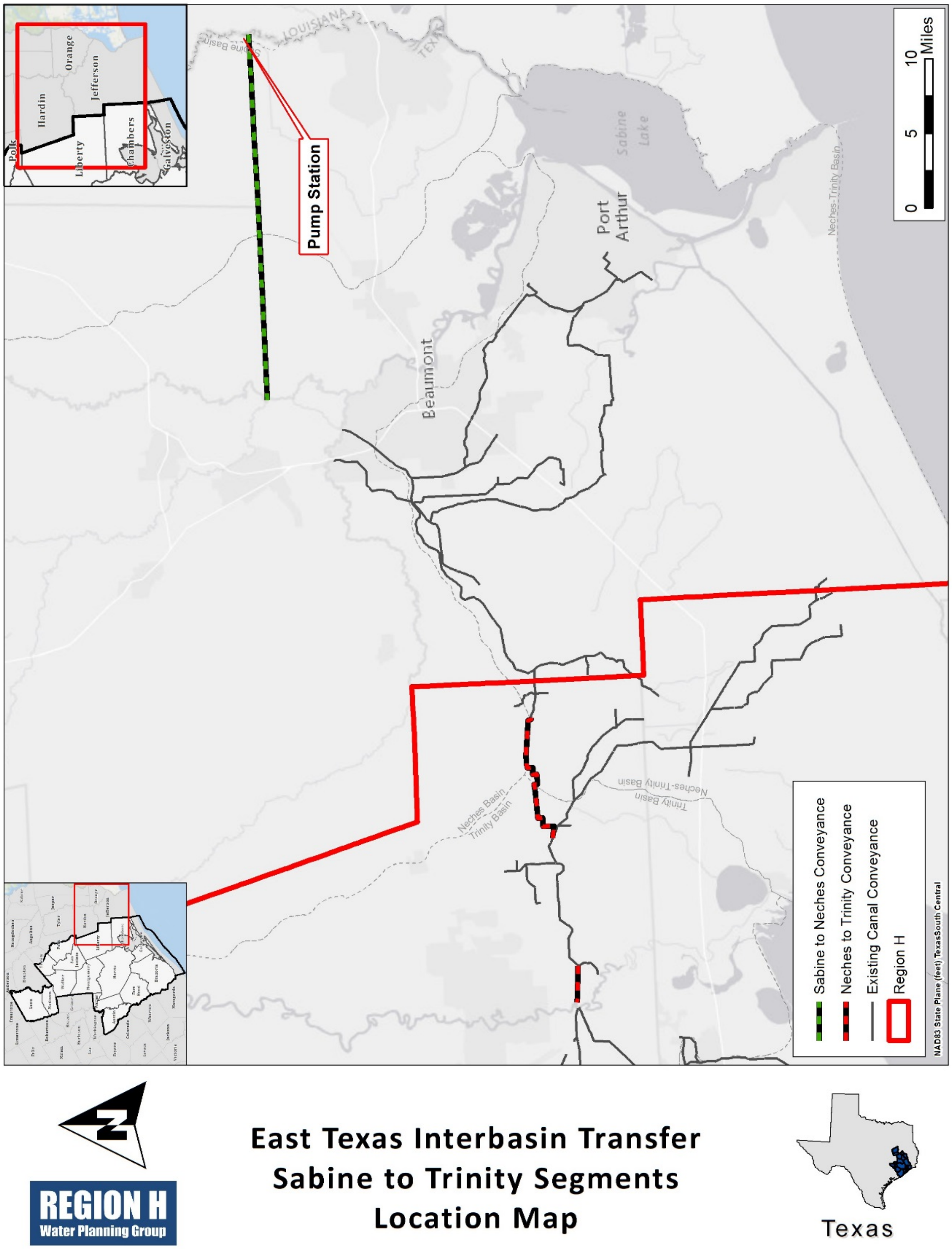
CRITERIA	WUG SUITABILITY
Proximity	This project will deliver water to locations where it may be utilized through existing take points in the Trinity, San Jacinto, and Brazos River Basins.
Size	The magnitude of this project dictates that it be accomplished by major water providers in response to large, growing demands among their many customers. In effect, this water may be utilized by WUGs of many sizes that receive water from these major providers.
Water Quality	Project will provide raw water which will require treatment for some uses such as municipal supply.
Unit Cost	The project would have a low overall unit cost.
Other Factors	This project will be accomplished by specific, regional water providers based on strategic needs when current water supplies become inadequate to meet future needs.

REFERENCES

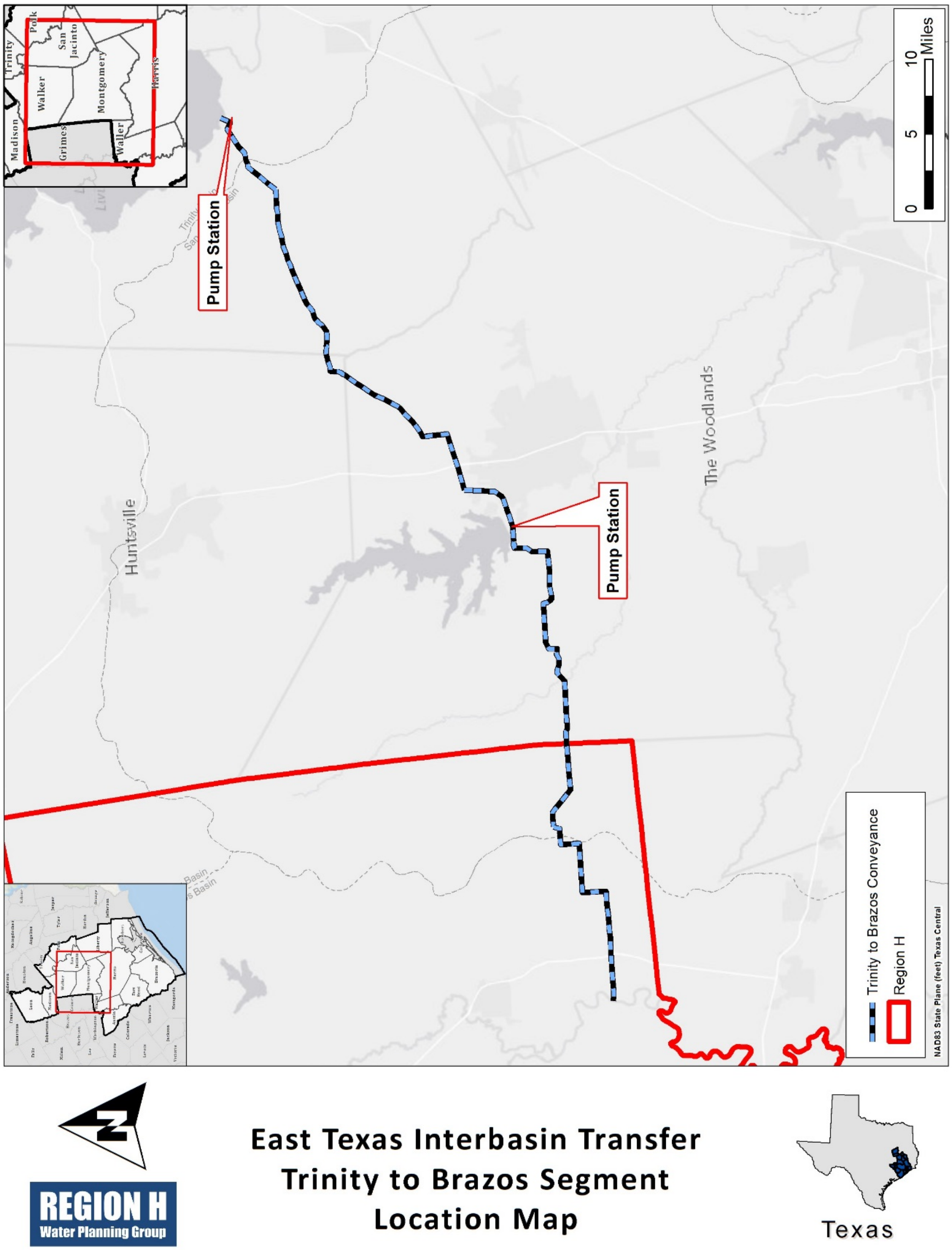
Freese and Nichols, Inc. for Gulf Coast Water Authority. 2014. *Long Range Water Supply Study – Detailed Evaluation of Selected Strategies*.

Sabine River Authority of Texas, Lower Neches Valley Authority, San Jacinto River Authority, City of Houston, Brazos River Authority, and Texas Water Development Board. 1998. *Trans-Texas Water Program, Southeast Area, Final Report*.

LOCATION MAP – SABINE TO TRINITY



LOCATION MAP –TRINITY TO BRAZOS



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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	GCWA Treated Water from LNVA
Project ID:	CONV-004
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	16,800 ac-ft/yr (15 mgd)
Implementation Decade:	2020 potential
Development Timeline:	5 years
Project Capital Cost:	$195,068,333 (Sept. 2013)
Unit Water Cost (Rounded):	$1,073 per ac-ft (during loan period) $101 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Lower Neches Valley Authority (LNVA) currently provides surface water to Bolivar Peninsula by way of a water treatment plant (WTP) in Winnie, located in Chambers County, which feeds a pipeline to High Island that turns and extends to the end of the peninsula. This treated water supply is approximately two miles from Galveston Island across the strait from Port Bolivar. A similar concept and corridor could potentially be used to deliver treated water to the GCWA service area which could offset treated water demands from the Thomas Mackey Water Treatment Plant (TMWTP).

PROJECT ANALYSES

The project analyses for GCWA Treated Water from LNVA include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The current WTP in Winnie is rated for 5 MGD but can be doubled twice within the existing property for a total potential capacity of 20 MGD. Bolivar SUD's current usage from the WTP peaks at approximately 2.5 MGD. Introduction of treated water to Galveston Island from the Winnie Plant would require the expansion of the plant and construction of a new pipeline parallel to the existing alignment. Additional supply would be limited by the expandability of the WTP (an additional 15 MGD) and/or the limitations to develop a transmission line within the same right of way.

A conceptual-level investigation was conducted for the delivery of water to Galveston Island from the Winnie Plant. It was assumed that assumed that the existing Winnie WTP would be expanded by 15 MGD to its maximum capacity (of 20 MGD), and that a new 36-inch diameter, 56 mile, treated water pipeline would be constructed from the WTP to the 59th Street Water Plant on Galveston Island. This pipeline route, as shown in the attached location map, would parallel the existing pipeline alignment from Winnie to the end of the Bolivar Peninsula and would require marine crossings of the Houston

Ship Channel (from Bolivar Peninsula to Pelican Island) and the Galveston Channel (from Pelican Island to Galveston Island). A 36-inch diameter pipeline was selected for the extent of the corridor.

Marine crossings of the Houston Ship Channel (approximately 10,500 linear feet) and Galveston Channel (approximately 4,000 linear feet) represent a significant undertaking of the treated water pipeline option. The crossings would likely involve laying high-density polyethylene (HDPE) along the marine floor. These sections of pipe would be anchored using concrete blocks placed at intervals of approximately 50 feet (two per segment of pipe). The line would be fused together on land and floated into place. Once located correctly, the line would be filled with water and placed in a trench dredged in the bay floor.

Environmental Considerations

The development of this project would pose significant environmental challenges, particularly related to the marine crossings required to connect the supply to Galveston Island. Potential environmental issues for the crossings would include oyster beds, marine habitat, and potentially some marine archeology.

Permitting and Development

LNVA holds water right permits to 792,000 ac-ft/yr from Lake Sam Rayburn and B.A. Steinhagen Lake System. The authority also owns rights to divert another 381,876 ac-ft/yr from Pine Island Bayou and the Neches River. This total volume of water, minus any existing contracts honored by LNVA, could potentially be made available for transfer to customers in the west. However, these waters are permitted only for use as far west as the Neches-Trinity Coastal Basin within the service area of LNVA at present.

Some significant challenges to this alternative include unit water cost, water quality, and permitting. Potential water quality considerations include water age upon delivery to Galveston and chemical differences from blending multiple water sources (the alternative would not fully supply the municipal demands of the Galveston area). Further analysis will be required to determine the blending ability of the two waters.

Construction of the marine bay and channel crossings will require partial shutdown of marine traffic in the area, which is potentially problematic. As a navigable water, the crossings would be subject to implications of Sections 9 and 10 of the River and Harbors Act of 1899 (requiring an Individual Permit), and, as a waterway of the U.S., there are implications to Section 404 of the Clean Water Act. Finally, permitting with the General Land Office (GLO) for a right-of-way would be necessary.

Cost Analysis

Preliminary costs for the project were developed base on the concept proposed above. These costs are summarized in *Table 1*, below. The costs presented in this memorandum do not include the purchase cost of water.

Table 1 – GCWA Treated Water from LNVA

OPINION OF PROBABLE CONSTRUCTION COST					November 30, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$143,808,207	$143,808,207
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$45,179,950	$45,179,950
3	LAND AND EASEMENTS	1	LS	$16,744	$16,744
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$16,744	$16,744
5	INTEREST DURING CONSTRUCTION	1	LS	$6,046,688	$6,046,688
	PROJECT CAPITAL COST				$195,068,333

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$16,323,187	$16,323,187	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,030,584	$1,030,584	$1,030,584	$1,030,584	$1,030,584	$1,030,584
3	PUMPING ENERGY COSTS	$666,000	$666,000	$666,000	$666,000	$666,000	$666,000
	TOTAL ANNUAL COST	$18,019,772	$18,019,772	$1,696,584	$1,696,584	$1,696,584	$1,696,584

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$18,019,772	$18,019,772	$1,696,584	$1,696,584	$1,696,584	$1,696,584
2	YIELD	16,800	16,800	16,800	16,800	16,800	16,800
3	UNIT COST	$1,073	$1,073	$101	$101	$101	$101
	TOTAL UNIT COST						$425

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$93,792,971	$93,792,971
2	PIPELINE CROSSINGS	1	LS	$9,265,469	$9,265,469
3	WATER TREATMENT PLANTS	1	LS	$40,749,767	$40,749,767
	PROJECT COST				$143,808,207

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$93,792,971	$937,930
2	PIPELINE CROSSINGS	1.0	%	$9,265,469	$92,655
3	WATER TREATMENT PLANTS	1.0	LS	$0	$0
	ANNUAL OPERATION AND MAINTENANCE COST				$1,030,584

PROJECT EVALUATION

Based on the analysis provided above, the GCWA Treated Water from LNVA project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	Proposed project is expected to deliver at a very high cost due to cost of transmission.
Location	1	Long conveyance from outside of Region H requiring IBT permitting.
Water Quality	3	No known issues regarding water quality.
Environmental Land and Habitat	2	Numerous environmental concerns, particularly related to marine crossings and overall length of pipeline required.
Environmental Flows	3	No significant impact to environmental flows anticipated. Surface water supply is already permitted for various uses.
Local Preference	2	No significant support identified at this point.
Institutional Constraints	2	Some opposition anticipated in project development, particularly for marine crossings.
Development Timeline	4	Project development, including permitting, could be accomplished in approximately 10 years.
Sponsorship	2	GCWA is not currently committed to developing this project.
Vulnerability	2	Long distance and pipeline crossings make this project potentially susceptible to impacts from natural and man-made disasters.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

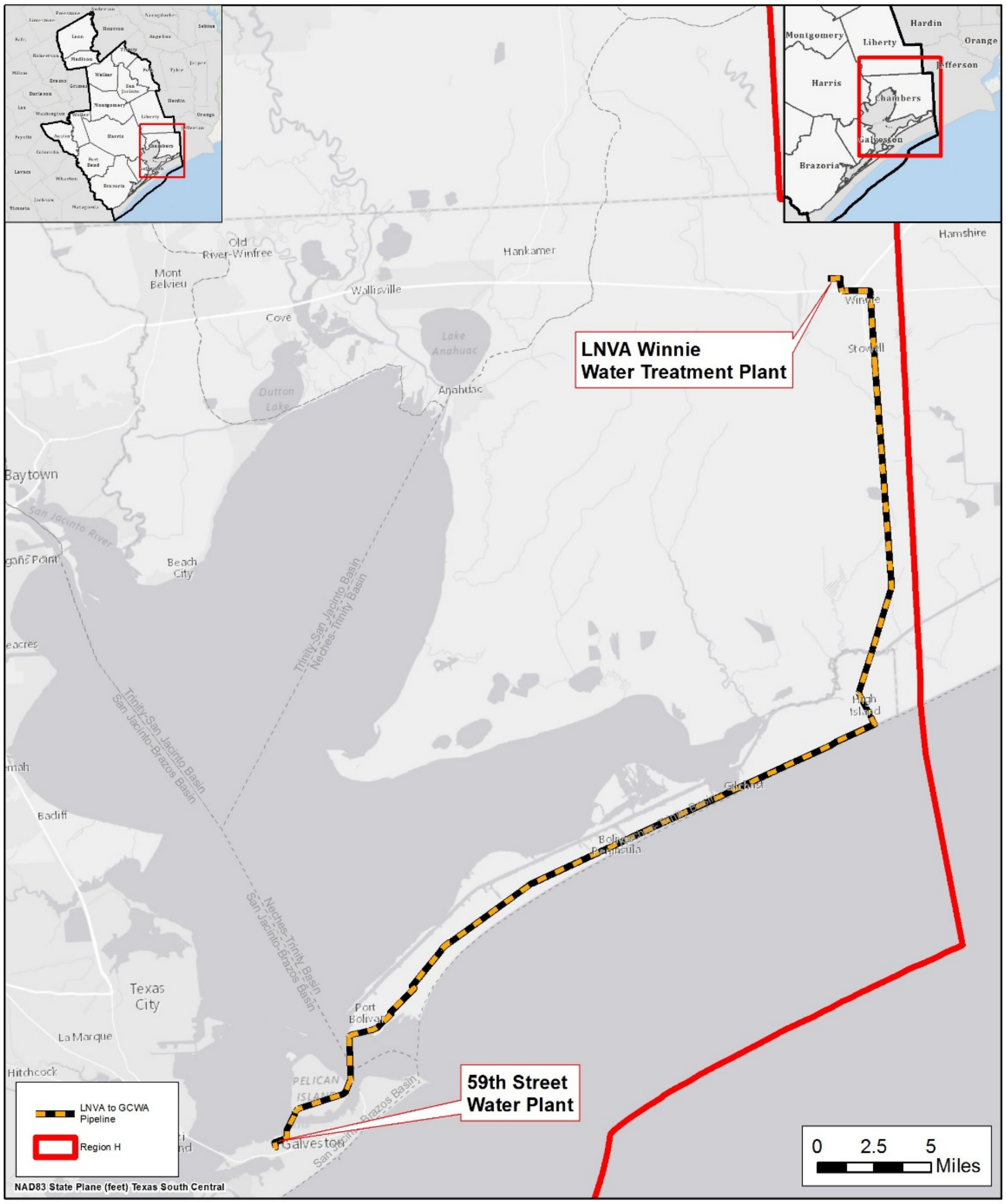
WATER USER GROUP APPLICATION

The GCWA Treated Water from LNVA project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	The project is capable of serving water to Galveston Island which, in turn, could reduce demands on the TMWTP.
Size	The project provides a significant supply to Galveston. However, this quantity is not capable of meeting peak demands and additional supply would still be required from the TMWTP.

CRITERIA	WUG SUITABILITY
Water Quality	The project provides treated water, as is currently utilized by Galveston Island to meet a mixture of demands.
Unit Cost	The cost of this project limits its application to municipal supply.
Other Factors	The project requires City of Galveston to manage supplies from multiple sources.

LOCATION MAP



REGION H
Water Planning Group

LNVA to GCWA Transfer Location Map

Texas

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Lake Livingston to SJRA Transfer
Project ID:	CONV-005
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	50,000 ac-ft/yr (45 mgd)
Implementation Decade:	2050
Development Timeline:	10 years
Project Capital Cost:	$166,710,892 (Sept. 2013)
Unit Water Cost (Rounded):	$311 per ac-ft (during loan period) $32 per ac-ft (after loan period)

PROJECT DESCRIPTION

Montgomery County is currently in the process of converting excess groundwater demand to surface water and other sources. This process is being carried out by numerous Large Volume Groundwater Users (LVGUs) in the county. However, the San Jacinto River Authority (SJRA) represents the largest Wholesale Water Provider (WWP) providing a means of conversion within the county. Current supplies from Lake Conroe are adequate for initial phases of conversion but future growth will require the introduction of additional groundwater alternatives. Recently, SJRA secured an agreement with the Trinity River Authority (TRA) for the purchase of 50,000 acre-feet of water per year from Lake Livingston. This supply may be utilized within the Trinity River Basin or permitted for transfer out of the basin through existing infrastructure operated by the Coastal Water Authority (CWA) or through a new conveyance capable of delivering the raw water to Montgomery County.

PROJECT ANALYSES

The project analyses for Lake Livingston to SJRA Transfer include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The identified supply of 50,000 acre-feet per year is allocated out of TRA's existing rights associated with Lake Livingston and the Wallisville Saltwater Barrier. This total supply of 403,200 acre-feet per year was determined to be firm in the context of the Region H Plan and available for use by TRA.

Use of this water by SJRA requires various approaches to delivering the supply to demands within SJRA's service area. SJRA serves a substantial demand center of largely industrial water needs from its Highlands System. In addition to water rights and return flows diverted at Lake Houston, SJRA also contracts with CWA to convey run-of-the-river water rights it owns in the lower Trinity River Basin to its Highland canals. A similar arrangement could be feasible for the transfer of this TRA water supply into the San Jacinto and Trinity-San Jacinto Basins.

Use of the project supply in Montgomery County requires the development of a new conveyance to divert water from the Trinity River Basin and deliver it to Montgomery County. The proposed approach for this transfer would begin at a pump station situated near the southwest shore of Lake Livingston where it may benefit from access to lower levels of the reservoir to guard against reduced water availability during periods of low lake levels.

From that point, the pipeline travels along State Highway 150 and Farm to Market 1097 to the east side of Willis. Upon circumventing Willis, the pipeline would terminate in the vicinity of Lake Conroe where the conveyed water may be discharge to Lake Conroe or fed directly to treatment infrastructure operated by SJRA.

Environmental Considerations

The interbasin transfer of water from one basin to another is always associated with potential impacts to water resources and the potential for transmission of species. Consideration must be given to impacts to both the source and receiving basins in developing a viable project.

A large portion of the pipeline alignment travels through the Sam Houston National Forest. One option for development would be through privately owned lands within the forest. However, coordination with the United States Forest Service (USFS) indicated that it may be preferable to follow existing corridors through the forest in order to limit impacts to habitat associated with making additional cuts through forested land. This is a sensitive issue requiring further consideration prior to development.

Permitting and Development

Although a water right permit exists for the development of the TRA supply, additional permitting will be required to make the supply available in the San Jacinto River Basin. This requirement is not applicable the service of SJRA’s demands in the Trinity-San Jacinto Coastal Basin.

Cost Analysis

Costs were developed based on planning-level estimates and are shown below in *Table 1*. The costs presented in this memorandum do not include the purchase cost of water.

Table 1 – Lake Livingston to SJRA Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					February 14, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$106,970,000	$106,970,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$33,045,500	$33,045,500
3	LAND AND EASEMENTS	1	LS	$7,170,000	$7,170,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$7,170,000	$7,170,000
5	INTEREST DURING CONSTRUCTION	1	LS	$12,355,392	$12,355,392
	PROJECT CAPITAL COST				$166,710,892

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$0	$13,950,256	$13,950,256	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$0	$1,356,050	$1,356,050	$1,356,050
3	PUMPING ENERGY COSTS	$0	$0	$0	$237,000	$237,000	$237,000
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$0	$15,543,306	$15,543,306	$1,593,050

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$0	$15,543,306	$15,543,306	$1,593,050
2	YIELD	-	-	-	50,000	50,000	50,000
3	UNIT COST	$0	$0	$0	$311	$311	$32
	TOTAL UNIT COST						$218

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$19,090,000	$19,090,000
2	PIPELINES	1	LS	$87,880,000	$87,880,000
	PROJECT COST				$106,970,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$19,090,000	$477,250
2	PIPELINES	1.0	%	$87,880,000	$878,800
	ANNUAL OPERATION AND MAINTENANCE COST				$1,356,050

PROJECT EVALUATION

Based on the analysis provided above, the Lake Livingston to SJRA Transfer project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

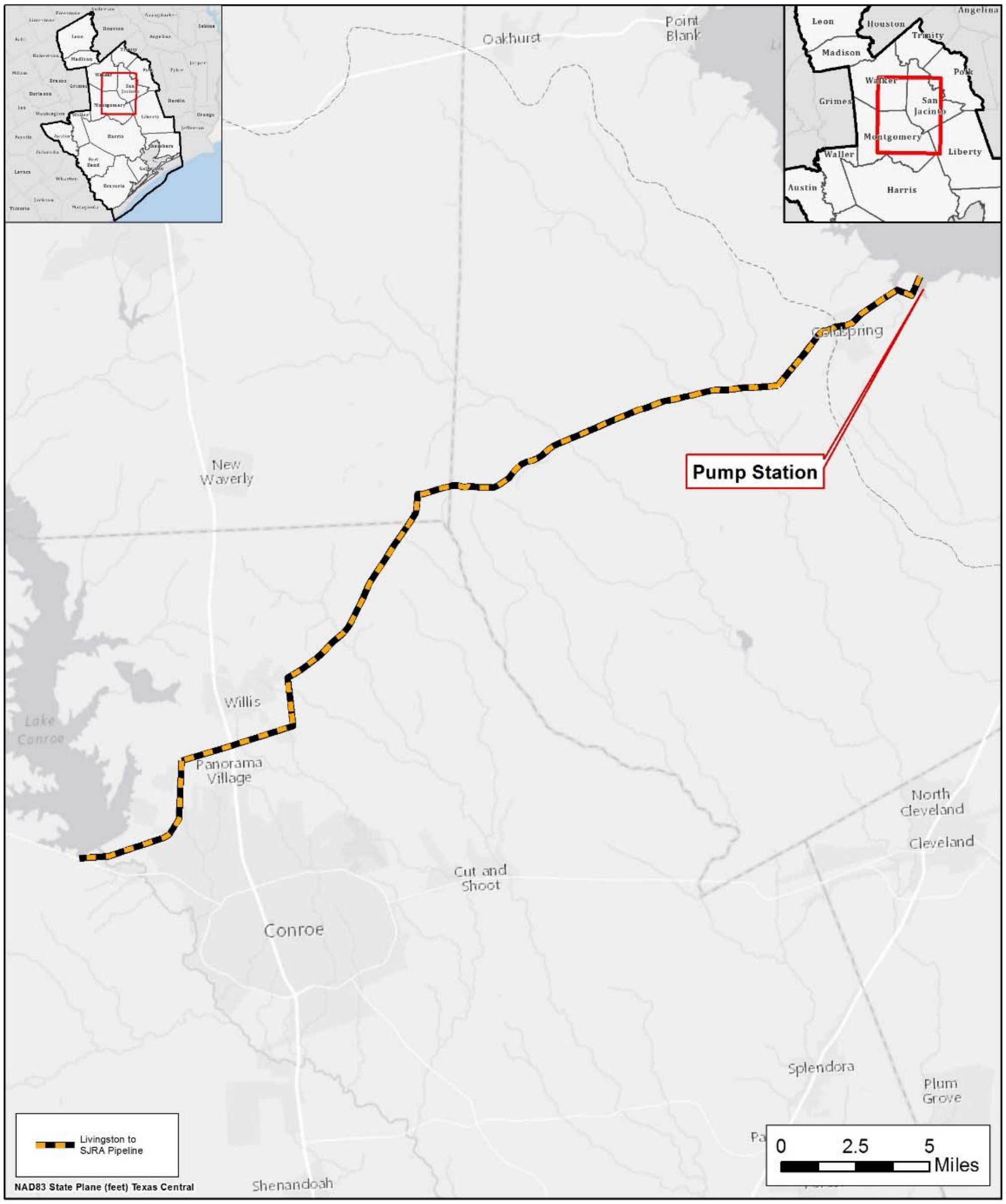
CRITERIA	RATING	EXPLANATION
Cost	4	Relatively low-cost project for delivery of raw water. Total cost will also include contract cost of water.
Location	2	Project development requires IBT.
Water Quality	3	No known impacts to water quality.
Environmental Land and Habitat	2	Some environmental issues to address related to conveyance route.
Environmental Flows	2	Project will reduce flows within the Trinity Basin in the terms of existing permit but will provide increased return flows in the San Jacinto Basin.
Local Preference	4	Local support for development of a surface water supply in addition to Lake Conroe in Montgomery County.
Institutional Constraints	2	Property acquisition required in order to provide for pump station site and pipeline corridor.
Development Timeline	4	Project development within 10 years.
Sponsorship	4	SJRA is committed to exploring options for utilizing this resource.
Vulnerability	4	Slight risk from natural or man-made disasters related to infrastructure.
Impacts on Other Projects	4	This project takes advantage of an existing water source by making it available to demand centers.

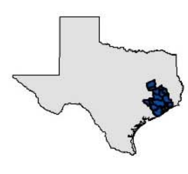
WATER USER GROUP APPLICATION

The Lake Livingston to SJRA Transfer project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	The project provides water for the SJRA service area by delivering water to Lake Conroe and/or the SJRA water treatment plant.
Size	The magnitude of this project provides for a significant additional supply to Montgomery County. When provided to a point at the SJRA treatment plant, it may serve a large, and flexible demand base throughout the county.
Water Quality	This project provides raw water that may be treated through additional infrastructure in order to provide water for municipal and other uses.
Unit Cost	The costs for this project make it suited to providing for municipal and industrial needs.
Other Factors	The project is associated with water supplies that have already been obtained by SJRA through agreement with TRA.

LOCATION MAP





REGION H Water Planning Group

Lake Livingston to SJRA Transfer Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Luce Bayou Interbasin Transfer
Project ID:	CONV-006
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	450,000 ac-ft/yr (400 mgd)
Implementation Decade:	2020
Development Timeline:	10 years
Project Capital Cost:	$360,004,806 (Sept. 2013)
Unit Water Cost (Rounded):	$143 per ac-ft (during loan period) $23 per ac-ft (after loan period)

PROJECT DESCRIPTION

The City of Houston (City) is a major water provider in Region H and will provide treated surface water to numerous municipalities, districts and areas outside of its current corporate limits. Many of these WUGs, as well as a significant amount of the City's own growth in surface water demand, are located in northern and northwestern Harris County. The Northeast Water Purification Plant (NEWPP) on the western edge of Lake Houston provides is slated to serve the entirety of the surface water that is planned to be required by the North Harris County Regional Water Authority (NHCRWA) and the Central Harris County Regional Water Authority (CHCRWA). In addition, the NEWPP has been identified as the source for future phases of conversion for the West Harris County Regional Water Authority (WHCRWA) and North Fort Bend Water Authority (NFBWA) beginning in 2025.

The NEWPP takes its raw water directly from Lake Houston. The City's East Water Purification Plant (EWPP) and a group of industries also draw raw water supplies from Lake Houston. By year 2020, demands for this customer base will exceed the City's firm raw water supplies currently available in Lake Houston.

However, supplies owned by the City in the Trinity River basin in conjunction with other available supplies from the Trinity River Authority are sufficient to meet the demands of this customer base. The City's permit for Lake Livingston allows for the inter-basin transfer of supply via Luce Bayou. However, this conveyance system has not yet been constructed. The Luce Bayou project will supply Trinity River water to the upstream end of Luce Bayou. From there, the water will flow to and be available from Lake Houston.

PROJECT ANALYSES

The project analyses for Luce Bayou Interbasin Transfer include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost. The primary source of information for this summary is the *Preliminary Engineering Report for the Luce Bayou Interbasin Transfer Project* prepared by AECOM Technical Services and dated January 2011.

Supply Development

The Luce Bayou Interbasin Transfer project is intended to take advantage of supplies that have already been developed in the Trinity River Basin and are permitted for diversion. The project will allow for transfer of these supplies to the San Jacinto River Basin and beyond to meet the growth of demands in this service area without the need for additional surface water development.

The terms of the supply made available by the Luce Bayou project are captured in Certificates of Adjudication 08-4261 and 08-4261B. Diversions at the Luce Bayou take point are limited by that permit to 450,000 acre-feet per year on an annual basis and a maximum diversion rate of 775 cfs. The divertible water would be made available for all users that currently receive water from Lake Houston or who access to Lake Houston will be made available in the future through the development of other infrastructure.

Environmental Considerations

Although the original plan for the Luce Bayou project included the conveyance of water through the stream corridor for which the project is named, the current project concept avoids the sensitive areas of the stream and utilizes a combined pipeline and canal conveyance to deliver water to Lake Houston. Pipeline segments of the project are limited to the property identified for the pump station and on-site mitigation and this area was considered when determining the overall area of potential mitigation. The canal sections were routed in order to minimize impacts to property and identified wetlands.

Other considerations for environmental impacts include the design of intake structures intended to protect fish species in the Trinity River Basin. Other wildlife considerations include the fencing used around the canal sections and the mobility needs of wildlife.

Permitting and Development

The Luce Bayou Interbasin Transfer project is subject to requirements related for the diversion of water as well as the U.S. Army Corps of Engineers (USACE) Section 404 process. Provisions for water rights were already established for the project under Certificates of Adjudication 08-4261 and 08-4261B. The project had also received its Section 404 permit for project development.

Cost Analysis

Costs were developed for the project in the PER prepared by AECOM. These costs were adjusted to September 2013 costs based on standard indices and power costs were estimated based on anticipated yield from the project over time. The costs presented in this memorandum do not include the purchase cost of water. These cost are shown below in *Table 1*.

Table 1 – Luce Bayou Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					November 19, 2014
ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$236,000,000	$236,000,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$77,600,000	$77,600,000
3	LAND AND EASEMENTS	1	LS	$15,000,000	$15,000,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$15,000,000	$15,000,000
5	INTEREST DURING CONSTRUCTION	1	LS	$16,404,806	$16,404,806
	PROJECT CAPITAL COST				**$360,004,806**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
1	DEBT SERVICE	$30,124,961	$30,124,961	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$3,155,000	$3,155,000	$3,155,000	$3,155,000	$3,155,000	$3,155,000
3	PUMPING ENERGY COSTS	$3,547,148	$3,547,148	$7,188,031	$7,188,031	$7,188,031	$7,188,031
	TOTAL ANNUAL COST	**$36,827,109**	**$36,827,109**	**$10,343,031**	**$10,343,031**	**$10,343,031**	**$10,343,031**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
1	ANNUAL COST	$36,827,109	$36,827,109	$10,343,031	$10,343,031	$10,343,031	$10,343,031
2	YIELD	257,600	257,600	450,000	450,000	450,000	450,000
3	UNIT COST	$143	$143	$23	$23	$23	$23
	TOTAL UNIT COST						**$50**

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	CANAL	23	Mi	$5,190,000	$122,000,000
2	PIPELINE	16,000	Ft	$2,949	$47,000,000
3	PUMP STATION	1	LS	$53,000,000	$53,000,000
4	ELECTRICAL SERVICE	1	LS	$14,000,000	$14,000,000
	PROJECT COST				**$236,000,000**

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	CANAL	1.0	%	$122,000,000	$1,220,000
2	PIPELINE	1.0	%	$47,000,000	$470,000
3	PUMP STATION	2.5	%	$53,000,000	$1,325,000
4	ELECTRICAL SERVICE	1.0	%	$14,000,000	$140,000
	ANNUAL OPERATION AND MAINTENANCE COST				**$3,155,000**

PROJECT EVALUATION

Based on the analysis provided above, the Luce Bayou Interbasin Transfer project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Low cost option for delivering water but will require development of other projects as well.
Location	2	Project is for development of an IBT. However, the transfer is already permitted and similar conveyance is already in place.
Water Quality	3	No known impacts to water quality.
Environmental Land and Habitat	3	Mitigation plans developed to address environmental concerns.
Environmental Flows	2	Some impacts from the diversion of water at a more upstream location. Considered within existing permits.
Local Preference	4	Great support from a number of stakeholders and project participants.
Institutional Constraints	5	Project is permitted and ready for construction.
Development Timeline	5	Project can be constructed within 5 years.
Sponsorship	5	Project sponsors are engaged in development.
Vulnerability	4	Project may be vulnerable to some natural or man-made disasters.
Impacts on Other Projects	5	Project is intended to work in conjunction with other projects to make water available to serve future demands.

WATER USER GROUP APPLICATION

The Luce Bayou Interbasin Transfer project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

In general, the water supplied by the Luce Bayou project will be mixed with the waters of Lake Houston, treated at the NEWPP and supplied to the City of Houston, NHCRWA, WHCRWA, CHCRWA, NFBWA and numerous other WUGs served by the COH.

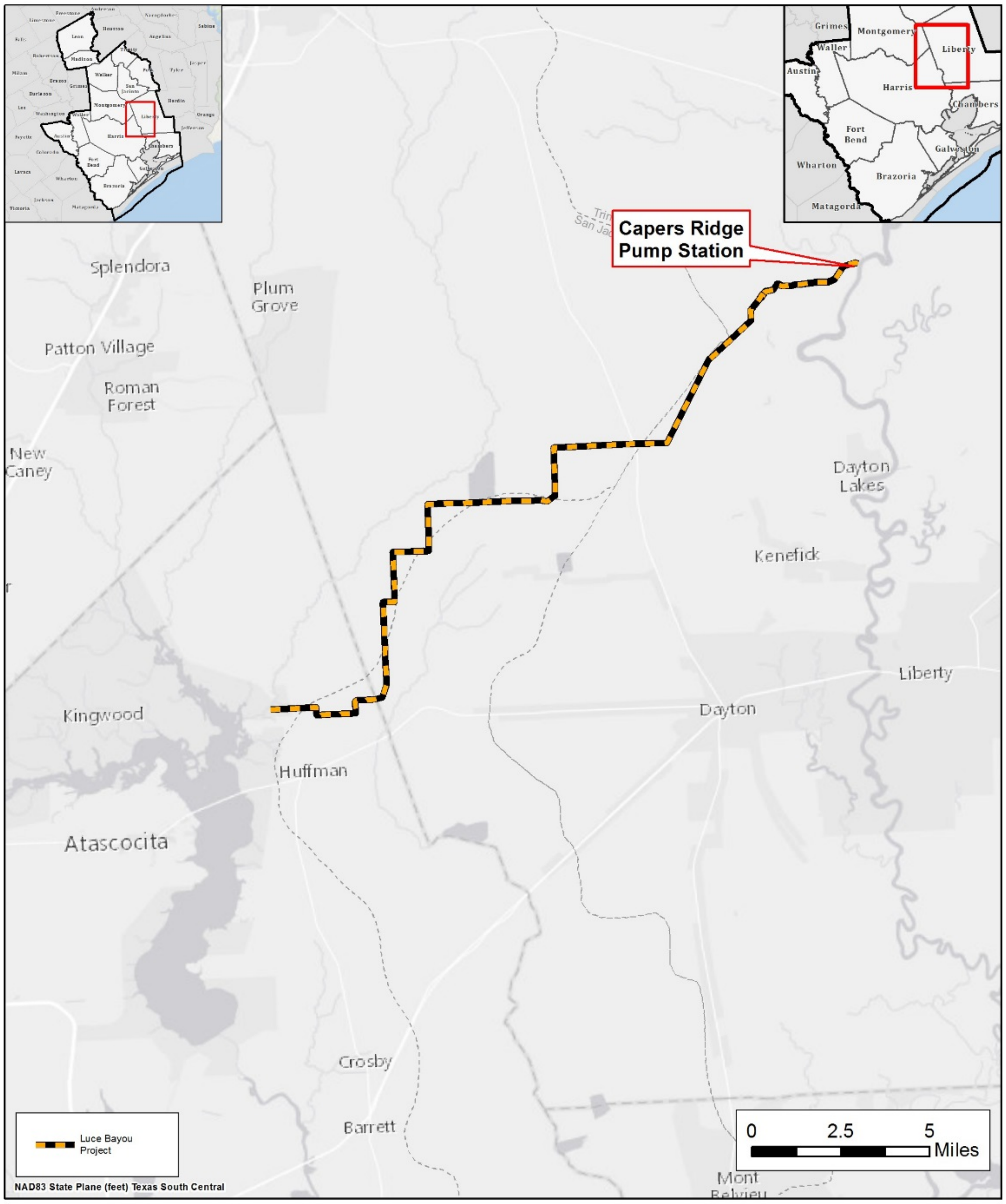
CRITERIA	WUG SUITABILITY
Proximity	The project will serve the Lake Houston area and any other projects that originate from Lake Houston or the NEWPP.

CRITERIA	WUG SUITABILITY
Size	This project will provide a substantial supply of water for use by many regional providers.
Water Quality	This project will provide raw water from the Trinity River basin to the San Jacinto River basin.
Unit Cost	The unit cost of this project is of reasonable magnitude for municipal and industrial water supplies, although other projects and costs will also be required to make the water suitable for municipal use.
Other Factors	The project has many WWP sponsors identified who will utilize the supply generated.

REFERENCES

AECOM Technical Services, *Preliminary Engineering Report for Luce Bayou Interbasin Transfer Project*, Prepared for Coastal Water Authority, January 2011.

LOCATION MAP



Luce Bayou Transfer
Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	North Fort Bend Water Authority Phase 2 Distribution Segments
Project ID:	CONV-007
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	62,496 ac-ft/yr (55.8 mgd) (conveyance only – supply generated by other projects)
Implementation Decade:	2020 (2024)
Development Timeline:	<10 years
Project Capital Cost:	$65,450,062(Sept. 2013)
Unit Water Cost (Rounded):	$95 per ac-ft (during loan period) $7 per ac-ft (after loan period)

PROJECT DESCRIPTION

To address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer, the Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the North Fort Bend Water Authority (NFBWA) and West Harris County Regional Water Authority (WHCRWA) have contracted with the City of Houston (COH) to receive treated surface water. Both Authorities have already developed transmission and distribution infrastructure to meet their initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, NFBWA must expand the distribution infrastructure network through which it supplies its member districts, allowing for greater overall volume conveyed and conversion of additional districts to surface water.

PROJECT ANALYSES

The Project analyses for the NFBWA Phase 2 Distribution Segments include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The NFBWA will deliver surface water to the majority of the 69 MUDs and City of Fulshear within the Authority to meet the requirements of its Groundwater Reduction Plan (GRP) approved by the FBSD.

Environmental Considerations

The NFBWA has engaged in a variety of activities and investigations for projects within the Authority, as summarized below. Note that the following descriptions are not limited to studies of the NFBWA Phase 2 Distribution Segments and also include studies related to NFBWA and WHCRWA's proposed future shared transmission infrastructure. The Authority relies on COH and WHCRWA to address the environmental considerations of projects for which those entities are primarily responsible.

- Threatened and Endangered Species Study - There were no threatened and/or endangered species identified at the time of field investigation. This does not eliminate the possibility of threatened and/or endangered species inhabiting the proposed route area at the time of construction. Further, reconnaissance did identify some habitats conducive for threatened and/or endangered species. At the time of final design and construction, an additional investigation of the area will be required to verify these species have not inhabited the construction area.
- Cultural Resources Study – Investigation revealed limited potential for cultural/archeological resources within the portion along Buffalo Bayou. The majority of this route lies within residential development where any cultural/archeological resources have been previously handled by the land owner. It is anticipated that the Texas Historical Commission will require field investigations prior to construction to verify no archeological sites exist along the proposed route.
- Reconnaissance of Potential Wetlands and Waters of the United States - Historical aerial photography and National Wetland Inventory (NWI) maps identified areas displaying characteristics consistent with potential wetland habitats. Field reconnaissance identified these areas and verified that in the opinion of the environmental consultant, the landscape does not appear to contain any potential wetlands. Depending on the amount of time between the investigation and construction, the Authority may reconfirm this assessment. If conditions have changed, then permitting or avoidance (trenchless construction) of these aquatic resources would be decided at that time. Given that the on-site investigation did not reveal any obvious wetland features, any subtle or smaller wetlands determined to be in the construction zone will most likely be avoided via trenchless construction.
- Limited Phase 1 Environmental Site Assessment (ESA) - The PEA investigation documented environmental conditions that could impact future land use or planned development, including installation of water line segments. No known hazardous material sites, or oil and gas sites were identified. The proposed alignments are within the vicinity of gas stations, however; the alignment is located to avoid close proximity to these gas stations. Segments have a low potential for presence of hazardous materials or substances based on research conducted for this report.

Permitting and Development

The North Fort Bend Water Authority is subject to requirements imposed by COH as well as the State of Texas. As indicated above, the Authority relies on the COH and WHCRWA to address the permitting and development requirements of projects for which those entities are primarily responsible.

Cost Analysis

NFBWA's engineering consultant provided Region H with estimated capital costs for the NFBWA Phase

2 Distribution Expansion, including costs associated with planning, acquisition, design, and construction. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Environmental study and mitigation costs, which were not included in the preliminary estimate, were assumed using standard Regional Planning costing assumptions to be equal to land acquisition costs. Debt service and annual operations and maintenance cost were also calculated using standard Regional Planning procedures. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – NFBWA Phase 2 Distribution Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 10, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$45,790,000	$45,790,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$7,010,000	$7,010,000
3	LAND AND EASEMENTS	1	LS	$2,930,000	$2,930,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$2,930,000	$2,930,000
5	INTEREST DURING CONSTRUCTION	1	LS	$6,790,062	$6,790,062
	PROJECT COST				$65,450,062

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$5,476,817	$5,476,817	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$457,900	$457,900	$457,900	$457,900	$457,900	$457,900
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$5,934,717	$5,934,717	$457,900	$457,900	$457,900	$457,900

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$5,934,717	$5,934,717	$457,900	$457,900	$457,900	$457,900
2	YIELD	62,496	62,496	62,496	62,496	62,496	62,496
3	UNIT COST	$95	$95	$7	$7	$7	$7
	TOTAL UNIT COST						$37

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$45,790,000	$45,790,000
	PROJECT COST				$45,790,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$45,790,000	$457,900
	ANNUAL OPERATION AND MAINTENANCE COST				$457,900

PROJECT EVALUATION

Based on the analysis provided above, the NFBWA Phase 2 Distribution Segments project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	The NFBWA Phase 2 Distribution Segments, while not directly generating supply, allow conveyance with small additional cost.
Location	4	Reflects conveyance infrastructure from major transmission pipelines to demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The NFBWA Phase 2 Distribution Segments project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the project will only serve NFBWA and any entities that it provides with water supply.

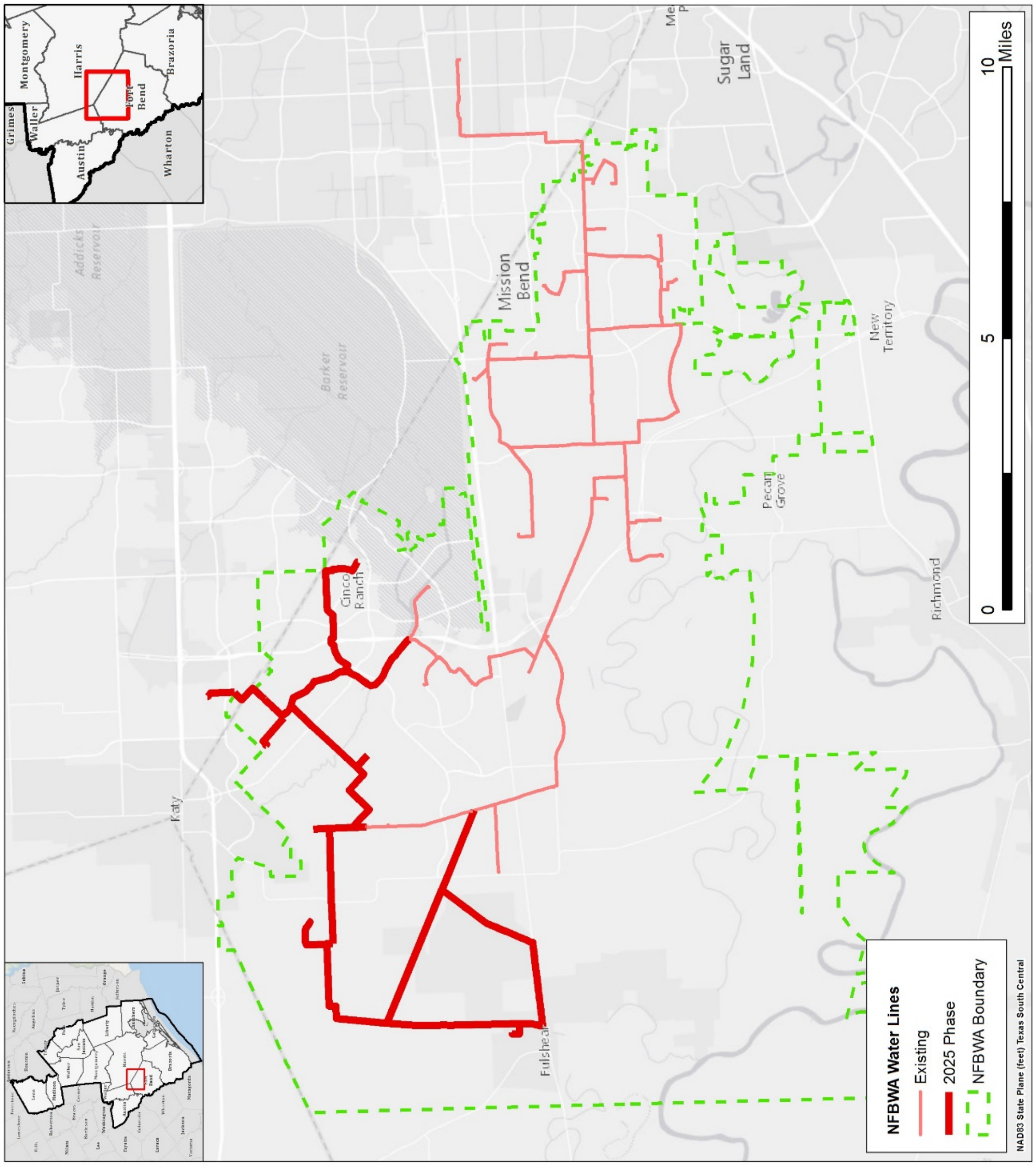
CRITERIA	WUG SUITABILITY
Proximity	Conveyance infrastructure from major transmission pipelines to demand centers.

CRITERIA	WUG SUITABILITY
Size	Conveyance is sized to convey the requisite amount of source water.
Water Quality	Conveys treated water of quality appropriate for municipal use.
Unit Cost	Adds small amount to unit cost of NFBWA's surface water conversion process.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

LOCATION MAP



NFBWA Distribution Expansion Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	North Harris County Regional Water Authority Distribution Expansion
Project ID:	CONV-008
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	143,360 ac-ft/yr (128 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	<10 years (per phase)
Project Capital Cost:	$922,549,086 (Sept. 2013)
Unit Water Cost (Rounded):	$518 per ac-ft (during loan period) $50 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the North Harris County Regional Water Authority (NHCRWA) has contracted with the City of Houston (COH) to receive treated surface water. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, NHCRWA is developing a phased expansion of the distribution infrastructure network through which it supplies its member districts, allowing for greater overall volume conveyed and conversion of additional districts to surface water.

PROJECT ANALYSES

The project analyses for the CHCRWA Distribution Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and is receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its Groundwater Reduction Plan (GRP) program, increasing its supply reservation and planning for large scale transmission to its service area. In order to utilize this expanded supply in order to meet future required phases of conversion, NHCRWA will engage in a phased expansion of the distribution infrastructure network through which it supplies its member districts, allowing for greater overall volume conveyed and conversion of additional districts to surface water. The year 2025 expansion will include development an expanded distribution pipeline network and two new pump station facilities, one near the Hardy Toll Road and Richey Road, and the other west of SH 249 near the Heron Lakes subdivision. The existing Louetta Regional Water Plant will be expanded, and two groundwater wells will be added to the system. The year 2025 expansion will bring the total number of districts in the NHCRWA surface water service area to 105. A subsequent 2035 expansion of the distribution pipeline system will allow surface water to be conveyed to an additional 36 districts. Other infrastructure measures implemented in this phase will include three additional wells, a new West Regional Water Plant, and enhancements to the Spears Road Pump Station, Louetta Regional Water Plant, and SH 249 Regional Pump Station. The 2045 conversion phase will involve limited expansion of infrastructure and add an additional seven districts receiving surface water.

Environmental Considerations

Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the GRP is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

NHCRWA is subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Development of expanded distribution infrastructure will cause some degree of surface disturbance, which may require permitting and mitigation. Infrastructure development is also likely to require acquisition of additional easements or property.

Cost Analysis

Planning-level capital cost estimates for the NHCRWA Distribution Expansion project were included in the NHCRWA GRP. The primary capital components of the project were pump station and pipeline development, with additional cost for contingency, engineering, legal costs, land acquisition, and environmental studies and mitigation. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Other cost components not included in the GRP, such as interest during construction, annualized debt service, and annualized operations and maintenance costs, were assumed using standard Regional Planning costing assumptions. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1.*

Table 1 – NHCRWA Distribution Expansion Project Costs

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$494,200,000	$494,200,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$254,690,000	$254,690,000
3	LAND AND EASEMENTS	1	LS	$77,160,000	$77,160,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$790,000	$790,000
5	INTEREST DURING CONSTRUCTION	1	LS	$95,709,086	$95,709,086
	PROJECT COST				**$922,549,086**

ITEM	**DESCRIPTION**	**ANNUAL TOTAL**					
ANNUAL COST SUMMARY		**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
1	DEBT SERVICE	$39,564,352	$67,036,335	$28,318,425	$846,441	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$4,393,550	$7,165,850	$7,224,550	$7,224,550	$7,224,550	$7,224,550
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	**$43,957,902**	**$74,202,185**	**$35,542,975**	**$8,070,991**	**$7,224,550**	**$7,224,550**

ITEM	**DESCRIPTION**	**ANNUAL TOTAL**					
ANNUAL COST SUMMARY		**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
1	ANNUAL COST	$43,957,902	$74,202,185	$35,542,974	$8,070,991	$7,224,550	$7,224,550
2	YIELD	143,360	143,360	143,360	143,360	143,360	143,360
3	UNIT COST	$307	$518	$248	$56	$50	$50
	TOTAL UNIT COST						**$205**

PROJECT EVALUATION

Based on the analysis provided above, the NHCRWA Distribution Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	3	The project unit cost is slightly over $500/ac-ft during debt service but declines sharply after debt service completion.
Location	4	Reflects distribution infrastructure from major transmission pipelines to demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.

CRITERIA	RATING	EXPLANATION
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The NHCRWA Distribution Expansion project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

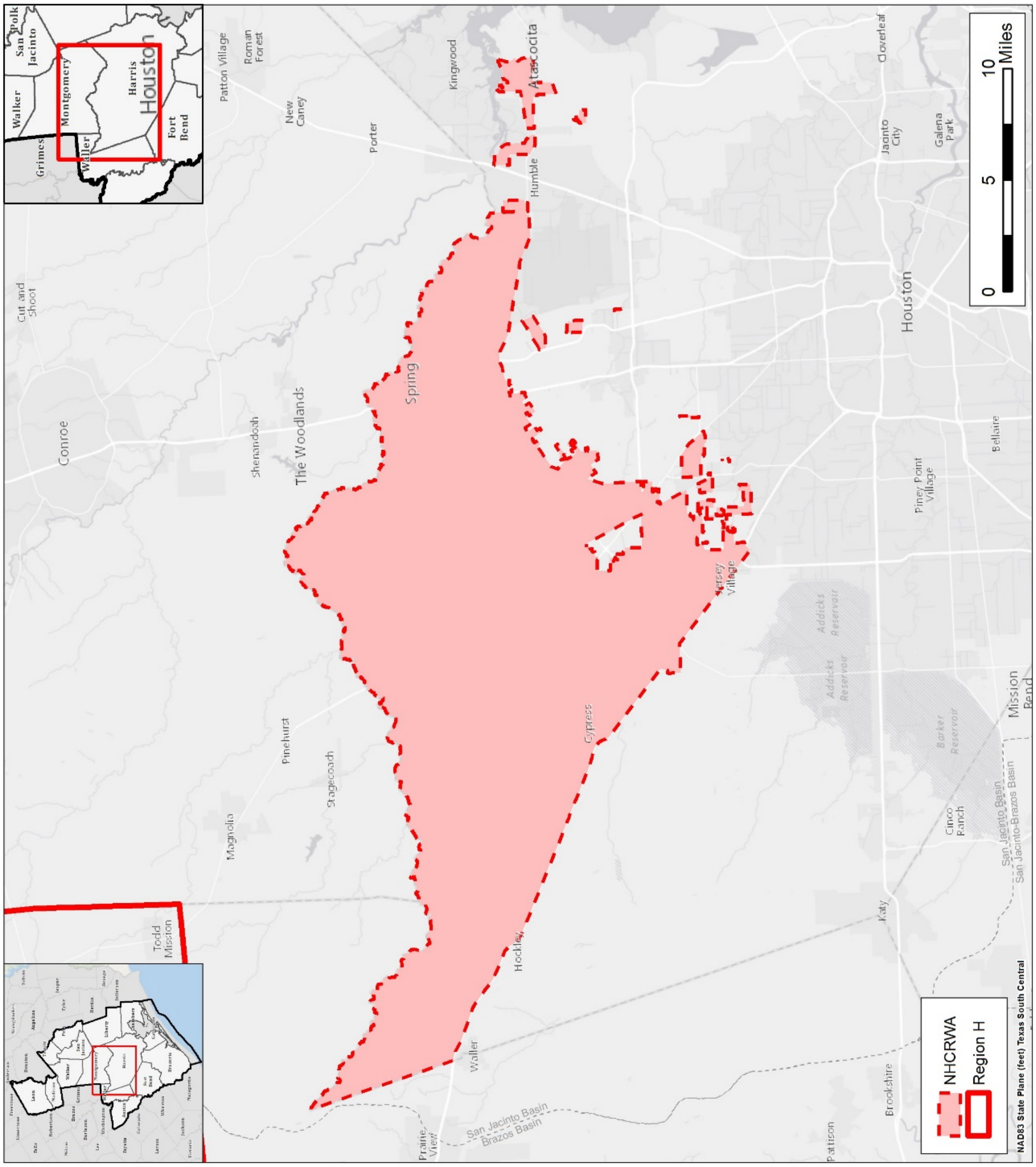
CRITERIA	WUG SUITABILITY
Proximity	Distribution infrastructure from major transmission pipelines to demand centers.
Size	Conveyance is sized to convey the requisite amount of source water.
Water Quality	Conveys treated water of quality appropriate for municipal use.
Unit Cost	Reflects a portion of the overall cost to implement NHCRWA's surface water conversion.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

AECOM. *2014 North Harris County Regional Water Authority Groundwater Reduction Plan*, prepared for NHCRWA, June 2014.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013..

LOCATION MAP



NHCRWA Distribution Expansion Location Map

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	North Harris County Regional Water Authority Transmission Lines
Project ID:	CONV-009
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	143,360 ac-ft/yr (128 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	<10 years
Project Capital Cost:	$155,993,406 (Sept. 2013)
Unit Water Cost (Rounded):	$86 per ac-ft (during loan period) $6 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the North Harris County Regional Water Authority (NHCRWA) has contracted with the City of Houston (COH) to receive treated surface water. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, NHCRWA is developing transmission infrastructure to convey additional treated surface water to its service area from connections with a large pipeline developed jointly by COH, NHCRWA, and the Central Harris County Regional Water Authority (CHCRWA).

PROJECT ANALYSES

The project analyses for the NHCRWA Transmission Lines include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The Authority has already developed transmission and distribution infrastructure to meet its initial obligations for reducing groundwater demand and is receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its Groundwater Reduction Plan (GRP) program, increasing its supply reservation and planning for large scale transmission to its service area. In order to utilize this expanded supply in order to meet future required phases of conversion, NHCRWA will expand its treated surface water transmission capacity by 2025. A major 84-inch pipeline jointly sponsored by and serving COH, NHCRWA, and CHCRWA is planned to convey water from the COH Northeast Water Purification Plant (NEWPP) westward to point just west of Interstate 45 along a route roughly parallel to Beltway 8. The NHCRWA Transmission Lines will convey this water to the Authority service area in several segments. A 54-inch line will run north from the shared transmission along the Hardy Toll Road north to a pump station near Richey Road. Another line of 84-inch diameter will run westward from the terminus of the shared pipeline to a proposed pump station near the Heron Lakes subdivision slightly west of SH 249. A smaller 36-inch line will branch off at TC Jester Blvd and connect to the existing Spears Road Pump Station.

Environmental Considerations

Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the project is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

NHCRWA is subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Development of expanded distribution infrastructure will cause some degree of surface disturbance, which may require permitting and mitigation. Infrastructure development is also likely to require acquisition of additional easements or property.

Cost Analysis

Planning-level capital cost estimates for the NHCRWA Transmission Lines project were included in the NHCRWA GRP. The primary capital component of the project was pipeline construction through both open cut and trenchless methods, with additional cost for contingency, engineering, legal costs, land acquisition, and environmental studies and mitigation. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Other cost components not included in the GRP, such as interest during construction, annualized debt service, and annualized operations and maintenance costs, were assumed using standard Regional Planning costing assumptions. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1.*

Table 1 – NHCRWA Transmission Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$88,050,000	$88,050,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$43,620,000	$43,620,000
3	LAND AND EASEMENTS	1	LS	$8,070,000	$8,070,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$70,000	$70,000
5	INTEREST DURING CONSTRUCTION	1	LS	$16,183,406	$16,183,406
	PROJECT COST				$155,993,406

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$11,478,268	$11,478,268	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$880,500	$880,500	$880,500	$880,500	$880,500	$880,500
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$12,358,768	$12,358,768	$880,500	$880,500	$880,500	$880,500

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$12,358,768	$12,358,768	$880,500	$880,500	$880,500	$880,500
2	YIELD	143,360	143,360	143,360	143,360	143,360	143,360
3	UNIT COST	$86	$86	$6	$6	$6	$6
	TOTAL UNIT COST						$33

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$88,050,000	$88,050,000
	PROJECT COST				$88,050,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$88,050,000	$880,500
	ANNUAL OPERATION AND MAINTENANCE COST				$880,500

PROJECT EVALUATION

Based on the analysis provided above, the NHCRWA Transmission Lines project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	The NHCRWA Transmission Lines, while not directly generating supply, allow conveyance with small additional cost.
Location	4	Reflects conveyance infrastructure from major transmission pipelines to demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The NHCRWA Transmission Lines project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Conveyance infrastructure from major transmission pipelines to demand centers.
Size	Conveyance is sized to convey the requisite amount of source water.
Water Quality	Conveys treated water of quality appropriate for municipal use.

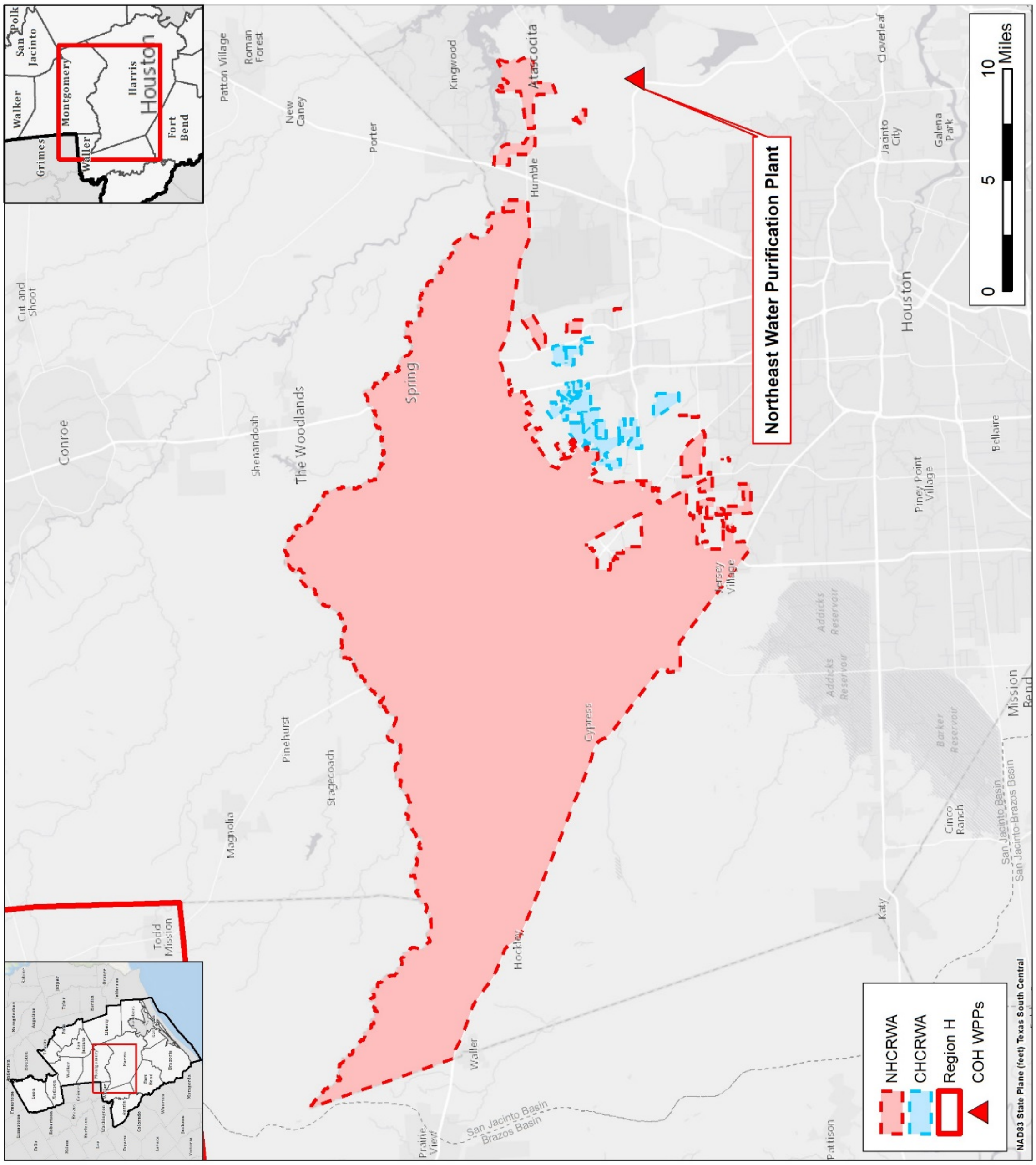
CRITERIA	WUG SUITABILITY
Unit Cost	Adds small amount to unit cost of NHCRWA's surface water conversion process.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

AECOM. *2014 North Harris County Regional Water Authority Groundwater Reduction Plan*, prepared for NHCRWA, June 2014.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013.

LOCATION MAP



NHCRWA Transmission Line Location Map

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Old Galveston Road Transmission Improvements
Project ID:	CONV-010
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	24,300 ac-ft/yr (21.7 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$99,886,253 for Beamer Road Option (Sept. 2013)
Unit Water Cost (Rounded):	$322 per ac-ft (during loan period) $25 per ac-ft (after loan period)

PROJECT DESCRIPTION

The existing Old Galveston Road line transmits water from the Southeast Water Purification Plant (SEWPP) to seven customers of the plant in southeastern Harris County and eventually to users in Galveston County. In recent years, existing customers have expressed an interest in expanding capacity in the pipeline during a rehabilitation project to be carried out in upcoming years.

PROJECT ANALYSES

The project analyses for Old Galveston Road Transmission Improvements include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The concept for the project presented here is adapted from information from the City of Houston (COH) and the co-participants in the project. It should be noted that the proposed project is in early stages of development and project details are subject to significant revision.

COH and the co-participants are currently considering future needs for water from the pipeline. The current estimated water needs are shown below in *Table 1*. The project is expected to result in an increased capacity of 32.57 MGD in capacity or a long-term average daily flow (ADF) of approximately 24,300 ac-ft/yr.

Table 1 – Summary of Co-Participant Allocations

Co-Participant	Project Allocation (MGD)	
	Current	Future
Clear Lake City Water Authority	9.12	9.12
City of Friendswood	4.84	4.84
League City (GCWA)	16.50	36.50
City of Webster	3.97	4.05
Harris County MUD 55	2.89	2.89
Baybrook MUD 1	3.38	1.80
City of Houston	2.83	16.90
TOTAL	**43.53**	**76.10**
Increased Capacity (MGD)	32.57	
ADF Increase (Acre-Feet/Year)	24,300	

Dimensions of the proposed line replacement range from 48-inches to 60-inches in diameter. The actual configuration will be based on final co-participant allocations.

Three alignments are currently under consideration for the project. The first alignment follows Space Center Boulevard and El Camino Real from the SEWPP. The second options connects to a large-diameter pipeline on the opposite side of Interstate 45 and travels parallel to the existing Old Galveston Road pipeline long Beamer Road. Finally, a third alternative will utilize the existing Old Galveston Road corridor.

Environmental Considerations

Environmental issues are expected to be minimal due to the use of existing corridors for development. Further environmental study will be conducted as part of the ongoing study of alternatives and configurations.

Permitting and Development

Permitting issues related to the project will be examined more closely during further phases of study. However, the use of existing thoroughfares minimizes potential permitting obstacles.

Development will be carried out once the co-participants, including the COH, have come to agreement on the project requirements and a preferred alignment and diameter have been selected.

Cost Analysis

Costs were adapted from a COH presentation of planning-level costs of a 48-inch configuration for each of the three alignments considered. The estimated project costs for the El Camino Real, Beamer Road, and Old Galveston Road are shown in *Tables 2* through *4*, respectively. Representative costs for the overall project are based on the Beamer Road alignment which is the currently the most costly alternative.

Table 2 – El Camino Real Estimated Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$59,800,000	$59,800,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$17,940,000	$17,940,000
3	LAND AND EASEMENTS	1	LS	$2,950,000	$2,950,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$2,950,000	$2,950,000
5	INTEREST DURING CONSTRUCTION	1	LS	$2,675,593	$2,675,593
	PROJECT CAPITAL COST				$86,315,593

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$7,222,831	$7,222,831	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$598,000	$598,000	$598,000	$598,000	$598,000	$598,000
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$7,820,831	$7,820,831	$598,000	$598,000	$598,000	$598,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$7,820,831	$7,820,831	$598,000	$598,000	$598,000	$598,000
2	YIELD	24,300	24,300	24,300	24,300	24,300	24,300
3	UNIT COST	$322	$322	$25	$25	$25	$25
	TOTAL UNIT COST						$124

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$59,800,000	$59,800,000
	PROJECT COST				$59,800,000

Table 3 – Beamer Road Estimated Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$60,500,000	$60,500,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$18,150,000	$18,150,000
3	LAND AND EASEMENTS	1	LS	$9,070,000	$9,070,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$9,070,000	$9,070,000
5	INTEREST DURING CONSTRUCTION	1	LS	$3,096,253	$3,096,253
	PROJECT CAPITAL COST				$99,886,253

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$8,358,415	$8,358,415	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$605,000	$605,000	$605,000	$605,000	$605,000	$605,000
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$8,963,415	$8,963,415	$605,000	$605,000	$605,000	$605,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$8,963,415	$8,963,415	$605,000	$605,000	$605,000	$605,000
2	YIELD	24,300	24,300	24,300	24,300	24,300	24,300
3	UNIT COST	$369	$369	$25	$25	$25	$25
	TOTAL UNIT COST						$140

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$60,500,000	$60,500,000
	PROJECT COST				$60,500,000

Table 4 – Old Galveston Road Estimated Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$45,280,000	$45,280,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$13,584,000	$13,584,000
3	LAND AND EASEMENTS	1	LS	$10,000	$10,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$10,000	$10,000
5	INTEREST DURING CONSTRUCTION	1	LS	$1,883,663	$1,883,663
	PROJECT CAPITAL COST				$60,767,663

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$5,084,997	$5,084,997	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$452,800	$452,800	$452,800	$452,800	$452,800	$452,800
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$5,537,797	$5,537,797	$452,800	$452,800	$452,800	$452,800

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$5,537,797	$5,537,797	$452,800	$452,800	$452,800	$452,800
2	YIELD	24,300	24,300	24,300	24,300	24,300	24,300
3	UNIT COST	$228	$228	$19	$19	$19	$19
	TOTAL UNIT COST						$88

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$45,280,000	$45,280,000
	PROJECT COST				$45,280,000

PROJECT EVALUATION

Based on the analysis provided above, the Old Galveston Road Transmission Improvements project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	Project cost may vary based on final configuration.
Location	5	Project located to serve existing and growing demands.
Water Quality	3	No impacts to water quality.
Environmental Land and Habitat	5	Limited impacts associated with construction in existing corridors.

CRITERIA	RATING	EXPLANATION
Environmental Flows	3	No impact to environmental flows.
Local Preference	5	Significant support from co-participants.
Institutional Constraints	3	Property availability and limited permitting efforts.
Development Timeline	5	Projected may be implemented within five years.
Sponsorship	5	Sponsors identified and in the process of developing project.
Vulnerability	5	Minimal risk associated with pipeline infrastructure.
Impacts on Other Projects	5	Project helps to facilitate the use of treated surface water from the SEWPP.

WATER USER GROUP APPLICATION

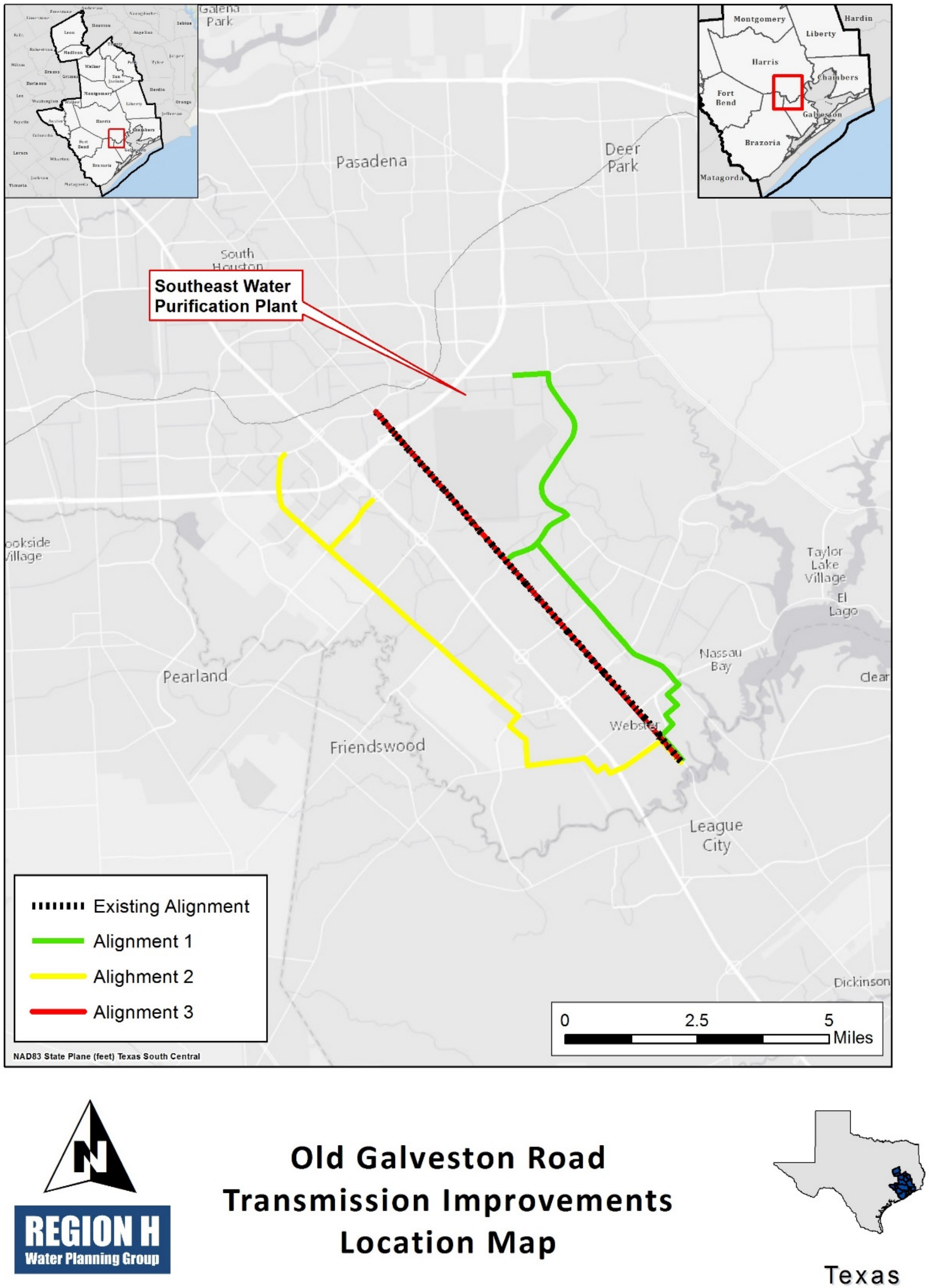
The Old Galveston Road Transmission Improvements project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	This project is intended to provide water to customers in Harris and Galveston Counties along the Interstate 45 corridor.
Size	The capacity of this project is based on projected need of its specific stakeholders.
Water Quality	This project will convey treated surface water.
Unit Cost	The unit cost for this project is a reasonable price for transmission of treated water for municipal, commercial, or industrial uses.
Other Factors	This project is identified for a few, specific co-participants in the vicinity of the SEWPP.

REFERENCES

Replace Old Galveston Road 42-Inch Waterline. Presentation by City of Houston. October 11, 2012.

LOCATION MAP



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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	West Harris County Regional Water Authority Distribution Expansion
Project ID:	CONV-011
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	Up to 91,896 ac-ft/yr (82.1 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	<10 years
Project Capital Cost:	$293,290,000 (Sept. 2013)
Unit Water Cost (Rounded):	$299 per ac-ft (during loan period) $32 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the West Harris County Regional Water Authority (WHCRWA) and North Fort Bend Water Authority (NFBWA) have contracted with the City of Houston (COH) to receive treated surface water. Both Authorities have already developed transmission and distribution infrastructure to meet their initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, WHCRWA must expand the distribution infrastructure network through which it supplies its member districts, allowing for greater overall volume conveyed and conversion of additional districts to surface water.

PROJECT ANALYSES

The project analyses for the WHCRWA Distribution Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and is receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its GRP program, increasing its supply reservation and planning for large scale transmission to its service area. In order to utilize this expanded supply in order to meet future required phases of conversion, WHCRWA will expand its distribution network by 2025, allowing it to provide a greater volume of treated surface water and convert additional member districts to primary surface water supply. As with the currently implemented stage of conversion, some entities will remain on groundwater, while others will rely solely on surface water or utilize groundwater only to meet peak demands. WHCRWA anticipates additional conversion of additional districts in the Atascocita area by 2035.

Environmental Considerations

Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the GRP is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

WHCRWA is subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Development of expanded distribution infrastructure will cause some degree of surface disturbance, which may require permitting and mitigation. Infrastructure development is also likely to require acquisition of additional easements or property.

Cost Analysis

Cost information regarding the WHCRWA Distribution Expansion project was included in the WHCRWA GRP, which lists an estimated capital cost of $293,450,000 for the WHCRWA 2025 Capital Improvement Plan (CIP). This cost was scaled to a September 2013 equivalent cost using the Construction Cost Index and Producer Price Index in accordance with TWDB guidance. Non-construction capital costs (engineering, land acquisition, environmental components, and interest during construction) were not called out separately and for purposes of the Regional Plan are assumed to be included in the value indicated in the GRP. Costs for the year 2035 distribution expansion are not included but are likely to be much lower than the year 2025 distribution expansion. Debt service and annual operations and maintenance cost were also calculated using standard Regional Planning procedures. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – WHCRWA Distribution Expansion Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 23, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$293,290,000	$293,290,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$0	$0
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$0	$0
	PROJECT COST				$293,290,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$24,542,311	$24,542,311	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$2,932,900	$2,932,900	$2,932,900	$2,932,900	$2,932,900	$2,932,900
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$27,475,211	$27,475,211	$2,932,900	$2,932,900	$2,932,900	$2,932,900

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$27,475,211	$27,475,211	$2,932,900	$2,932,900	$2,932,900	$2,932,900
2	YIELD	91,896	91,896	91,896	91,896	91,896	91,896
3	UNIT COST	$299	$299	$32	$32	$32	$32
	TOTAL UNIT COST						$121

WATER MANAGEMENT PROJECT EVALUATION

Based on the analysis provided above, the WHCRWA Distribution Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	The project, while not directly generating supply, allows conveyance with small additional cost.
Location	4	Reflects conveyance infrastructure from major transmission pipelines to demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.

CRITERIA	RATING	EXPLANATION
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The WHCRWA Distribution Expansion project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the project will only serve WHCRWA, GRP participants, and any entities that it provides with water supply.

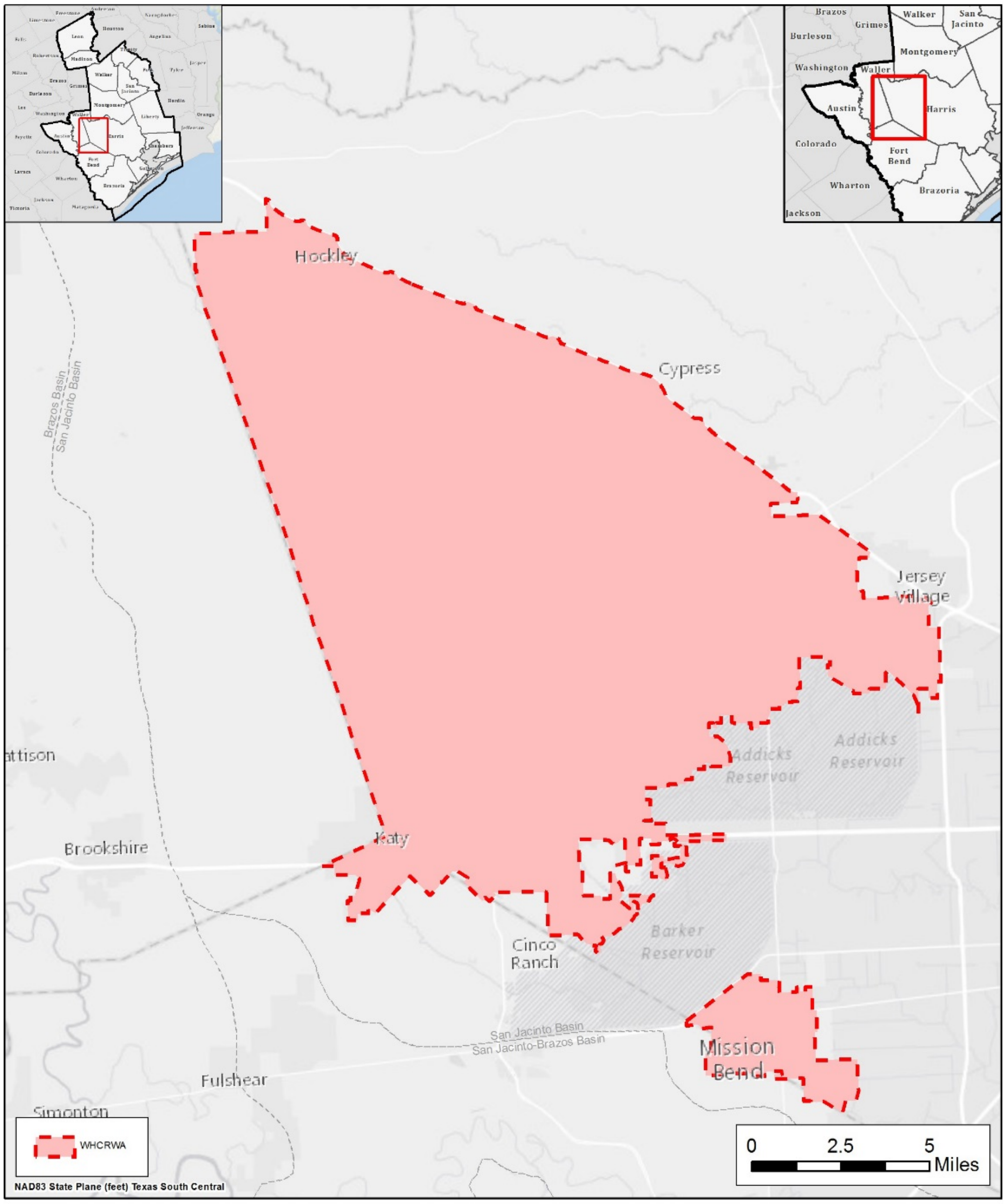
CRITERIA	WUG SUITABILITY
Proximity	Conveyance infrastructure from major transmission pipelines to demand centers.
Size	Conveyance is sized to convey the requisite amount of source water.
Water Quality	Conveys treated water of quality appropriate for municipal use.
Unit Cost	Adds small amount to unit cost of WHCRWA's surface water conversion process.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

Dannenbaum Engineering Corporation. *West Harris County Regional Water Authority Groundwater Reduction Plan*, prepared for WHCRWA, June 2014.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013.

LOCATION MAP



WHCRWA Distribution Expansion
Location Map

REGION H
Water Planning Group

Texas

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	WHCRWA and NFBWA Shared Transmission
Project ID:	CONV-012
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	154,392 ac-ft/yr (137.85 mgd)
Implementation Decade:	2020 (2021-2025)
Development Timeline:	<10 years
Project Capital Cost:	$642,986,052 (Sept. 2013)
Unit Water Cost (Rounded):	$340 per ac-ft (during loan period) $34 per ac-ft (after loan period)

PROJECT DESCRIPTION

To address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer, the Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the North Fort Bend Water Authority (NFBWA) and West Harris County Regional Water Authority (WHCRWA) have contracted with the City of Houston (COH) to receive treated surface water. Both Authorities have already developed transmission and distribution infrastructure to meet their initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, the Authorities are jointly sponsoring the development of additional large scale transmission infrastructure (the Second Source Transmission Line) from the COH Northeast Water Purification Plant (NEWPP) to the Authority distribution areas.

PROJECT ANALYSES

The project analyses for WHCRWA and NFBWA Shared Transmission include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

WHCRWA and NFBWA have acquired capacity in the COH Luce Bayou Interbasin Transfer Project and Northeast Water Purification Plant (NEWPP) Expansion to provide treated surface water supply which will be conveyed through the WHCRWA and NFBWA Shared Transmission project infrastructure to the Authority service areas. WHCRWA has increased its contracted supply reservation with COH from an original amount of 28.25 mgd (31,640 ac-ft/yr) currently applied in the Regional Plan as existing supply to 110.3 mgd (123,536 ac-ft/yr). NFBWA has increased from an original reservation of 19.5 mgd (21,840 ac-ft/yr) currently applied in the Regional Plan as existing supply to 75.3 mgd (84,336 ac-ft/yr). In order to convey these supplies, the Authorities are jointly developing shared transmission pipeline infrastructure to convey treated surface water supplies from the NEWPP to the Authority Distribution areas. The transmission infrastructure consists of two major pipeline segments. The first is a 96-inch pipeline running from the NEWPP to the northern portion of NFBWA near Katy, TX with pump stations in the vicinity of Highway 290 and Fry Road. A smaller pipeline, primarily 36-inch diameter, branches from the larger line slightly west of Beltway 8 and travels south to the NFBWA Bellaire pump station. Construction of the Shared Transmission project infrastructure is anticipated to be completed by 2025.

Environmental Considerations

Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the project is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

WHCRWA and NFBWA are subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Development of expanded transmission infrastructure will cause some degree of surface disturbance, which may require permitting and mitigation. Infrastructure development is also likely to require acquisition of additional easements or property.

Cost Analysis

Planning level cost estimates were developed for the Region H Plan based on available information from WHCRWA and NFBWA. WHCRWA's share of the project capital cost is estimated in the WHCRWA GRP as $319,751,000. For purposes of the Regional Plan, it was assumed that this cost was inclusive of all engineering and legal services, land acquisition, and environmental studies and mitigation; because these components were not identified separately, WHCRWA's full cost share is represented as construction capital cost in this memorandum. NFBWA also provided an estimate of shared cost. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Other cost components not included in the available data, such as interest during construction, annualized debt service, and annualized operations and maintenance costs, were assumed using standard Regional Planning costing assumptions. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – WHCRWA and NFBWA Shared Transmission Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 26, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$517,420,000	$517,420,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$38,060,000	$38,060,000
3	LAND AND EASEMENTS	1	LS	$10,400,000	$10,400,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$10,400,000	$10,400,000
5	INTEREST DURING CONSTRUCTION	1	LS	$66,706,052	$66,706,052
	PROJECT COST				$642,986,052

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$47,312,039	$47,312,039	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$5,174,200	$5,174,200	$5,174,200	$5,174,200	$5,174,200	$5,174,200
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$52,486,239	$52,486,239	$5,174,200	$5,174,200	$5,174,200	$5,174,200

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$52,486,239	$52,486,239	$5,174,200	$5,174,200	$5,174,200	$5,174,200
2	YIELD	154,392	154,392	154,392	154,392	154,392	154,392
3	UNIT COST	$340	$340	$34	$34	$34	$34
	TOTAL UNIT COST						$136

PROJECT EVALUATION

Based on the analysis provided above, the WHCRWA and NFBWA Shared Transmission project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	The shared transmission pipeline will allow conveyance with small additional cost.
Location	4	Reflects conveyance infrastructure from major transmission pipelines to demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.

CRITERIA	RATING	EXPLANATION
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The WHCRWA and NFBWA Shared Transmission project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

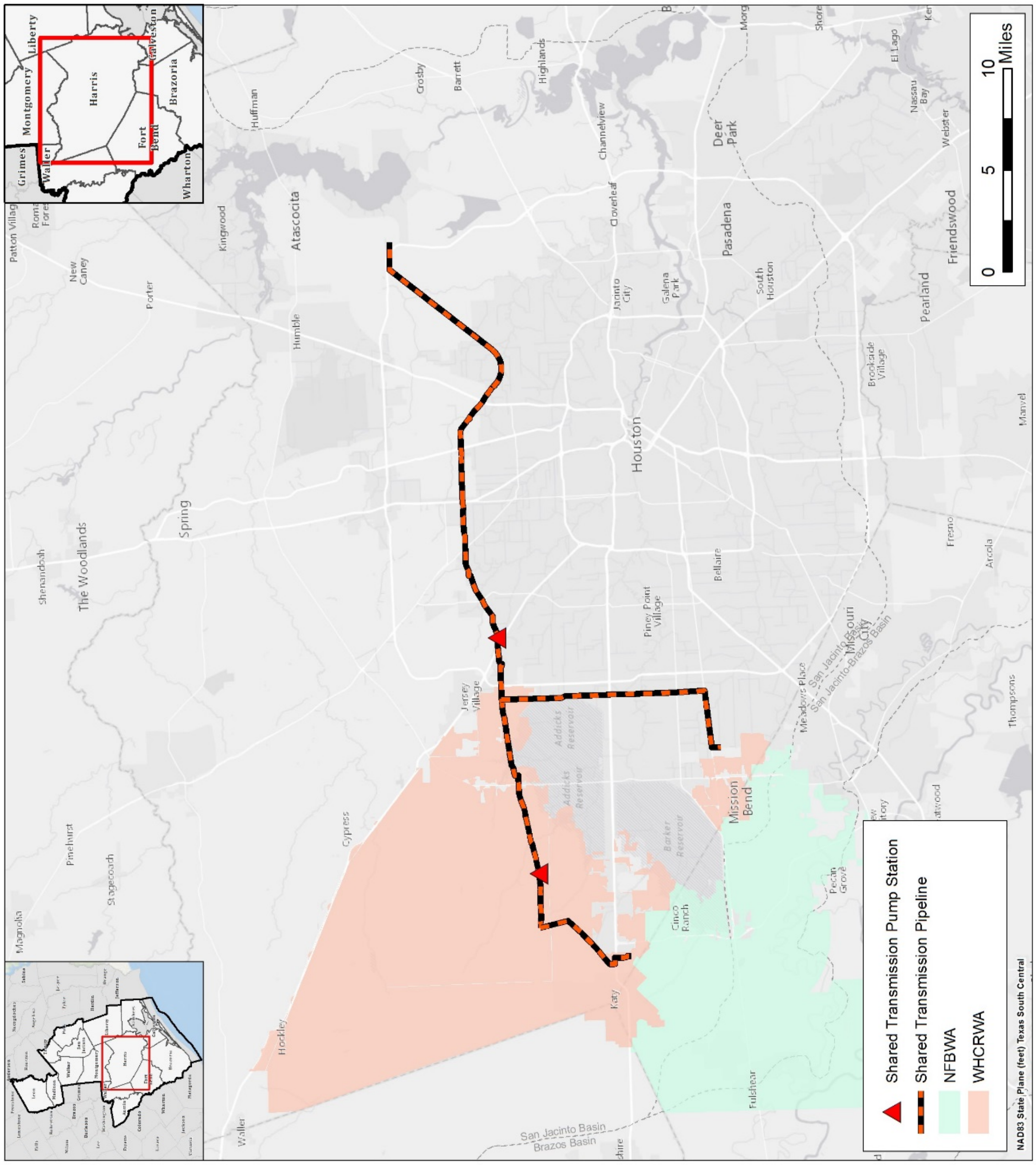
CRITERIA	WUG SUITABILITY
Proximity	Conveyance infrastructure from major transmission pipelines to demand centers.
Size	Conveyance is sized to convey the requisite amount of source water.
Water Quality	Conveys treated water of quality appropriate for municipal use.
Unit Cost	Adds small amount to unit cost of surface water conversion process.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

Dannenbaum Engineering Corporation. *West Harris County Regional Water Authority Groundwater Reduction Plan*, prepared for WHCRWA, June 2014.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013..

LOCATION MAP



WHCRWA/NFBWA Shared Transmission Location Map

REGION H Water Planning Group

Texas

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Brackish Groundwater Development
Project ID:	GWDV-002
Project Type:	New Groundwater Source
Potential Supply Quantity	Varies
Implementation Decade:	2020 (varies)
Development Timeline:	1 years
Project Capital Cost:	Varies by specific project
Unit Water Cost (Rounded):	\$278-1,557 per ac-ft (during loan period) \$152-913 per ac-ft (after loan period)

PROJECT DESCRIPTION

As growth occurs throughout Region H there is a need to provide alternative supplies to a number of WUGs that may not be within close proximity to conventional, surface water resources. In addition, the need for low-cost water supplies in conjunction with conventional groundwater resources encourages the utilization of unconventional sources of water. Studies suggest that brackish groundwater may be a viable source of water in some areas through the exploration of formations outside of the commonly accepted groundwater formations in each county. Additionally, the cost of brackish groundwater desalination is far less than seawater desalination and, in some cases, raw brackish groundwater may be blended with conventional supplies to produce an acceptable supply without treatment. Within Region H, several communities within Montgomery County have successfully employed this project for water supplies and it is also being investigated in other parts of the region.

PROJECT ANALYSES

The project analyses for Brackish Groundwater Development include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

A review of aquifer conditions within Region H was conducted in order to identify potential areas of brackish groundwater development. These areas vary geographically with the water quality of geologic features. In that way, two areas that may utilize water from the same traditional formations may also have differing levels of access to usable, brackish groundwater. For purposes of this study, water of quality ranging from 1,000 to 3,000 mg/l of Total Dissolved Solids (TDS) was considered slightly saline brackish and water of 3,000 to 10,000 mg/l of TDS was considered moderately saline brackish water. Detailed exhibits of the analysis described below can be found as an attachment to this technical memorandum.

Simsboro Aquifer: The Simsboro outcrops north of Region H. Brackish water supplies may be found in this formation across Madison County where the quality ranges from 1,000 mg/l of TDS to 10,000 mg/l.

Carrizo-Wilcox Aquifer: The outcrop of the Carrizo Wilcox in Region H occurs in the northwestern portion of Leon County. The downdip portion approaches saline conditions in southern Madison County with quality transitioning to approximately 3,000 mg/l of TDS at the Madison and Walker County line. A thin band of water between 3,000 and 10,000 mg/l of TDS can be found extending approximately five miles into northwestern Walker County.

Sparta Aquifer: The outcrop of the Sparta Aquifer in Region H occurs in Leon County. Saline portions of the formation occur in Walker County north of Huntsville and central Trinity County along a line between the cities of Trinity and Groveton.

Catahoula Formation of the Gulf Coast Aquifer: The outcrop of the Catahoula in Region H occurs in Walker, Trinity, and Polk Counties and water quality in the downdip maintains fresh water conditions as far south as central Montgomery, San Jacinto, and Polk Counties. Water of brackish quality extends southward in a band that reach the Woodlands in Montgomery County, crosses south of Coldspring and Livingston to the northeast and south of Hempstead and Bellville to the Southwest. This formation is currently being developed as a supply in Montgomery County although its location could make it available to other WUGs in Austin, Waller, Montgomery, San Jacinto, and Polk Counties.

Jasper Formation of the Gulf Coast Aquifer: The outcrop of the Jasper in Region H cross northern Austin and cuts through central Walker County and around the junction of Trinity, Polk, and San Jacinto Counties. The formation is a source of fresh water for Austin, Waller, northern Harris County, and northward. A band of brackish water reaches its greatest width across almost the entirety of Fort Bend County with the majority of that supply being in the 3,000 to 10,000 mg/l of TDS range. The southern portions of Harris County and the central portion of Liberty County also benefit from the availability of brackish groundwater from this formation.

Evangeline Formation of the Gulf Coast Aquifer: The Evangeline in Region H outcrops in Montgomery, Walker, San Jacinto, and Polk Counties. Water quality remains fresh for most of the area southward. However, water from the formation becomes brackish in all but the northern portion of Brazoria County, the central portion of Chambers County, and the southeastern tip of Liberty County. This segment contains water of varying brackish quality until reaching the coast where TDS climbs well above 10,000 mg/l.

Chicot Formation of the Gulf Coast Aquifer: This Chicot represents the shallowest formation of the Gulf Coast Aquifer and outcrops in a wide band from Austin County toward southern Polk County. Supplies are generally fresh until approaching the coast where water quality quickly declines from fresh water to highly brackish within a span of approximately 10 miles.

Typically, the depth to water for these formations is far greater than the more commonly developed formations. However, these confined systems often have static well levels that are far above the upper confining unit of the formation, making pumping costs more consistent with other groundwater supplies although capital costs to develop deep wells are correspondingly higher than for typical groundwater applications.

The brackish supplies identified in these areas are relatively undocumented compared to the typical supply formations in Region H. Therefore, the question of long-term availability is uncertain until the level of use increases to the point that adequate information can be collected to fully evaluate these resources. However, it is known that pumpage in these formations may alter the geographic distribution of brackish water. Therefore, the location of waters of various qualities may change over time. Developed brackish water supplies may be determined to be unreliable in the long-term in the level of quality initially produced from these wells.

Introduction to water supply may be made through two primary methods. When a pure brackish groundwater sourced is used to meet demands, it will be necessary to treat the water in order to reduce the TDS from natural levels to the below the secondary standard of 500 mg/l. This may be performed through RO desalination. In addition to the cost of treatment, the cost of brine disposal must also be considered. This is typically performed through deep well injection which deposits the concentrated brine in a deep layer that is safely separated from water sources. Alternatively, disposal to surface water may be performed when conditions warrant such an arrangement.

Environmental Considerations

In general, environmental concerns for development of brackish groundwater are site-specific and similar to the concerns associated with conventional groundwater projects. Additional concern may arise from the disposal of brine concentrate from RO treatment processes used to lower the levels of TDS in the produced water stream. This may be performed through deep well injection which forces the refuse to deep formations away from environmentally sensitive features. In some other case, conditions permitting, this disposal may be made into a natural water course although this may only be performed in cases where receiving water already experience high levels of TDS (coastal areas) or where, otherwise, species and habitat would not be impacted.

In the Gulf Coast area and particularly in Region H, concerns over subsidence are critical to all decisions made in groundwater development. Currently, there is limited information as to whether pumpage from these deeper formations poses a threat from subsidence similar to the risk of overpumpage in the shallower formations of the Gulf Coast Aquifer. This issue is currently being studies as well as other impacts to fresh water that may be brought about by the use of brackish supplies.

Permitting and Development

Permitting of groundwater supplies is conducted through the local groundwater management authority. In Region H, county supplies may be managed by a Groundwater Conservation District (GCD) or one of the subsidence districts. Each of these entities has a different means to address the availability and development of brackish groundwater so it is important to address these issues on a project by project basis. Furthermore, many brackish groundwater resources are encompassed within the extent of traditional groundwater formations throughout the region. For these formations which have a defined Modeled Available Groundwater (MAG) developed through the local Groundwater Management Area (GMA), availability is set for the purposes of regional water planning. If the current use of fresh groundwater form these formations is already equal to the MAG, there is not additional brackish groundwater that may be made available to allocate to projects in the regional plan.

In addition to the production well, permitting is also required for the development of an injection well associated with the RO process. In most cases, this is a matter of permitting a Class I non-hazardous injection well with the Texas Commission on Environmental Quality (TCEQ). This process typically takes a year to complete.

Cost Analysis

Unit cost analyses were based on the development one, 1,000 gpm production well. Three scenarios were developed to treat brackish groundwater of 1,000, 2,000, and 3,000 mg/l TDS to a level of 50 mg/l. Blending water incorporated to the degree possible and RO treatment was assumed to remove 99 percent of the influent TDS and reject 25 percent of the overall input stream as concentrated brine. The scenarios were based on development of one brackish well and included the cost of an injection well for disposal of RO concentrate. The costs for the 1,000, 2,000, and 3,000 mg/l TDS scenarios are shown in *Tables 1-3*, below.

In addition, costs for a one-well scenario were also developed for scenarios where blending with existing water sources was a viable alternative. This option only included the cost for well development and the construction of collection lines to receive water from the well site. This cost summary is also included below in *Table 4*.

Table 1 – One Well at 1,000 mg/l TDS Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					June 30, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$5,494,267	$5,494,267
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$1,920,570	$1,920,570
3	LAND AND EASEMENTS	1	LS	$26,840	$26,840
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$16,423	$16,423
5	INTEREST DURING CONSTRUCTION	1	LS	$123,066	$123,066
	PROJECT CAPITAL COST				$7,581,166

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$634,387	$634,387	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$635,436	$635,436	$635,436	$635,436	$635,436	$635,436
3	PUMPING ENERGY COSTS	$256,917	$256,917	$256,917	$256,917	$256,917	$256,917
	TOTAL ANNUAL COST	$1,526,740	$1,526,740	$892,353	$892,353	$892,353	$892,353

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$1,526,740	$1,526,740	$892,353	$892,353	$892,353	$892,353
2	YIELD	1,407	1,407	1,407	1,407	1,407	1,407
3	UNIT COST	$1,085	$1,085	$634	$634	$634	$634
	TOTAL UNIT COST						$784

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$48,467	$48,467
2	WATER TREATMENT PLANTS	1	LS	$3,378,535	$3,378,535
3	WELL FIELDS	1	LS	$2,067,265	$2,067,265
	PROJECT COST				$5,494,267

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$48,467	$485
2	WATER TREATMENT PLANTS	1.0	LS	$614,279	$614,279
3	WELL FIELDS	1.0	%	$2,067,265	$20,673
	ANNUAL OPERATION AND MAINTENANCE COST				$635,436

Table 2 – One Well at 2,000 mg/l TDS Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					June 30, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$6,250,050	$6,250,050
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$2,185,094	$2,185,094
3	LAND AND EASEMENTS	1	LS	$27,903	$27,903
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$17,486	$17,486
5	INTEREST DURING CONSTRUCTION	1	LS	$139,937	$139,937
	PROJECT CAPITAL COST				$8,620,469

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$721,355	$721,355	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$730,357	$730,357	$730,357	$730,357	$730,357	$730,357
3	PUMPING ENERGY COSTS	$281,021	$281,021	$281,021	$281,021	$281,021	$281,021
	TOTAL ANNUAL COST	$1,732,733	$1,732,733	$1,011,378	$1,011,378	$1,011,378	$1,011,378

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$1,732,733	$1,732,733	$1,011,378	$1,011,378	$1,011,378	$1,011,378
2	YIELD	1,306	1,306	1,306	1,306	1,306	1,306
3	UNIT COST	$1,326	$1,326	$774	$774	$774	$774
	TOTAL UNIT COST						$958

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$48,467	$48,467
2	WATER TREATMENT PLANTS	1	LS	$3,886,997	$3,886,997
3	WELL FIELDS	1	LS	$2,314,586	$2,314,586
	PROJECT COST				$6,250,050

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$48,467	$485
2	WATER TREATMENT PLANTS	1.0	LS	$706,727	$706,727
3	WELL FIELDS	1.0	%	$2,314,586	$23,146
	ANNUAL OPERATION AND MAINTENANCE COST				$730,357

Table 3 – One Well at 3,000 mg/l TDS Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					June 30, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$7,116,709	$7,116,709
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$2,488,425	$2,488,425
3	LAND AND EASEMENTS	1	LS	$28,965	$28,965
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$18,549	$18,549
5	INTEREST DURING CONSTRUCTION	1	LS	$159,278	$159,278
	PROJECT CAPITAL COST				$9,811,926

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$821,055	$821,055	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$873,758	$873,758	$873,758	$873,758	$873,758	$873,758
3	PUMPING ENERGY COSTS	$289,252	$289,252	$289,252	$289,252	$289,252	$289,252
	TOTAL ANNUAL COST	$1,984,065	$1,984,065	$1,163,010	$1,163,010	$1,163,010	$1,163,010

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$1,984,065	$1,984,065	$1,163,010	$1,163,010	$1,163,010	$1,163,010
2	YIELD	1,274	1,274	1,274	1,274	1,274	1,274
3	UNIT COST	$1,557	$1,557	$913	$913	$913	$913
	TOTAL UNIT COST						$1,128

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$48,467	$48,467
2	WATER TREATMENT PLANTS	1	LS	$4,671,167	$4,671,167
3	WELL FIELDS	1	LS	$2,397,076	$2,397,076
	PROJECT COST				$7,116,709

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$48,467	$485
2	WATER TREATMENT PLANTS	1.0	LS	$849,303	$849,303
3	WELL FIELDS	1.0	%	$2,397,076	$23,971
	ANNUAL OPERATION AND MAINTENANCE COST				$873,758

Table 4 – One Well for Blending Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					June 30, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$1,579,847	$1,579,847
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$550,523	$550,523
3	LAND AND EASEMENTS	1	LS	$19,402	$19,402
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$8,985	$8,985
5	INTEREST DURING CONSTRUCTION	1	LS	$35,622	$35,622
	PROJECT COST				$2,194,378

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$183,624	$183,624	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$15,798	$15,798	$15,798	$15,798	$15,798	$15,798
3	PUMPING ENERGY COSTS	$204,593	$204,593	$204,593	$204,593	$204,593	$204,593
	TOTAL ANNUAL COST	$404,015	$404,015	$220,391	$220,391	$220,391	$220,391

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$404,015	$404,015	$220,391	$220,391	$220,391	$220,391
2	YIELD	1,452	1,452	1,452	1,452	1,452	1,452
3	UNIT COST	$278	$278	$152	$152	$152	$152
	TOTAL UNIT COST						$194

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$48,467	$48,467
2	WELL FIELDS	1	LS	$1,531,380	$1,531,380
	PROJECT COST				$1,579,847

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$48,467	$485
2	WELL FIELDS	1.0	%	$1,531,380	$15,314
	ANNUAL OPERATION AND MAINTENANCE COST				$15,798

PROJECT EVALUATION

Based on the analysis provided above, the Brackish Groundwater Development project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	3	The costs of this project vary greatly from one application to another. Cost is primarily subjective to the quality of local supplies and the opportunity to blend with fresh sources.
Location	5	Where water is available, it may be developed in the immediate vicinity of demand.
Water Quality	3	When treated or blended responsibly, there are no known issues related to water quality.
Environmental Land and Habitat	4	Minimal impacts related to development of well sites and treatment facilities.
Environmental Flows	4	The project produces return flows from deep, groundwater supplies.
Local Preference	3	No local preference identified.
Institutional Constraints	3	Regulation varies by specific application. However, where supply development is within the limits of the regulating authority, pathways are available for development.
Development Timeline	5	Projects may be identified and implemented in a short period of time.
Sponsorship	3	Sponsorship varies by specific application. Some WUGs are proceeding with development and others have had the project applied through the planning process.
Vulnerability	4	Supplies are generally more drought-tolerant than surface water resources and have limited risk from human impacts.
Impacts on Other Projects	4	Slight increase in return flows associated with groundwater development.

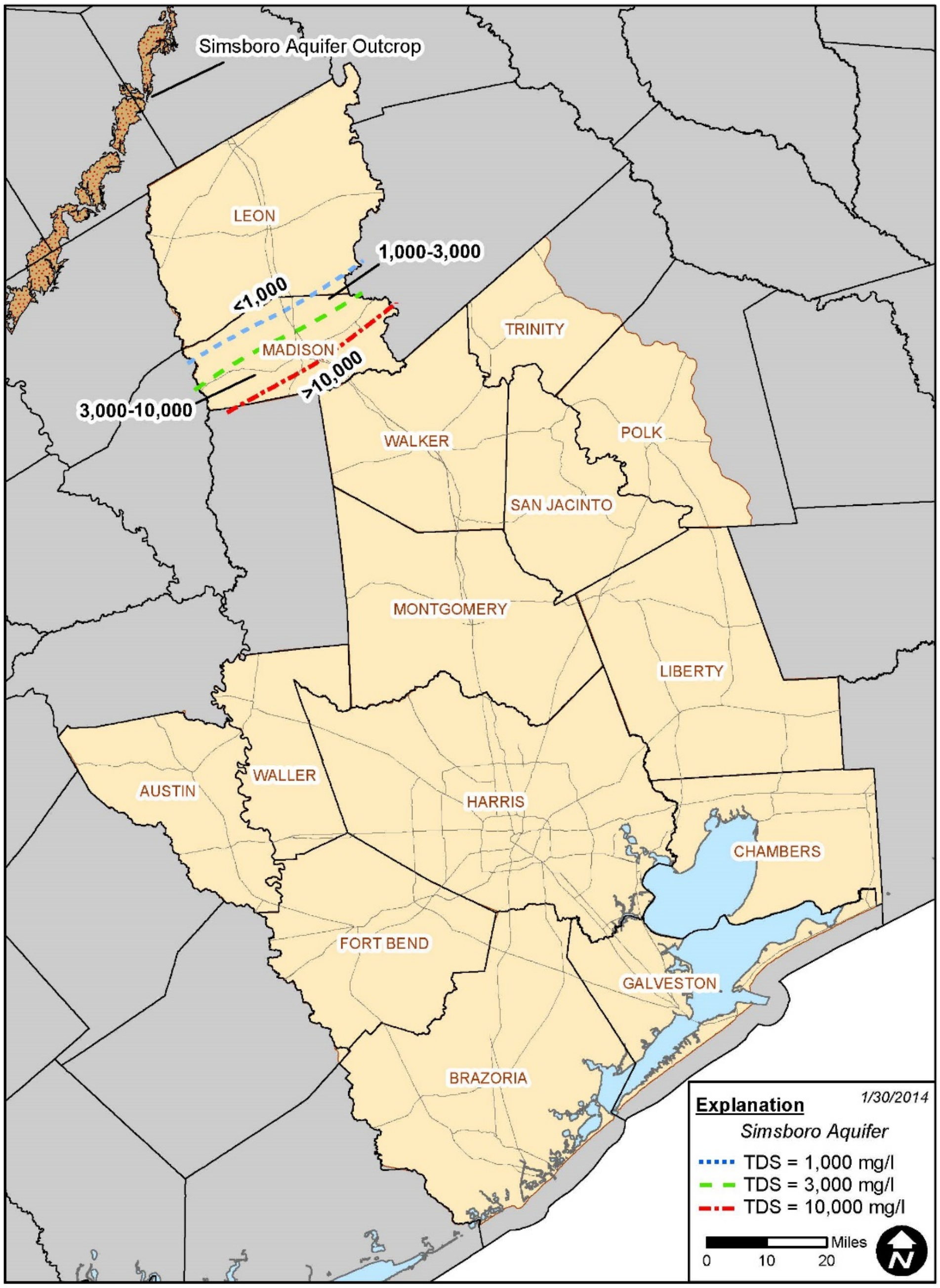
WATER USER GROUP APPLICATION

The Brackish Groundwater Development project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

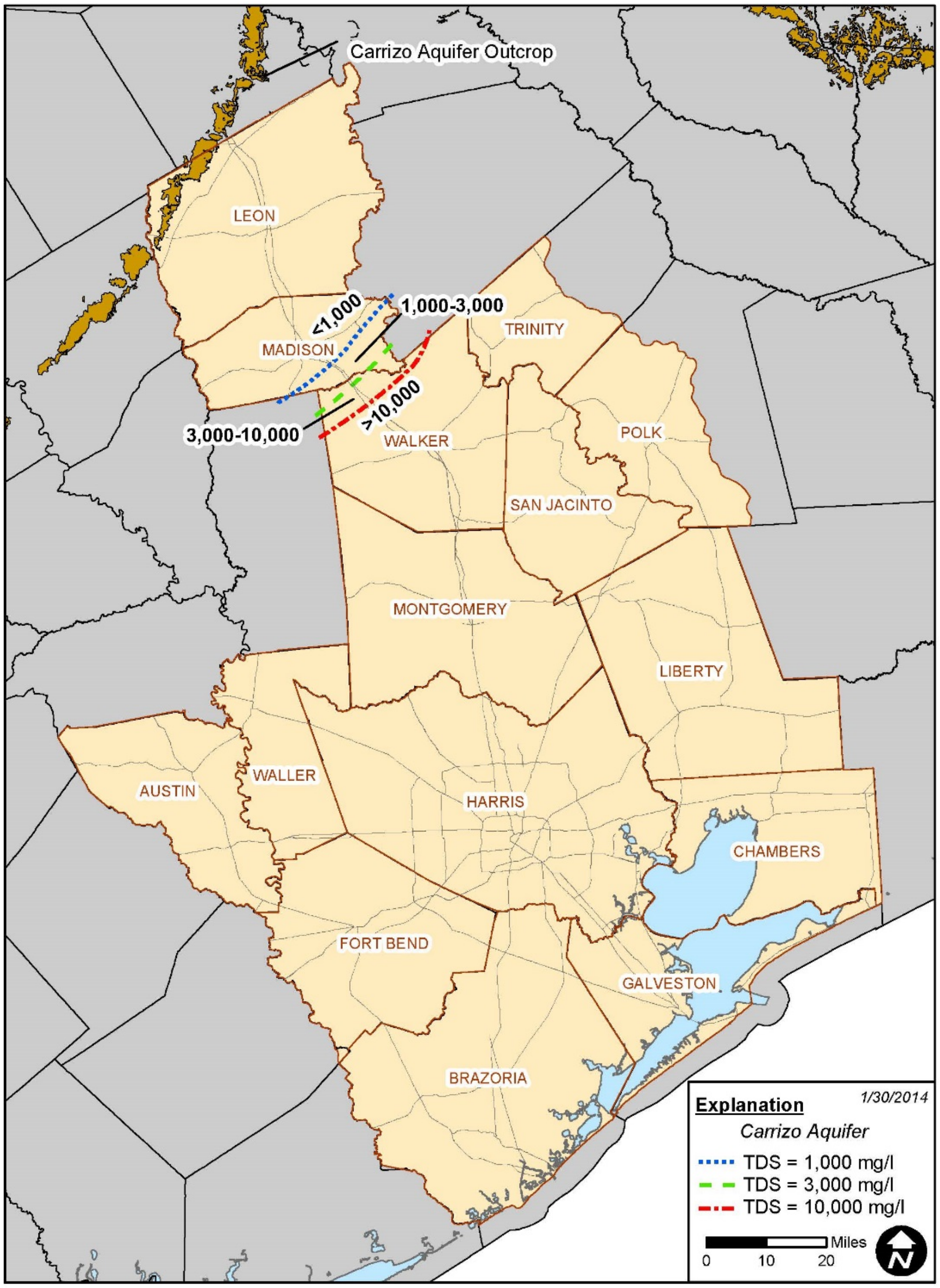
CRITERIA	WUG SUITABILITY
Proximity	This project may be developed as a supply in the vicinity of brackish groundwater zones identified in this technical memorandum.

CRITERIA	WUG SUITABILITY
Size	This project is scalable to fit local demands. However, little is known regarding the long-term sustainability of these brackish supplies and availability may be limited through physical constraints or regulation in the future.
Water Quality	Supplies from this project can be developed in such a way to provide water at a number of quality levels.
Unit Cost	The unit cost for the project varies based on magnitude and the specifics of each application. Generally, the range of costs limit the application of this project to municipal and industrial applications.
Other Factors	Brackish groundwater supplies are currently in use from the Catahoula Aquifer in Montgomery County.

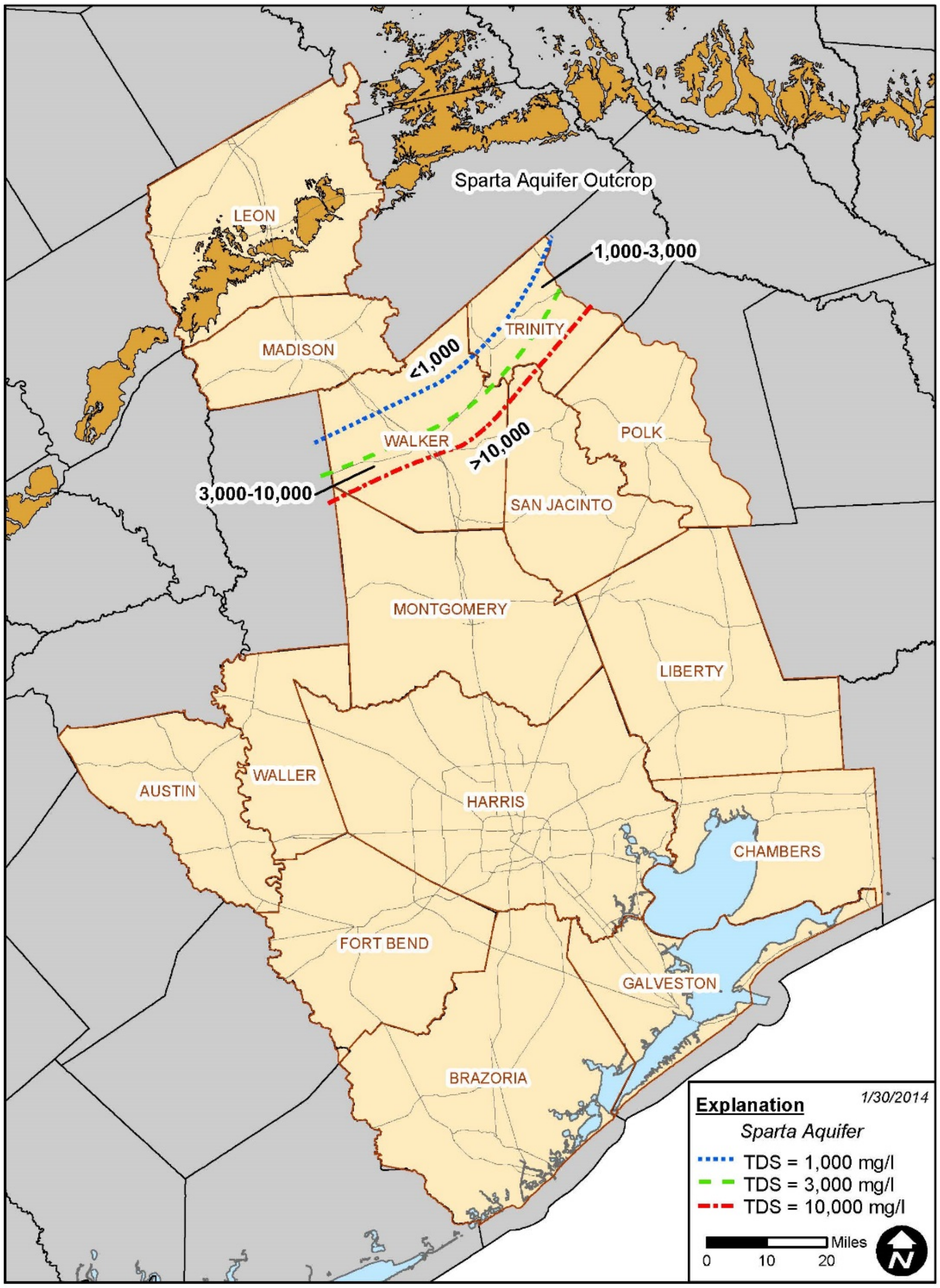
LOCATION MAP



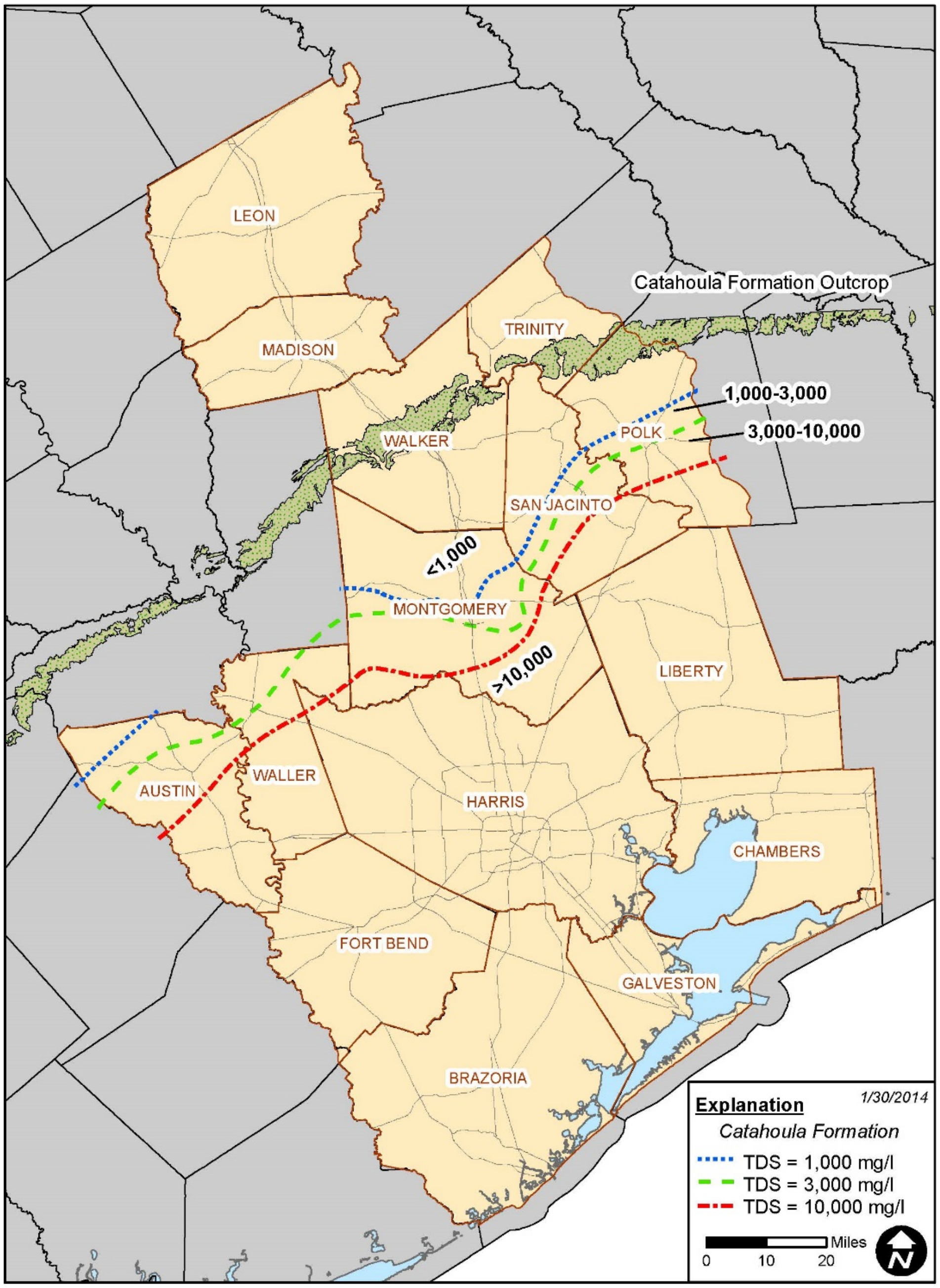
Delineation of Brackish Groundwater, Simsboro Aquifer Total Dissolved Solids



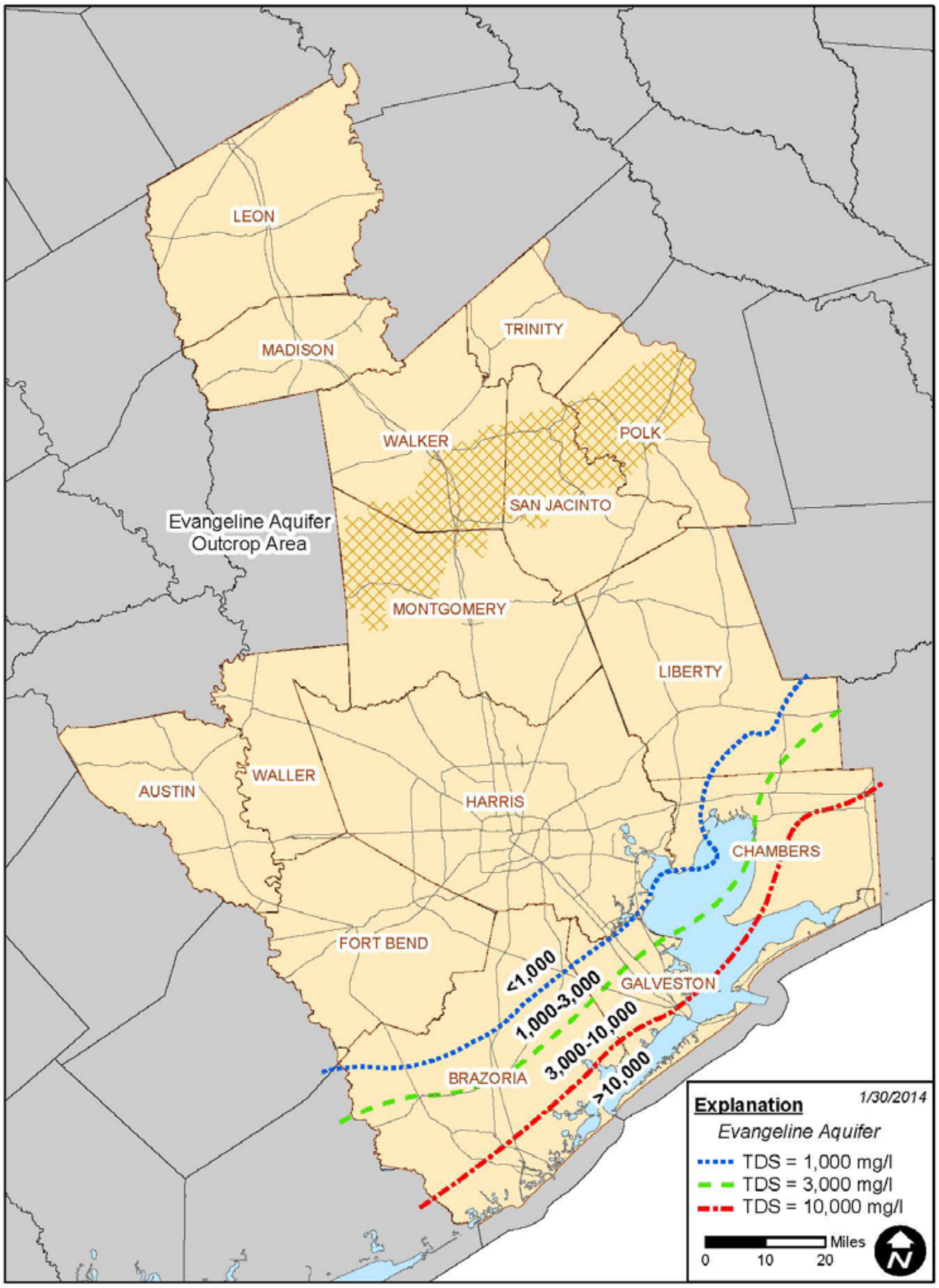
Delineation of Brackish Groundwater, Carrizo Aquifer Total Dissolved Solids



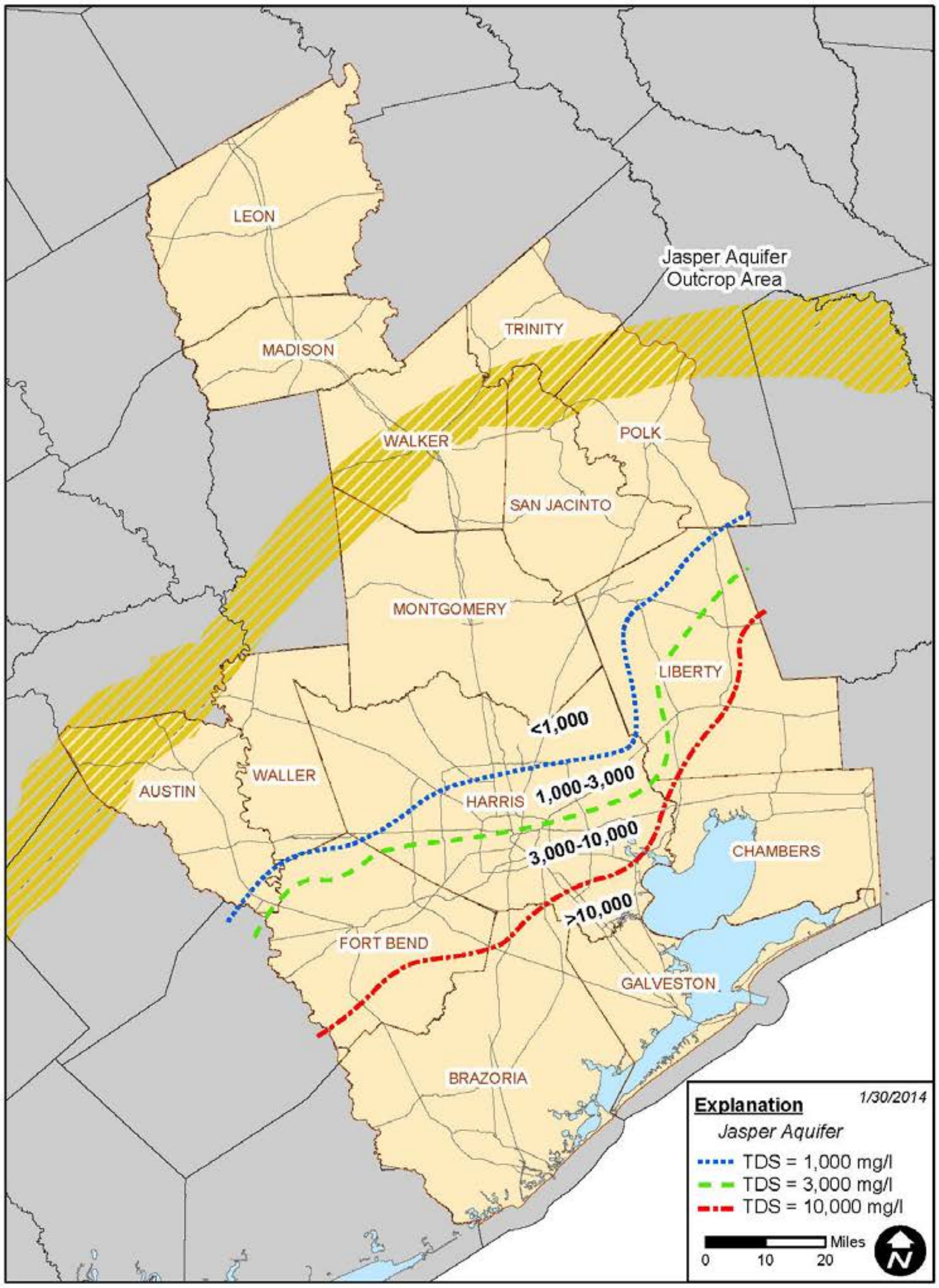
Delineation of Brackish Groundwater, Sparta Aquifer Total Dissolved Solids



Delineation of Brackish Groundwater, Catahoula Formation Total Dissolved Solids



Delineation of Brackish Groundwater, Evangeline Aquifer Total Dissolved Solids



Delineation of Brackish Groundwater, Jasper Aquifer Total Dissolved Solids

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Brazosport Water Authority Brackish Groundwater
Project ID:	GWDV-003
Project Type:	New Groundwater Source
Potential Supply Quantity (Rounded):	3,136/11,200 ac-ft/yr average/peak capacity (2.8/10 mgd average/peak capacity)
Implementation Decade:	2020 (Two phases of development prior to 2020)
Development Timeline:	2 years
Project Capital Cost:	$34,016,950 (Sept. 2013)
Unit Water Cost (Rounded):	$600 per ac-ft at peak capacity (during loan period) $346 per ac-ft at peak capacity (after loan period)

PROJECT DESCRIPTION

The Brazosport Water Authority (BWA) serves seven communities in the southern Brazoria County area in addition to potable service to Dow Chemical and two Texas Department of Criminal Justice (TDCJ) units. In December, 2013, BWA concluded a Texas Water Development Board (TWDB) Regional Facility Planning Grant study (Study) to examine the potential for serving the current BWA service area as well as other portions of Brazoria County in the future. The Study included several recommendations including the development of a reverse osmosis (RO) water treatment plant (WTP) at the site of the current BWA surface water treatment plant to be fed by brackish groundwater well field in the vicinity of the current plant site. The RO WTP would function in two basic modes:

1. When the Brazos River has sufficient flow, including Harris and Brazoria Reservoir diversions, the RO WTP would provide a minimal baseline potable water flow, supplementing the primary, lower cost portable water from the BWA surface water treatment plant.
2. When the Brazos River has insufficient flow, the RO WTP would operate up to its peak capacity to meet the potable water demands.

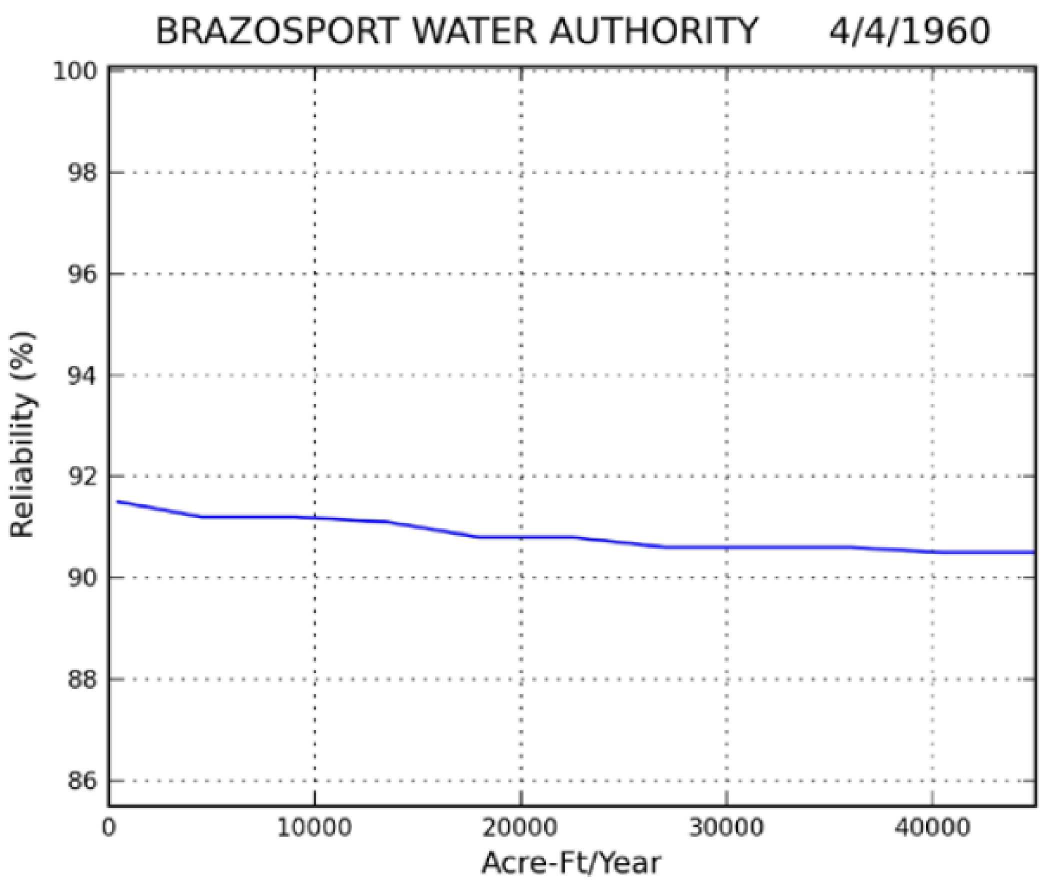
PROJECT ANALYSES

The project analyses for Brazosport Water Authority Brackish Groundwater include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Existing surface water supplies were evaluated using the Texas Commission on Environmental Quality (TCEQ) Brazos River Basin and San Jacinto-Brazos Coastal Basin Water Availability Model (WAM). For the purposes of this exercise, the full authorization version of the model (bwam3) was employed to evaluate availability from BWA's water right, 5366. As shown in *Figure 1*, this right of 45,000 ac-ft/yr was found to have a time reliability of approximately 90.5 percent. That is, the right is 100% divertible 90.5 percent of the monthly simulation periods. *Figure 1* also shows that even a dramatically reduced target of only one percent of the permit value has limited improvement in reliability. In effect, the WAM indicates that availability for this right is subject to dramatic swings in river conditions resulting in conditions where either the entirety of or none of the right is available for diversion at any given time. This reliability is depicted below in *Figure 1*.

Figure 1 – Simulated Reliability of BWA Water Right 5366



As part of the regional study, various approaches were considered to close the water supply gap. These include the purchase of surface water from wholesale providers in the Brazos River Basin, brackish groundwater desalination, and seawater desalination. Brackish groundwater desalination was selected as the preferred alternative for meeting supply shortages in supply due to availability and cost of water considerations.

Although the RO WTP's initial phase capacity is rated at 6 MGD, actual operation of the facility would result in a somewhat lower long-term average rate of production. The study indicates that Phase 1 of the facility will operate at peak capacity (6.0 MGD) 10 percent of the time to mitigate shortages in surface water supply. The plant would normally operate at just 2.0 MGD 90 percent of the time. This results in an average rate of production of 2.40 MGD. In order to produce the peak rate of 6.00 MGD a feed rate of 6.7 MGD is anticipated. This is based on blending 4.0 MGD of membrane permeate with 2.0 MGD of bypass flow. Similar permeate and bypass blending for the 2.40 MGD average flow will require a long-term groundwater production rate of 2.7 MGD or approximately 3,000 ac-ft/yr.

The proposed brackish groundwater facilities would consist of three closely located wells and collection lines ranging from 12-in. to 36-in. diameter. The WTP would provide cartridge filter pretreatment, chemical additives, and final treatment through three RO membrane racks.

The Phase 2 facility will operate at its 10.0 MGD peak capacity 10 percent of the time and a baseline rate similar to Phase 1 of 2.0 MGD, 90 percent of the time. This results in an average rate of production of 2.8 MGD. Peak capacity will be achieved with a feed rate of 11.2 MGD to produce 6.7 MGD of permeate to be blended with 3.3 MGD of bypass flow. The total long-term rate of production of groundwater will be 2.8 MGD or approximately 3,136 ac-ft/yr. Although it is difficult to determine what level of production would be required each year, this yield of 3,136 ac-ft/yr represents a yield under drought of record conditions assuming the 90/10 operating approach discussed above. This level of supply does not result in over-allocation of an existing or planned source of water. Of the estimated groundwater supply availability in the 2011 Regional Water Plan, adequate supply quantity remained unallocated in sufficient capacity to supply this project.

An additional two wells will be incorporated into the overall well field to reach the Phase 2 capacity of 10.0 MGD connected by additional 12-in. and 36-in. piping. Pretreatment will be accomplished in the same manner as Phase 1.

Environmental Considerations

Development of this project may impact environmental conditions in the immediate vicinity of the plant through disturbance of habitat.

According to the U.S. Fish and Wildlife Service (USFWS) Online Endangered Species list, the following threatened or endangered species are found in Brazoria County: brown pelican (*Pelecanus occidentalis*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), piping plover (*Charadrius melodus*), and whooping crane (*Grus americana*). Of these species, the brown pelican, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and piping plover are coastal species and should not occur on the project site.

Whooping cranes are listed as endangered in Brazoria County. The cranes breed in Canada and winter on the Texas Gulf Coast at the Aransas National Wildlife Refuge and may migrate through the project area during the spring and fall. Whooping cranes would be unlikely to use the site during migration due to the forested nature of the project area.

Construction within the vicinity of the Waters of the U.S. found along the Brazos River may be subject to Section 404 of the Clean Water Act (CWA) and crossing of the Brazos River to install collection line to the remote well across the river would be subject to a Section 10 permit from the U.S. Army Corps of Engineers. These issues may be covered under Nationwide Permit (NWP) 39 assuming certain conditions are met such as limitation of disturbance to no more than 0.5 acres. Also, construction of a pipeline across the CR 2004 bridge would be considered, itself, a bridge under Section 9 of the River and Harbors Act and require authorization.

In addition to the Brazos River, review of USFWS National Wetland Inventory (NWI) maps indicates the potential presence of forested wetland within portions of the project site. The soils comprising the project site consist of Norwood silt loam, 0 to 1 percent slopes and Pledger clay. Both these soils are hydric soils in Brazoria County, further supporting the potential presence of wetlands on at least a portion of the project site.

Projects sponsored by public entities that affect a cumulative area greater than five acres or that disturb more than 5,000 cubic yards require advance consultation with the THC according to Section 191.0525(d) of the Antiquities Code of Texas. Because the proposed project may exceed these thresholds, coordination with THC is recommended. In addition, coordination with the THC regarding the proposed project would be required to comply with USACE NWP general condition 20. Federal actions, such as Section 404/10 permits, also trigger Section 106 compliance with the National Historic Preservation Act.

Proposed project activities at the project site would all occur within Zone AE of an existing floodplain (Flood Insurance Rate Map {FIRM} 48039C0615H). Activities within the floodplain may require a permit from or coordination with the local floodplain administrator and must comply with applicable FEMA-approved state or local floodplain requirements.

The Brazos River in the project vicinity is a State owned riverbed. Any activity within or beneath the confines of the Brazos River would require an easement from the GLO prior to proceeding with construction.

The development of groundwater production may potentially increase the risk of subsidence and saltwater intrusion, especially for sites near the coast. To address these concerns, BWA has performed investigations into the potential for subsidence and drawdown occurring in the vicinity of the well field. To accomplish this, BWA utilized both the Houston Area Groundwater Model (HAGM) and the Lower-Colorado River Basin (LCRB). Various scenarios yielded maximum incremental subsidence. In a scenario similar to the proposed well field configuration, the subsidence predicted by the HAGM reached a maximum of 1.25 feet at the well field under a constant pumping scenario of 4,000 gpm (5.76 MGD) between 2005 and 2050. A scenario splitting pumpage stratigraphically across the Beaumont and Lissie formations in the LCRB demonstrated subsidence of 0.43 feet between the same time period. Note that this pumping rate of 5.76 MGD is greater than the anticipated long-term average pumping rates for Phases 1 and 2 discussed above. In addition to this desktop analysis, BWA has installed subsidence monitoring equipment for use in tracking long-term trends in proximity of the well field.

RO concentrate disposal to the Brazos River will be accomplished in a way to minimize potential environmental impacts. Discharge is anticipated to occur below State Highway (SH) 332 where there is no limit set for Total Dissolved Solids (TDS). At this point, the salinity of RO concentrate is expected to be below the ambient levels of the Brazos River. Similar projects have been employed for other projects in the Brazos River Basin. This discharge will require permitting under the Texas Pollutant Discharge Elimination System (TPDES).

Permitting and Development

The groundwater well components of this project will require permitting through the Brazoria County Groundwater Conservation District (BCGCD) to drill and operate the planned wells. Brine discharge from the facility will also require permitting through TCEQ. Additional permitting activities may be required to facilitate construction activities, as described above.

Cost Analysis

Costs for the proposed project were provided by BWA and adjusted for use in regional planning. Costs for Phase 1 and 2 of the project have been combined into one overall capital cost as it is expected that both phases will be developed in the 2020 planning period. These costs are summarized below in *Table 1*.

Table 1 – BWA Brackish Groundwater Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					January 28, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$24,520,000	$24,520,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$8,442,500	$8,442,500
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$1,054,450	$1,054,450
	PROJECT CAPITAL COST				$34,016,950

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$2,846,516	$2,846,516	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$3,161,700	$3,161,700	$3,161,700	$3,161,700	$3,161,700	$3,161,700
3	PUMPING ENERGY COSTS	$710,000	$710,000	$710,000	$710,000	$710,000	$710,000
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$6,718,216	$6,718,216	$3,871,700	$3,871,700	$3,871,700	$3,871,700

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$6,718,216	$6,718,216	$3,871,700	$3,871,700	$3,871,700	$3,871,700
2	YIELD	11,200	11,200	11,200	11,200	11,200	11,200
3	UNIT COST	$600	$600	$346	$346	$346	$346
	TOTAL UNIT COST						$430

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$2,330,000	$2,330,000
2	PIPELINE CROSSINGS	1	LS	$460,000	$460,000
3	WATER TREATMENT PLANTS	1	LS	$17,350,000	$17,350,000
4	WELL FIELDS	1	LS	$4,380,000	$4,380,000
	PROJECT COST				$24,520,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$2,330,000	$23,300
2	PIPELINE CROSSINGS	1.0	%	$460,000	$4,600
3	WATER TREATMENT PLANTS	1.0	LS	$3,090,000	$3,090,000
4	WELL FIELDS	1.0	%	$4,380,000	$43,800
	ANNUAL OPERATION AND MAINTENANCE COST				$3,161,700

PROJECT EVALUATION

Based on the analysis provided above, the Brazosport Water Authority Brackish Groundwater project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	3	Relatively low project cost for a desalination alternative.
Location	3	Conveyance required to provide water to diverse BWA service area.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts may be easily mitigated.
Environmental Flows	4	Slight increase in instream flows due to brine return to stream course.
Local Preference	4	Local support from BWA customers.
Institutional Constraints	4	Permitting efforts under way.
Development Timeline	5	Project can be implemented in a relatively short time period.
Sponsorship	5	Project is under development.
Vulnerability	4	No substantial risk from natural and man-made disasters. Potential for subsidence being monitored to prevent detrimental impacts.
Impacts on Other Projects	5	Project works in conjunction with BWA surface water rights to provide a reliable water supply.

WATER USER GROUP APPLICATION

The Brazosport Water Authority Brackish Groundwater project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

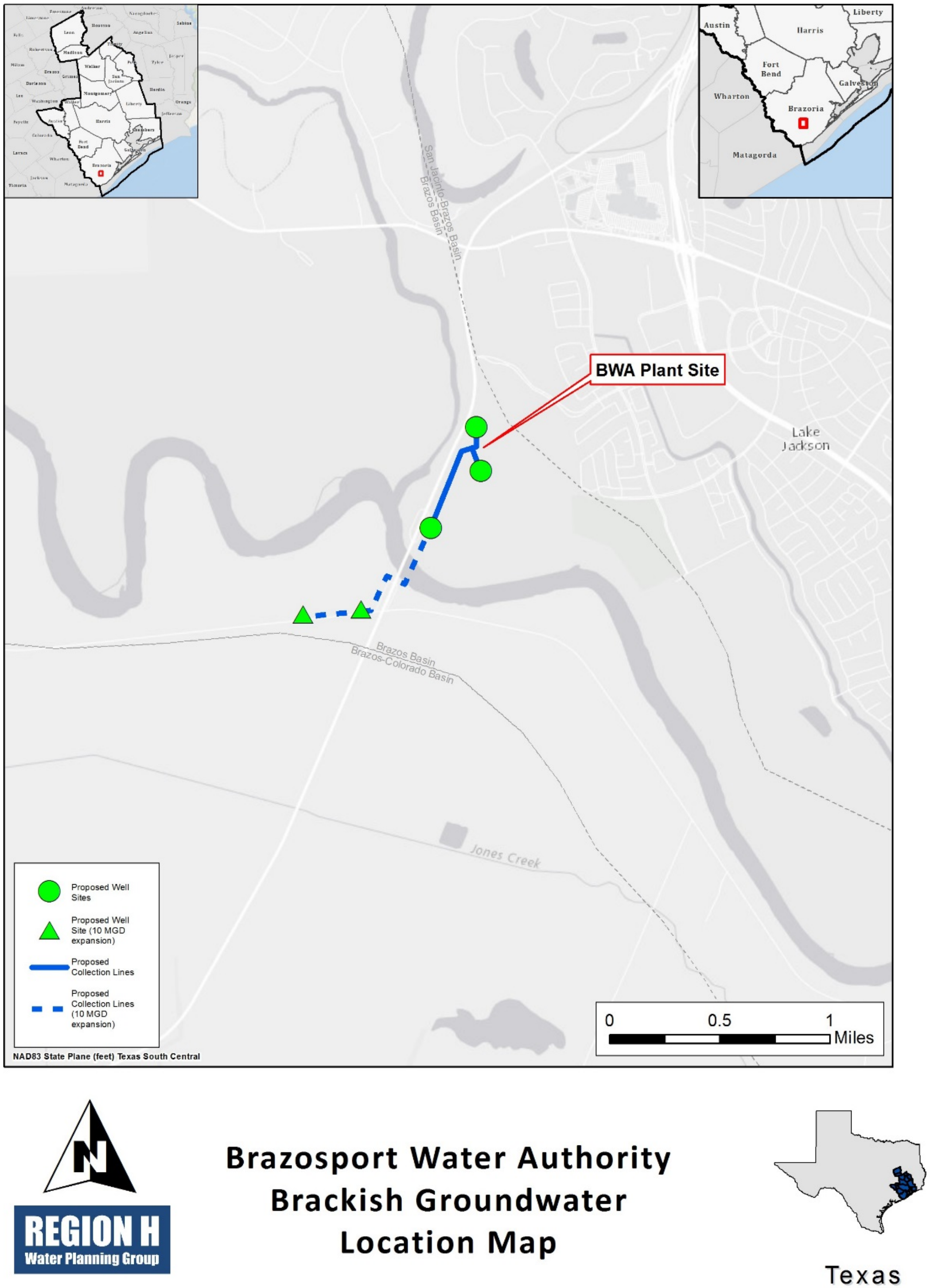
CRITERIA	WUG SUITABILITY
Proximity	Project is positioned to provide water within the current BWA customer service area.
Size	Project is sized to provide adequate, dry year supply, for BWA customer use.

CRITERIA	WUG SUITABILITY
Water Quality	Project will provide treated water for potable, municipal and industrial use.
Unit Cost	Unit cost is suited to use in municipal supply. Long-term costs are also mitigated by use of traditionally treated surface water supplies when available.
Other Factors	Project is identified for BWA service area.

REFERENCES

Brazoria County Regional Water Facility Study. CDM-Smith. May, 2013.

LOCATION MAP



REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Conroe Brackish Groundwater Desalination
Project ID:	GWDV-004
Project Type:	New Groundwater Source
Potential Supply Quantity (Rounded):	5,600 ac-ft/yr (5.0 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	10 years
Project Capital Cost:	$40,691,342 (Sept. 2013)
Unit Water Cost (Rounded):	$857 per ac-ft (during loan period) $323 per ac-ft (after loan period)

PROJECT DESCRIPTION

The project will include the development of brackish groundwater from the Catahoula aquifer and will utilize reverse osmosis for desalination.

PROJECT ANALYSES

The project analyses for Conroe Brackish Groundwater Desalination include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The supply development will include the evaluation of quality and quantity from the Catahoula aquifer in various locations through existing well logs and projected test wells to confirm preliminary findings. One or more wells will be constructed to provide 5 mgd (5,600 ac-ft/yr) of produced desalinated water from the brackish wells.

Environmental Considerations

Minimal surface impacts from the development of the project are expected. The facilities associated with the proposed project are anticipated to have a relatively small footprint compared to conventional surface water supply and treatment infrastructure. Concentrate discharge from the treatment plant will be disposed of in accordance with permit obtained from the Texas Commission on Environmental Quality (TCEQ). Potential options for concentrate disposal include deep well injection, open water discharge or processing through municipal wastewater treatment works.

Permitting and Development

Permitting of groundwater supplies is conducted through the local groundwater management authority. Development of the project will require several steps in permitting. First, permits must be sought from Lone Star Groundwater Conservation District (LSGCD) to allow for drilling a test bore in the Catahoula formation and then to permit the production from a completed well. Various permits are or may be required from the TCEQ. In addition to the production well, permitting is also required for the development of an injection well associated with the RO process. In most cases, this is a matter of permitting a Class I non-hazardous injection well with the Texas Commission on Environmental Quality (TCEQ). This process typically takes a year to complete.

Cost Analysis

Planning-level capital and operational cost estimates for the Conroe Brackish Groundwater Desalination project were provided by the sponsor’s engineering consultant. The primary capital components of the project include groundwater well development, a reverse osmosis treatment facility, and delivery infrastructure. Both capital and operational costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Environmental study and mitigation costs, which were not included in the preliminary estimate, were assumed using standard Regional Planning costing assumptions to be equal to land acquisition costs. Estimated costs are presented in *Table 1.*

Table 1 – Conroe Brackish Groundwater Desalination Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 17, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$28,360,000	$28,360,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$10,090,000	$10,090,000
3	LAND AND EASEMENTS	1	LS	$490,000	$490,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$490,000	$490,000
5	INTEREST DURING CONSTRUCTION	1	LS	$1,261,342	$1,261,342
	PROJECT COST				$40,691,342

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$2,994,140	$2,994,140	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,550,000	$1,550,000	$1,550,000	$1,550,000	$1,550,000	$1,550,000
3	PUMPING ENERGY COSTS	$257,027	$257,027	$257,027	$257,027	$257,027	$257,027
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$4,801,167	$4,801,167	$1,807,027	$1,807,027	$1,807,027	$1,807,027

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$4,801,167	$4,801,167	$1,807,027	$1,807,027	$1,807,027	$1,807,027
2	YIELD	5,600	5,600	5,600	5,600	5,600	5,600
3	UNIT COST	$857	$857	$323	$323	$323	$323
	TOTAL UNIT COST						$501

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$3,930,000	$3,930,000
2	WATER TREATMENT PLANTS	1	LS	$7,890,000	$7,890,000
3	WATER STORAGE TANKS	1	LS	$1,210,000	$1,210,000
4	WELL FIELDS	1	LS	$15,330,000	$15,330,000
	PROJECT COST				$28,360,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	100.0	%	$130,000	$130,000
2	WATER TREATMENT PLANTS	100.0	%	$1,020,000	$1,020,000
3	WATER STORAGE TANKS	0.0	%	0.0	$0
4	WELL FIELDS	100.0	%	400,000.0	$400,000
	ANNUAL OPERATION AND MAINTENANCE COST				$1,550,000

PROJECT EVALUATION

Based on the analysis provided above, the Conroe Brackish Groundwater Desalination project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	2	The cost of this project is initially relatively high but is reduced substantially after the completion of debt service.
Location	5	The proposed supply would be located in the immediate vicinity of demands.
Water Quality	3	With proper treatment and concentrate disposal, there are no known issues related to water quality.
Environmental Land and Habitat	4	Minimal impacts related to development of well sites and treatment facilities.
Environmental Flows	4	The project produces return flows from deep, groundwater supplies.
Local Preference	4	Some local support.
Institutional Constraints	3	Permit expected with minimal problems.
Development Timeline	5	Once initiated, it is anticipated that the project could be implemented in a short period of time.
Sponsorship	4	Project identified by sponsor.
Vulnerability	4	Supplies are generally more drought-tolerant than surface water resources and have limited risk from human impacts.
Impacts on Other Project	4	Slight increase in return flows associated with groundwater development.

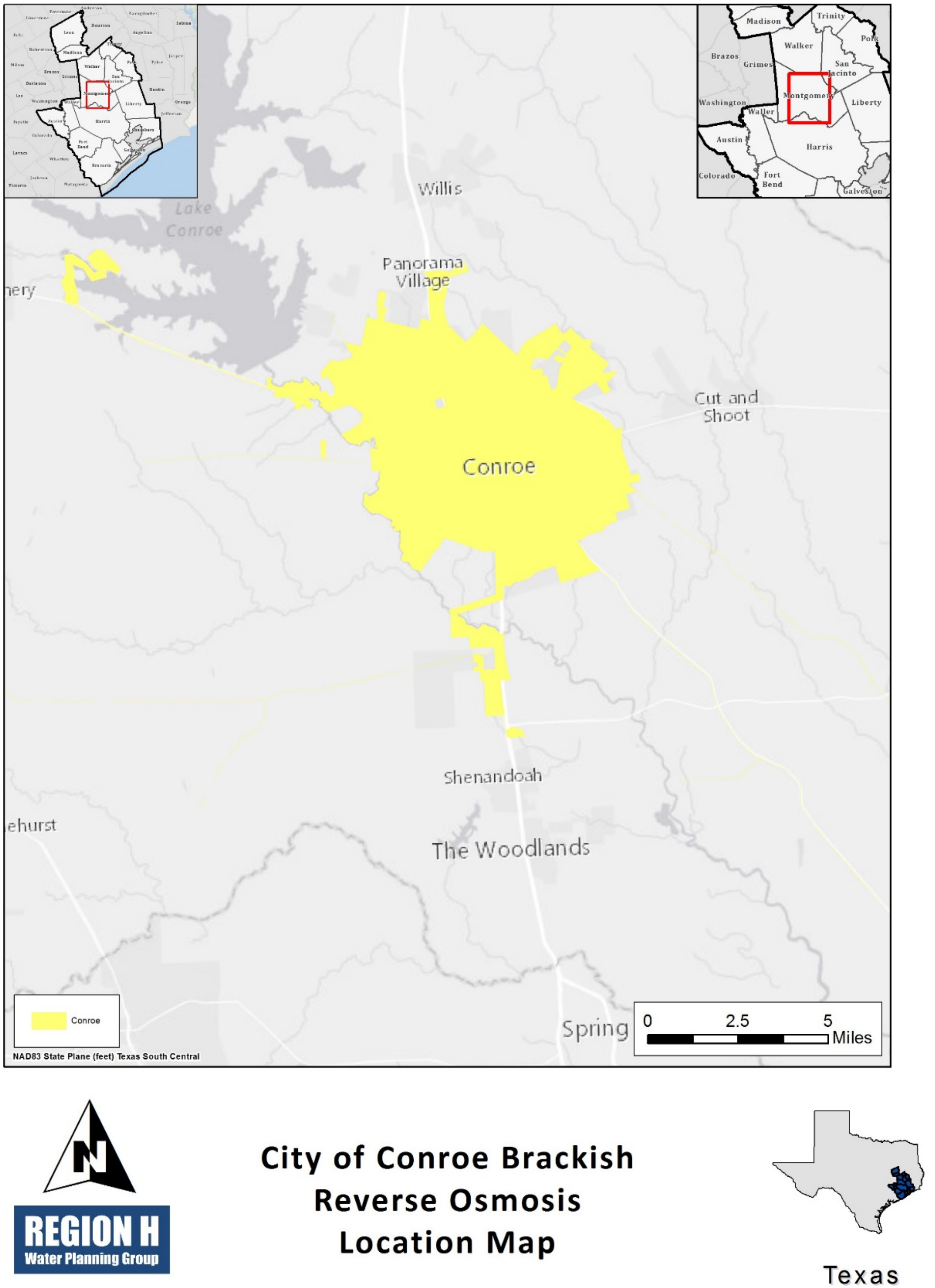
WATER USER GROUP APPLICATION

The Conroe Brackish Groundwater Desalination project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the project will only serve the City of Conroe and any entities that it provides with water supply.

CRITERIA	WUG SUITABILITY
Proximity	The project is located in close proximity to intended point(s) of use.
Size	Size of project is appropriate to intended use.
Water Quality	This project should provide water of acceptable quality for potable municipal use.

CRITERIA	WUG SUITABILITY
Unit Cost	The cost of this project is moderately high and decreases substantially after completion of debt service.
Other Factors	This project utilizes groundwater from the Catahoula Aquifer, reducing dependence on the Gulf Coast Aquifer.

LOCATION MAP



City of Conroe Brackish Reverse Osmosis Location Map

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Expanded Use of Groundwater
Project ID:	GWDV-005
Project Type:	Existing Groundwater Source
Potential Supply Quantity (Rounded):	Approximately 14,000 – 31,000 ac-ft/yr (12.5 – 27.7 mgd)
Implementation Decade:	2020 (varies by WUG)
Development Timeline:	<5 years
Project Capital Cost:	Varies by WUG type and projected need
Unit Water Cost (Rounded):	Varies by WUG type and projected need

PROJECT DESCRIPTION

A number of WUGs within Region H, particularly those with limited access to other supply sources, will likely meet a portion of their projected needs by developing or expanding infrastructure to utilize available groundwater within the limits established by groundwater conservation district (GCD) and subsidence district (SD) rules or local water quality concerns.

PROJECT ANALYSES

The project analyses for Expanded Use of Groundwater include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The Region H Water Plan anticipates the continued use of available groundwater to meet demands, unless such use is limited by GCD or SD rules or local water quality concerns. By utilizing this supply, a number of WUGs with projected needs would be able to defer or avoid implementation of more costly and logistically difficult options. Groundwater use from the Gulf Coast, Carrizo-Wilcox, Sparta, Queen City, and Yegua-Jackson Aquifers is projected to increase in certain counties during the planning period. Due to GCD and SD regulations or low remaining groundwater availability, the Expanded Use of Groundwater project was generally not applied in Brazoria, Fort Bend, Galveston, Harris, or Montgomery Counties; there are a limited number of exceptions, which generally reflect increased production by entities exempt from regulations limiting groundwater production (portions of County-Other and other WUGs reflecting small private household wells, water for oil and gas production, etc.). For the remaining counties within Region H, remaining groundwater availability was assigned to WUGs which already utilize groundwater or have limited other options.

Environmental Considerations

Environmental impacts of developing additional groundwater infrastructure are dependent on the project location, source aquifer, and project size. Generally, in the locations in Region H where Expanded Use of Groundwater is feasible and allowable under groundwater district and subsidence district regulations, it is not anticipated to have significant negative environmental impacts. Portions of Region H have been subject to land surface subsidence due to long-term excessive groundwater withdrawals, which should be considered when developing groundwater infrastructure in or near these areas. Groundwater within the region is generally of good quality and available at the point of use, allowing the wells and conveyance systems to be commingled with the supported development, and not requiring substantial additional land for well fields or conveyance systems. Site-specific evaluations of wildlife habitats, wetlands (including mitigation by wetlands off-sets) and cultural resources must be considered in the overall development plan. There are no major springs in Region H, but well pumping supplies return flows to all river basins within the region, and ultimately to Galveston Bay. These flows will increase proportionally with the increased groundwater use.

Permitting and Development

Permitting requirements will vary with the location and intended use of groundwater development. In areas within the jurisdiction of a GCD or SD, projects would be required to comply with the appropriate District rules regarding permitting, registration, production, well spacing, and other factors. Some groundwater development projects may also require minor construction permitting.

Cost Analysis

Costs for WUGs to implement Expanded Use of Groundwater vary by WUG type and size of project. Costs for each WUG were calculated using a set of standardized assumptions by use type (Sept 2013 equivalent cost). Agricultural wells, which are typically shallower than municipal wells and are normally used heavily for a small portion of the year, tended to have lower cost than municipal wells. Typical capital costs estimated for agricultural groundwater range from $171,585 for a 10 ac-ft/yr supply to $6,165,374 for a 5,000 ac-ft/yr supply. Estimates for municipal wells ranged from $837,894 for a 10 ac-ft/yr supply to $12,633,145 for a 5,000 ac-ft/yr supply.

PROJECT EVALUATION

Based on the analysis provided above, the Expanded Use of Groundwater project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	Costs are generally high but decline considerably after debt service. Agricultural groundwater production is less expensive than that for municipal use.
Location	5	Typically located near points of use.
Water Quality	3	No known water quality issues.

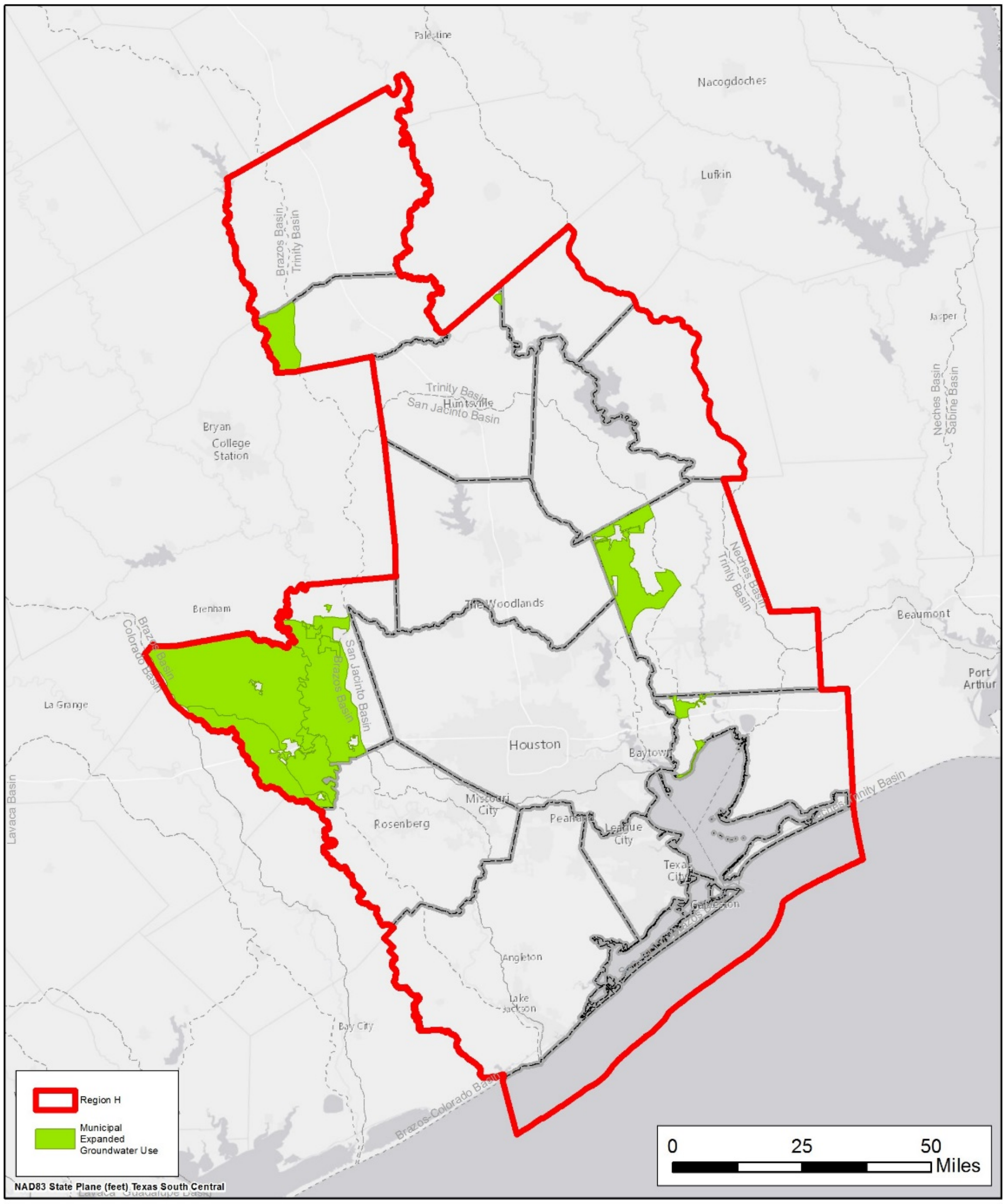
CRITERIA	RATING	EXPLANATION
Environmental Land and Habitat	4	Minimal environmental impacts expected.
Environmental Flows	4	Minor increases to streamflows.
Local Preference	4	Projects typically encounter minimal opposition.
Institutional Constraints	3	Minimal permitting challenges anticipated.
Development Timeline	5	Typically <5 years.
Sponsorship	3	Level of sponsor commitment unknown for most WUGS.
Vulnerability	5	Minimal ricks associated with this project.
Impacts on Other Projects	3	No major impacts to other project identified.

WATER USER GROUP APPLICATION

The Expanded Use of Groundwater project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Wells fields typically collocated with demand centers.
Size	Projects sized for sponsoring community.
Water Quality	Typically good in most areas of Region H.
Unit Cost	Costs are generally high but decline considerably after debt service.
Other Factors	Availability constrained by relevant local groundwater regulations.

LOCATION MAP



Municipal Expanded Use of Groundwater Location Map

Texas

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Forestar Houston County Project
Project ID:	GWDV-006
Project Type:	New Groundwater Source
Potential Supply Quantity (Rounded):	30,074 ac-ft/yr (26.85 mgd)
Implementation Decade:	2020 possible
Development Timeline:	10 years
Project Capital Cost:	$166,392,210 (Sept. 2013)
Unit Water Cost (Rounded):	$632 per ac-ft (during loan period) $169 per ac-ft (after loan period)

PROJECT DESCRIPTION

Forestar owns groundwater holdings in 21 counties in east Texas. Portions of these holdings are owned solely by Forestar whole others are held by Campbell Global. Forestar is entitled to 45 percent of these latter holdings and the entirety of the rights they are the sole owner of. The available supplies span resources in the Carrizo-Wilcox, Gulf Coast, Queen City, Sparta, and Yegua-Jackson Aquifers.

Forestar has engaged with several water users and suppliers to consider several alternatives for delivery of produced groundwater to adjoining basins with identified water needs. Through this analysis several alternatives have been developed to provide water to Regions C and H.

This project examines the potential for development of groundwater supplies in Houston County for transfer west to the Brazos River Basin. This option produces yield from the Carrizo-Wilcox Aquifer that will be delivered to the Brazos River where it may be diverted by a customer downstream.

PROJECT ANALYSES

The project analyses for Forestar Houston County Project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The proposed approach for this project is the conveyance of water developed in Houston County to the Brazos River Basin. An estimated 52 miles of pipeline will be required for this conveyance consisting of both rural and urban sections. The water will then be discharged into an existing stream segment of the Navasota River (Brazos River Basin) for conveyance downstream through bed and banks transfer.

Environmental Considerations

Detailed environmental assessments will be required once specifics of the project have determined following the identification of a customer for the water supply.

Permitting and Development

Houston County is not regulated by a groundwater conservation district (GCD) and, therefore, groundwater produced by this project is not currently regulated. Aspects of the site and transmission development will likely be regulated under various agencies. A water right permit will be required for any bed and banks transfer of water. These project specifics will be examined in greater detail once a customer has been identified and detailed studies have been commenced.

Cost Analysis

Costs were developed as part of the preliminary study conducted by Forestar. These were adapted to meet regional planning requirements for presentation of project costs and are shown believe in *Table 1*. The costs presented in this memorandum do not include the purchase cost of water.

Table 1 – Forestar Liberty County Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					January 15, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$116,100,000	$116,100,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$37,020,000	$37,020,000
3	LAND AND EASEMENTS	1	LS	$4,300,000	$4,300,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$1,390,000	$1,390,000
5	INTEREST DURING CONSTRUCTION	1	LS	$7,582,210	$7,582,210
	PROJECT CAPITAL COST				$166,392,210

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$13,923,589	$13,923,589	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,341,000	$1,341,000	$1,341,000	$1,341,000	$1,341,000	$1,341,000
3	PUMPING ENERGY COSTS	$3,748,000	$3,748,000	$3,748,000	$3,748,000	$3,748,000	$3,748,000
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$19,012,589	$19,012,589	$5,089,000	$5,089,000	$5,089,000	$5,089,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$19,012,589	$19,012,589	$5,089,000	$5,089,000	$5,089,000	$5,089,000
2	YIELD	30,074	30,074	30,074	30,074	30,074	30,074
3	UNIT COST	$632	$632	$169	$169	$169	$169
	TOTAL UNIT COST						$324

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$12,000,000	$12,000,000
2	PIPELINES	1	LS	$72,270,000	$72,270,000
3	WELL FIELDS	1	LS	$31,830,000	$31,830,000
	PROJECT COST				$116,100,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$12,000,000	$300,000
2	PIPELINES	1.0	%	$72,270,000	$722,700
3	WELL FIELDS	1.0	%	$31,830,000	$318,300
	ANNUAL OPERATION AND MAINTENANCE COST				$1,341,000

PROJECT EVALUATION

Based on the analysis provided above, the Forestar Houston County Project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	3	Project has a relatively moderate estimated unit cost compared to other raw water projects.
Location	2	Conveyance required to provide water to likely demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	2	Environmental impacts associated with long conveyance infrastructure.
Environmental Flows	4	Project will increase instream flows over the extent of the bed and banks transfer.
Local Preference	3	No local preference known.
Institutional Constraints	2	Project will require various permitting and right-of-way acquisition components.
Development Timeline	5	Approximate 5-10-year development timeline.
Sponsorship	2	No committed project sponsor identified.
Vulnerability	3	Moderate risk associated with conveyance infrastructure.
Impacts on Other Projects	3	No known impacts to other projects.

WATER USER GROUP APPLICATION

The Forestar Houston County Project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

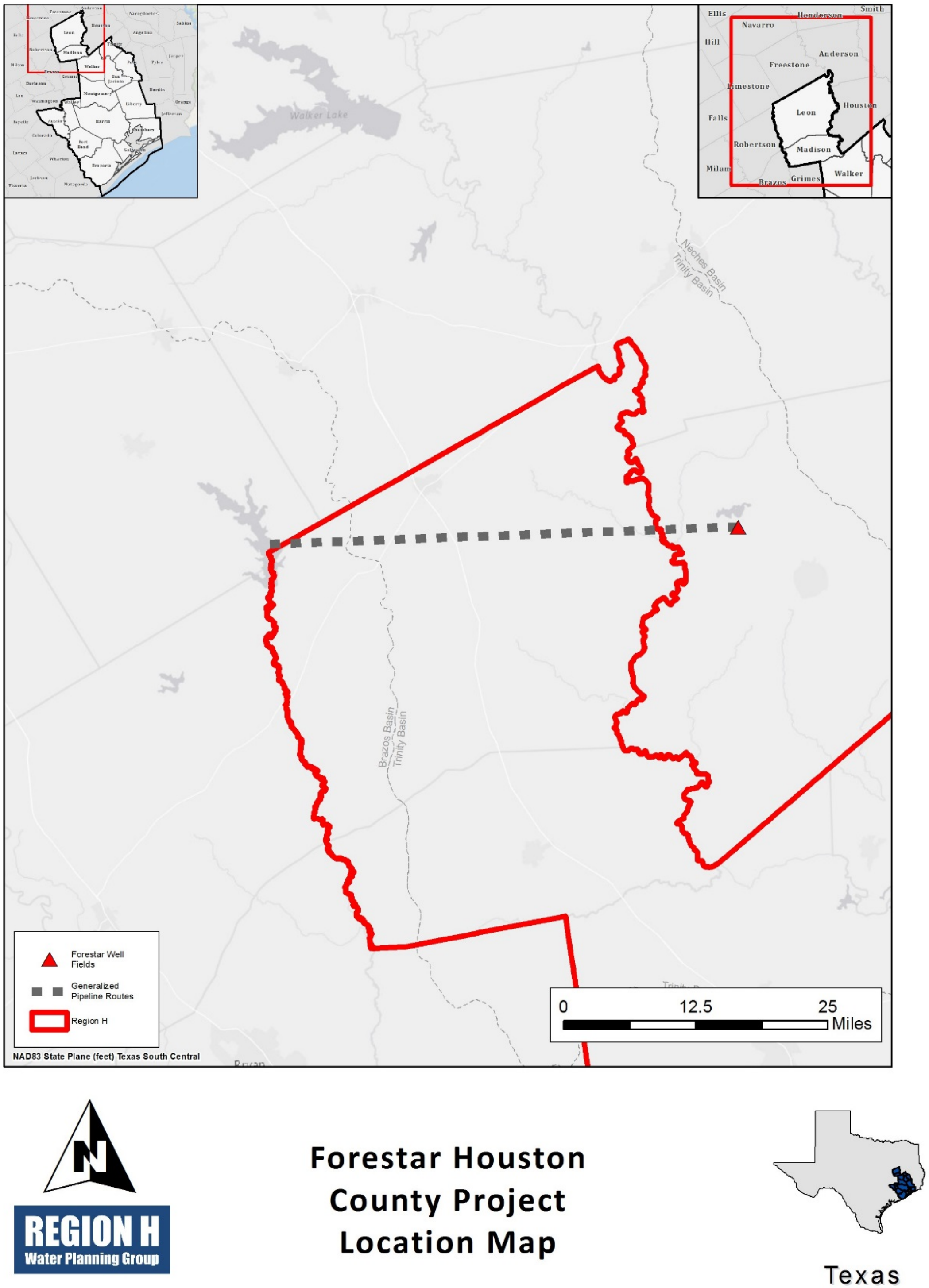
CRITERIA	WUG SUITABILITY
Proximity	Project will require conveyance through pipeline and natural corridors in order to make supplies available to demand centers.
Size	Relatively small project yield is suited to serving as a supply component for a small number of water users.
Water Quality	Project will produce a raw water supply that will require treatment for municipal and some industrial uses.

CRITERIA	WUG SUITABILITY
Unit Cost	Project cost makes it prohibitive for irrigation uses but may be economically feasible for other purposes.
Other Factors	

REFERENCES

Freese and Nichols, Inc. Assessment of Forestar's Water Assets. January, 2015.

LOCATION MAP



REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Forestar Liberty County Project
Project ID:	GWDV-007
Project Type:	New Groundwater Source
Potential Supply Quantity (Rounded):	16,130 ac-ft/yr (1.44 mgd)
Implementation Decade:	2020 possible
Development Timeline:	10 years
Project Capital Cost:	$201,386,856 (Sept. 2013)
Unit Water Cost (Rounded):	$1,228 per ac-ft (during loan period) $183 per ac-ft (after loan period)

PROJECT DESCRIPTION

Forestar owns groundwater holdings in 21 counties in east Texas. Portions of these holdings are owned solely by Forestar whole others are held by Campbell Global. Forestar is entitled to 45 percent of these latter holdings and the entirety of the rights they are the sole owner of. The available supplies span resources in the Carrizo-Wilcox, Gulf Coast, Queen City, Sparta, and Yegua-Jackson Aquifers.

Forestar has engaged with several water users and suppliers to consider several alternatives for delivery of produced groundwater to adjoining basins with identified water needs. Through this analysis several alternatives have been developed to provide water to Regions C and H.

This project examines the potential for development of groundwater supplies in Liberty County for transfer west to the Brazos River Basin. This option takes advantage of the Splendora and Magruder well fields to produce a combined yield from the Gulf Coast Aquifer that will be delivered to the Brazos River where it may be diverted by a customer downstream.

PROJECT ANALYSES

The project analyses for Forestar Liberty County Project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The proposed approach for this project is the conveyance of water developed in Liberty County to the Brazos River Basin. An estimated 77 miles of pipeline will be required for this conveyance consisting of both rural and urban sections. The water will then be discharged into an existing stream segment of the Brazos River for conveyance downstream through bed and banks transfer.

Environmental Considerations

Detailed environmental assessments will be required once specifics of the project have determined following the identification of a customer for the water supply.

Permitting and Development

Liberty County is not regulated by a groundwater conservation district (GCD) and, therefore, groundwater produced by this project is not currently regulated. Aspects of the site and transmission development will likely be regulated under various agencies. A water right permit will be required for any bed and banks transfer of water. These project specifics will be examined in greater detail once a customer has been identified and detailed studies have been commenced.

Cost Analysis

Costs were developed as part of the preliminary study conducted by Forestar. These were adapted to meet regional planning requirements for presentation of project costs and are shown believe in *Table 1*. The costs presented in this memorandum do not include the purchase cost of water.

Table 1 – Forestar Liberty County Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					January 15, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$133,220,000	$133,220,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$41,170,000	$41,170,000
3	LAND AND EASEMENTS	1	LS	$16,220,000	$16,220,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$1,600,000	$1,600,000
5	INTEREST DURING CONSTRUCTION	1	LS	$9,176,856	$9,176,856
	PROJECT CAPITAL COST				$201,386,856

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$16,851,917	$16,851,917	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,486,100	$1,486,100	$1,486,100	$1,486,100	$1,486,100	$1,486,100
3	PUMPING ENERGY COSTS	$1,470,000	$1,470,000	$1,470,000	$1,470,000	$1,470,000	$1,470,000
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$19,808,017	$19,808,017	$2,956,100	$2,956,100	$2,956,100	$2,956,100

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$19,808,017	$19,808,017	$2,956,100	$2,956,100	$2,956,100	$2,956,100
2	YIELD	16,130	16,130	16,130	16,130	16,130	16,130
3	UNIT COST	$1,228	$1,228	$183	$183	$183	$183
	TOTAL UNIT COST						$532

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$10,260,000	$10,260,000
2	PIPELINES	1	LS	$109,220,000	$109,220,000
3	WELL FIELDS	1	LS	$13,740,000	$13,740,000
	PROJECT COST				$133,220,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$10,260,000	$256,500
2	PIPELINES	1.0	%	$109,220,000	$1,092,200
3	WELL FIELDS	1.0	%	$13,740,000	$137,400
	ANNUAL OPERATION AND MAINTENANCE COST				$1,486,100

PROJECT EVALUATION

Based on the analysis provided above, the Forestar Liberty County Project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	Project has a relatively high estimated unit cost compared to other raw water projects.
Location	2	Conveyance required to provide water to likely demand centers.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	2	Environmental impacts associated with long conveyance infrastructure.
Environmental Flows	4	Project will increase instream flows over the extent of the bed and banks transfer.
Local Preference	3	No local preference known.
Institutional Constraints	2	Project will require various permitting and right-of-way acquisition components.
Development Timeline	4	Approximate 5-10-year development timeline.
Sponsorship	2	No committed project sponsor identified.
Vulnerability	3	Moderate risk associated with conveyance infrastructure.
Impacts on Other Projects	3	No known impacts to other projects.

WATER USER GROUP APPLICATION

The Forestar Liberty County Project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

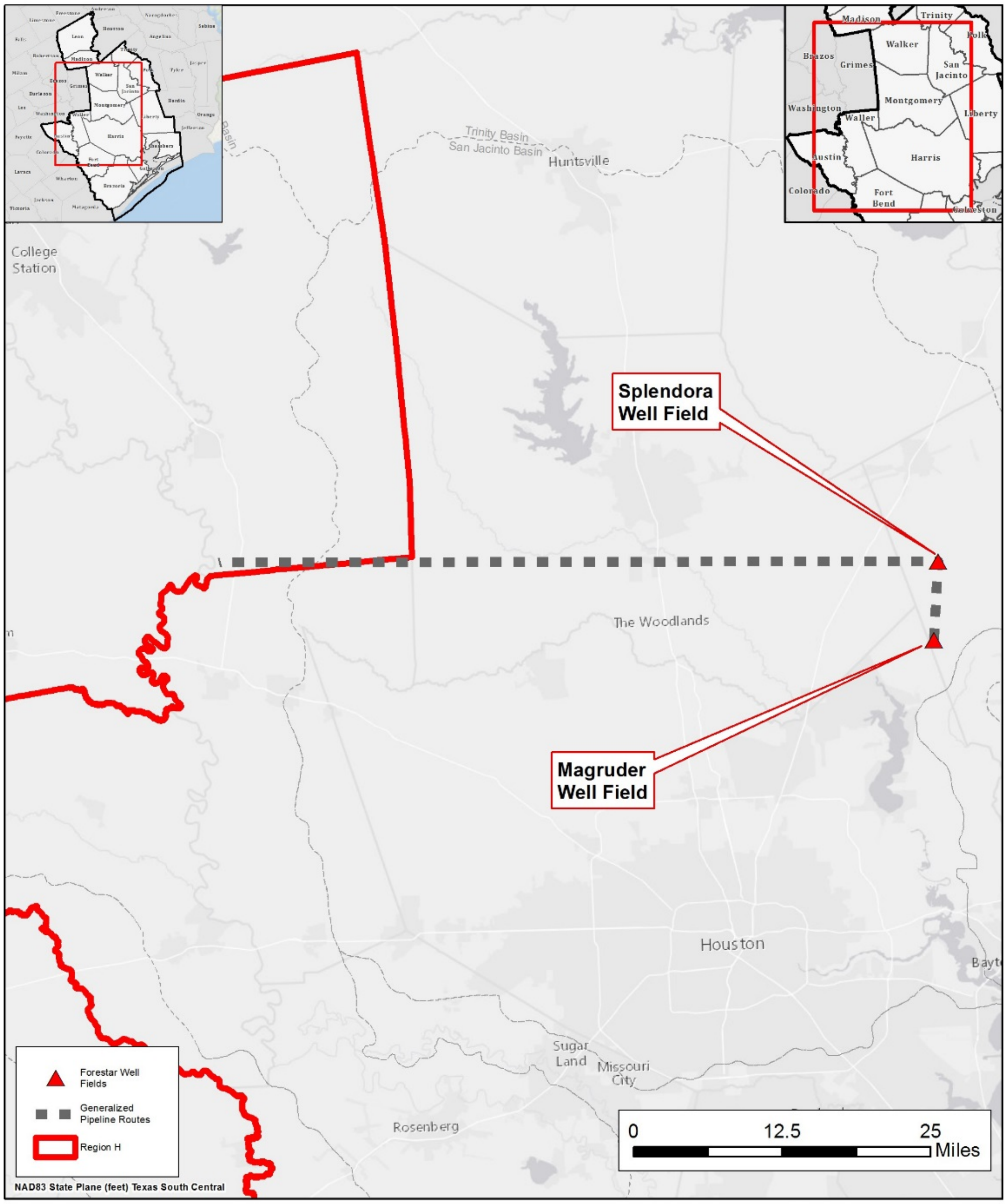
CRITERIA	WUG SUITABILITY
Proximity	Project will require conveyance through pipeline and natural corridors in order to make supplies available to demand centers.
Size	Relatively small project yield is suited to serving as a supply component for a small number of water users.
Water Quality	Project will produce a raw water supply that will require treatment for municipal and some industrial uses.

CRITERIA	WUG SUITABILITY
Unit Cost	Project cost makes it prohibitive for irrigation uses but may be economically feasible for other purposes.
Other Factors	

REFERENCES

Freese and Nichols, Inc. Assessment of Forestar's Water Assets. January, 2015.

LOCATION MAP



REGION H Water Planning Group

Forestar Liberty County Project Location Map

Texas

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	City of Groveton Groundwater Expansion
Project ID:	GWDV-008
Project Type:	Existing Groundwater Source
Potential Supply Quantity (Rounded):	161 ac-ft/yr (0.14 mgd)
Implementation Decade:	2020
Development Timeline:	<5 years
Project Capital Cost:	$2,195,000 (Sept. 2013)
Unit Water Cost (Rounded):	$1,277 per ac-ft (during loan period) $136 per ac-ft (after loan period)

PROJECT DESCRIPTION

The City of Groveton is engaged in the development of groundwater supply from the Yegua-Jackson aquifer to supplement its existing surface water supplies, which are not fully reliable under drought conditions due to infrastructure limitations.

PROJECT ANALYSES

The project analyses for the City of Groveton Groundwater Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The City of Groveton has one current well (in development, completion scheduled for March 2015) with a capacity of approximately 90 gpm and is pursuing construction of a second groundwater well in the Yegua-Jackson Aquifer. The capacity of the second well is projected to be between 100 and 150 gpm. This additional groundwater supply would be blended with the City's surface water supply to mitigate the possibility of slightly elevated total dissolved solids (TDS) levels. The source availability from the Yegua-Jackson Aquifer exceeds the planned size of the project, so adequate source water is expected to be readily available. Assuming an average production of 100 gpm for purposes of the Regional Plan, the project supply would be 161 ac-ft/yr.

Environmental Considerations

Environmental impacts of the project are expected to be minimal, as the source is groundwater from an aquifer with sufficient availability and surface disturbance from construction should be confined to a small area. Due to the small overall project size and its use to mitigate limitations in current surface water supply during drought periods, little impact on instream flows due to changes in effluent discharge are expected.

Permitting and Development

Permitting efforts associated with the City of Groveton Groundwater Expansion project are anticipated to be limited. Trinity County is not within the boundaries of a groundwater conservation district (GCD), and thus is not currently subject to GCD requirements regarding permitting, registration, or limitations on production. Because infrastructure is being developed at an existing water facility, construction permitting is also anticipated to be minimal. As a public water supplier, coordination with TCEQ and associated reporting would be required. TCEQ has granted the City and Alternate Capacity Requirement Reduction.

Cost Analysis

Estimated costs for the project are shown in *Table 1*. The City of Groveton provided an estimated capital cost of $2,195,000 for the groundwater well, transmission main, storage tank, and pump station. Costs associated with engineering, environmental studies, mitigation, and interest during construction are not identified as separate items, but for purposes of the Regional Plan it is assumed that these values are included in the overall estimated capital cost. Annual costs presented in *Table 1*, including debt service and costs for operations and maintenance, were calculated using standard cost estimation procedures for Region H.

Table 1 –Groveton Groundwater Expansion Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					December 18, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$2,195,000	$2,195,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$0	$0
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$0	$0
	PROJECT CAPITAL COST				$2,195,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$183,676	$183,676	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$21,950	$21,950	$21,950	$21,950	$21,950	$21,950
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$205,626	$205,626	$21,950	$21,950	$21,950	$21,950

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$205,626	$205,626	$21,950	$21,950	$21,950	$21,950
2	YIELD	161	161	161	161	161	161
3	UNIT COST	$1,277	$1,277	$136	$136	$136	$136
	TOTAL UNIT COST						$517

PROJECT EVALUATION

Based on the analysis provided above, the City of Groveton Groundwater Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

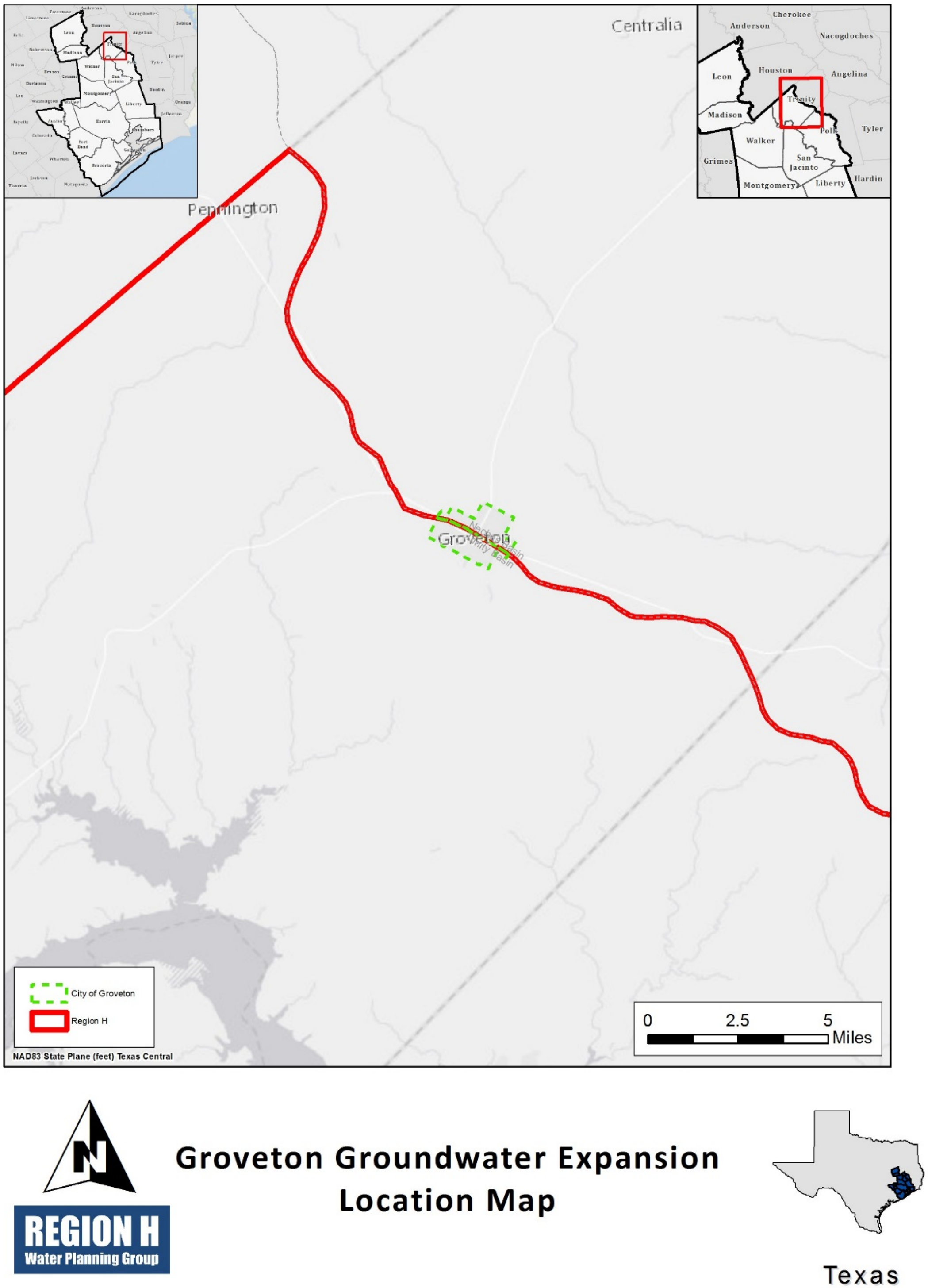
CRITERIA	RATING	EXPLANATION
Cost	1	Proposed project is expected to deliver at a high cost, but costs will decrease substantially after completion of debt service.
Location	5	Source located at point of demand.
Water Quality	3	Proposed source has some reduction in quality due to total dissolved solids but is to be blended with fresher water to acceptable quality.
Environmental Land and Habitat	5	Little or no impact anticipated. Construction on existing infrastructure site.
Environmental Flows	3	No impacts anticipated.
Local Preference	4	Project identified by sponsor. No known opposition.
Institutional Constraints	5	Minimal / no challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in less than 5 years.
Sponsorship	5	Sponsor identified and project is in development.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the City of Groveton Groundwater Expansion project may be applied was evaluated based on the entities identified in the GRP document. This information was considered in context of the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the applicability of the project to the WUGs served. At this time it is anticipated that the project will only supply the Groveton WUG.

CRITERIA	WUG SUITABILITY
Proximity	The project source wells are located in close proximity to intended points of use.
Size	Overall project supply volume is appropriate to the demands for the City of Groveton.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is high but decreases substantially after completion of debt service.
Other Factors	The City of Groveton has submitted an Intended Use Plan to TWDB for potential funding for the project.

LOCATION MAP



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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	SJRA Catahoula Aquifer Supplies
Project ID:	GWDV-009
Project Type:	New Groundwater Source
Potential Supply Quantity (Rounded):	7,840 ac-ft/yr (7 mgd)
Implementation Decade:	2020
Development Timeline:	1 years
Project Capital Cost:	$10,980,367 (Sept. 2013)
Unit Water Cost (Rounded):	$213 per ac-ft (during loan period) $96 per ac-ft (after loan period)

PROJECT DESCRIPTION

The San Jacinto River Authority (SJRA) provides water for a variety of municipal, industrial, and irrigation demands in the San Jacinto River Basin. Within Montgomery County, SJRA is responsible for raw water supplies to a nearby power facility as well as treated water supplies to customers of their Groundwater Reduction Plan (GRP). These customer needs are currently met using surface water from Lake Conroe. However, alternative sources such as the Catahoula Aquifer may also provide an alternative source of water from Gulf Coast Aquifer supplies that are limited under the Lone Star Groundwater Conservation District (LSGCD) regulatory plan. This project provides an alternative groundwater supply for meeting either industrial or municipal needs in the SJRA service area.

PROJECT ANALYSES

The project analyses for SJRA Catahoula Aquifer Supplies include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The proposed project considers the development of three wells to produce water from the Catahoula Aquifer located adjacent to Lewis Creek Reservoir. From that point, water may be delivered by pipeline to Lewis Creek Reservoir for industrial use or discharged into the channel of Lewis Creek to be conveyed through bed and banks to Lake Conroe where it may serve either industrial or municipal needs. The blending of the produced water with existing waters of Lewis Creek and Lake Conroe will serve to mitigate the water quality issues routinely recognized from the Catahoula Aquifer.

Environmental Considerations

Preliminary siting of the project has been performed in order to avoid wetlands and other features of environmental quality that may be impacted. The project will discharge groundwater containing an elevated level of dissolved solids into natural water courses and care should be taken in limiting impacts related to water quality.

Permitting and Development

Development of the project will require several steps in permitting. First, permits must be sought from LSGCD to allow for drilling a test bore in the Catahoula formation and then to permit the production from a completed well. Various permits are or may be required from the Texas Commission on Environmental Quality (TCEQ). Use of the bed and banks of Lewis Creek, Lake Conroe, and Lewis Creek Reservoir will require permits for bed and banks transfer. Should water be stored in Lewis Creek Reservoir, that permit would require amendment to allow for this provision. Finally, water quality may also dictate the pursuit of a permit under the Texas Pollutant Discharge Elimination System (TPDES) depending on the quality of water discharged.

Cost Analysis

Costs for the project are detailed below in *Table 1*.

Table 1 – SJRA Catahoula Supplies Project Costs

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$6,920,000	$6,920,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$3,500,000	$3,500,000
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$220,000	$220,000
5	INTEREST DURING CONSTRUCTION	1	LS	$340,367	$340,367
	PROJECT CAPITAL COST				$10,980,367

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$918,830	$918,830	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$69,200	$69,200	$69,200	$69,200	$69,200	$69,200
3	PUMPING ENERGY COSTS	$680,000	$680,000	$680,000	$680,000	$680,000	$680,000
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$1,668,030	$1,668,030	$749,200	$749,200	$749,200	$749,200

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$1,668,030	$1,668,030	$749,200	$749,200	$749,200	$749,200
2	YIELD	7,840	7,840	7,840	7,840	7,840	7,840
3	UNIT COST	$213	$213	$96	$96	$96	$96
	TOTAL UNIT COST						$135

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$1,280,000	$1,280,000
2	WELL FIELDS	1	LS	$5,640,000	$5,640,000
	PROJECT COST				$6,920,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$1,280,000	$12,800
2	WELL FIELDS	1.0	%	$5,640,000	$56,400
	ANNUAL OPERATION AND MAINTENANCE COST				$69,200

WATER MANAGEMENT STRATEGY EVALUATION

Based on the analysis provided above, the SJRA Catahoula Aquifer Supplies project was evaluated across eleven different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Competitive cost to other new raw water projects.
Location	5	Project location places it within easy reach of prospective users.
Water Quality	2	Catahoula Aquifer supplies are of lower quality than existing surface water.
Environmental Land and Habitat	5	Minimal impacts identified from project development.
Environmental Flows	4	Project will provide a slight improvement in instream flows.
Local Preference	3	Some local support for Catahoula Aquifer projects.
Institutional Constraints	3	Obstacles to development fairly well identified and understood.
Development Timeline	5	Short development timeline associated with wells.
Sponsorship	3	SJRA is considering this alternative for meeting future demands.
Vulnerability	3	Uncertainty of the long-term viability of the Catahoula Aquifer a risk factor involved in the project.
Impacts on Other Projects	4	Project may provide water for the comprehensive SJRA GRP.

WATER USER GROUP APPLICATION

The SJRA Catahoula Aquifer Supplies project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the strategy as well as other factors that may relate to the auditability of the strategy to the WUGs served.

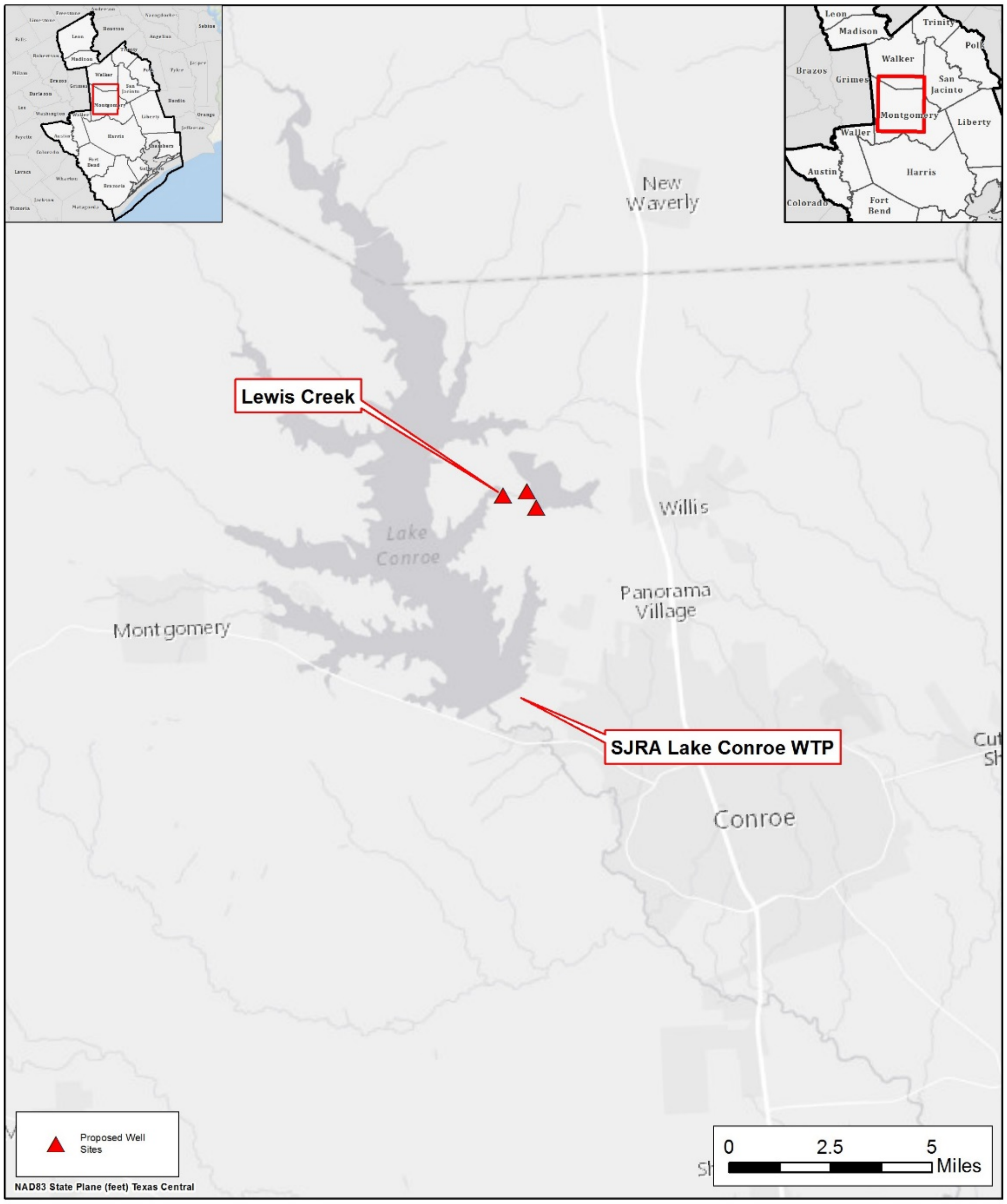
CRITERIA	WUG SUITABILITY
Proximity	Project is located near Lake Conroe where it may serve existing and future SJRA customers.
Size	Project is relatively small, but may be scaled to meet specific needs.
Water Quality	Project produces water that may not be suitable for direct use and would require blending with other existing supplies. Upon blending, the supply may be used for any raw water demand or treated.

CRITERIA	WUG SUITABILITY
Unit Cost	The unit cost of the project is highly competitive with options for developing raw surface water.
Other Factors	Application of this project to meet needs is subject to decisions by SJRA and its stakeholders.

REFERENCES

Catahoula Aquifer Phase II Feasibility Study. Freese and Nichols, Inc. 2014.

LOCATION MAP



REGION H Water Planning Group

SJRA Catahoula Aquifer Supplies
Location Map

Texas

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Name:	Central Harris County Regional Water Authority Groundwater Reduction Plan
Project ID:	GWRP-001
Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	4,682 ac-ft/yr (4.18 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	<10 years
Project Capital Cost:	Included under associated infrastructure projects
Unit Water Cost (Rounded):	Included under associated infrastructure projects

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the Central Harris County Regional Water Authority (CHCRWA) has contracted with the City of Houston (COH) to receive treated surface water. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, CHCRWA is participating in multiple infrastructure projects related to the treatment and distribution of surface water.

PROJECT ANALYSES

The project analyses for the CHCRWA Groundwater Reduction Plan (GRP) include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The CHCRWA will continue to deliver surface water to certain districts within the Authority to meet the requirements of its GRP. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its GRP program. CHCRWA is partnering with other Regional Water Authorities and COH in development of the Luce Bayou Interbasin Transfer Project to convey supplies from the Trinity River to Lake Houston, and is also a participant in the expansion of the treatment capacity of the COH Northeast Water Purification Plant (NEWPP). The Authority has also increased its supply reservation from these facilities from an original reservation of 2.12 mgd (2,374ac-ft/yr) currently applied in the Regional Plan as existing supply to 6.3 mgd (7,056 ac-ft/yr). CHCRWA is partnering with North Harris County Regional Water Authority (NHCRWA) and COH to develop a new shared transmission pipeline system, referred to by the sponsors as the Second Source Transmission Line, which will convey increased treated surface water supplies from the NEWPP; CHCRWA is also developing an expansion of the infrastructure network through which it supplies its member districts.

Environmental Considerations

Any environmental impacts related to the GRP project are a factor of the associated source and infrastructure projects. Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the GRP is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

The permitting and development requirements necessary for implementation of the CHCRWA GRP are associated with the source supply and infrastructure projects. CHCRWA is subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Much of the permitting associated with implementation infrastructure, such as the Luce Bayou Interbasin Transfer Project and the NEWPP Expansion are primarily being addressed by COH.

Cost Analysis

The costs associated with developing this project are included under other infrastructure projects.

PROJECT EVALUATION

Based on the analysis provided above, the CHCRWA GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Cost for project are related to the infrastructure projects which allow physical implementation of the GRP.
Location	3	Source supply requires an interbasin transfer of surface water and extensive conveyance infrastructure.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.

CRITERIA	RATING	EXPLANATION
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

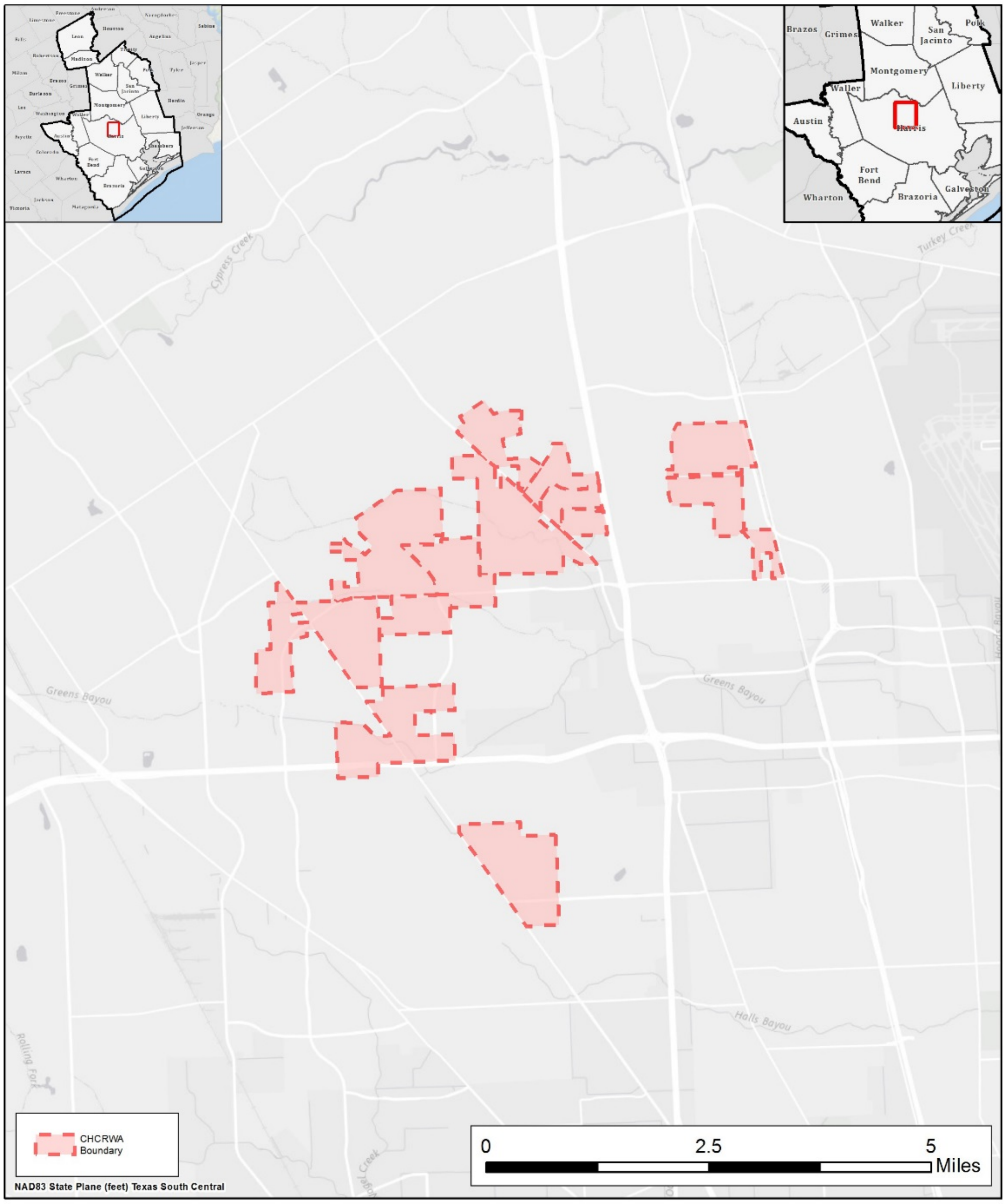
The CHCRWA GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the WMS will only serve CHCRWA, its wholesale customers, and GRP participants.

CRITERIA	WUG SUITABILITY
Proximity	Requires conveyance infrastructure from source basin pipelines to demand centers.
Size	Sized to convey the requisite amount of source water.
Water Quality	Treated water of quality appropriate for municipal use.
Unit Cost	Included under other infrastructure projects.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013.

LOCATION MAP



CHCRWA GRP
Location Map

Texas

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	City of Houston Groundwater Reduction Plan
Project ID:	GWRP-002
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	130,544 ac-ft/yr (116.6 mgd)
Implementation Decade:	2020
Development Timeline:	In progress
Project Capital Cost:	Included under associated infrastructure projects
Unit Water Cost (Rounded):	Included under associated infrastructure projects

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) has established requirements for entities within its boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the City of Houston (COH) has used its surface water rights and treatment capacity to provide an alternative to groundwater pumpage. The COH has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand. In order to utilize sufficient supplies to meet future surface water conversion obligations, COH is development in multiple infrastructure projects related to the treatment and distribution of surface water.

PROJECT ANALYSES

The project analyses for COH GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The COH has developed significant infrastructure for the development, treatment, and delivery of surface water supplies. These projects have formed the fundamental basis for much of the region's conversion from groundwater to alternative water sources. In several cases, such as the regional water authorities, COH supplies are already used as an alternative source of water and will continue to be a critical resource in the future.

However, in addition to water provide to authorities for their Groundwater Reduction Plans (GRPs), COH maintains its compliance with HGSD rules through its own use of surface water supplies. In addition, COH has made an opportunity available for other water users to join the COH GRP to promote synergy in addressing the region's water supply issues. A total of 6 participants reside within HGSD Areas I and II. Another 90 participants are located in HGSD Area III. Of these total participants, 60 can be identified as named Water User Groups (WUGs) in the Region H Regional Water Plan (RWP).

In most cases, COH does not provide direct surface water supplies to these customers. Instead, COH provides their own over-conversion as a service to these participants to account for their pumpage of groundwater causing a net reduction in overall groundwater use. In effect, the requirement for groundwater conversion is met jointly across the GRP as is done by other GRP sponsors in the region.

Environmental Considerations

Any environmental impacts related to the GRP project are a factor of the associated source and infrastructure projects. Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the GRP is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

The permitting and development requirements necessary for implementation of the COH GRP are associated with the source supply and infrastructure projects. The permitting associated with implementation infrastructure, such as the Luce Bayou Interbasin Transfer Project and the NEWPP Expansion are primarily addressed under those specific projects in the RWP.

Cost Analysis

The costs associated with developing this project are included under other infrastructure projects.

PROJECT EVALUATION

Based on the analysis provided above, the COH GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Cost for project are related to the infrastructure projects which allow physical implementation of the GRP.
Location	3	Source supply requires an interbasin transfer of surface water and extensive conveyance infrastructure.
Water Quality	5	Cost for project are related to the infrastructure projects which allow physical implementation of the GRP.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.

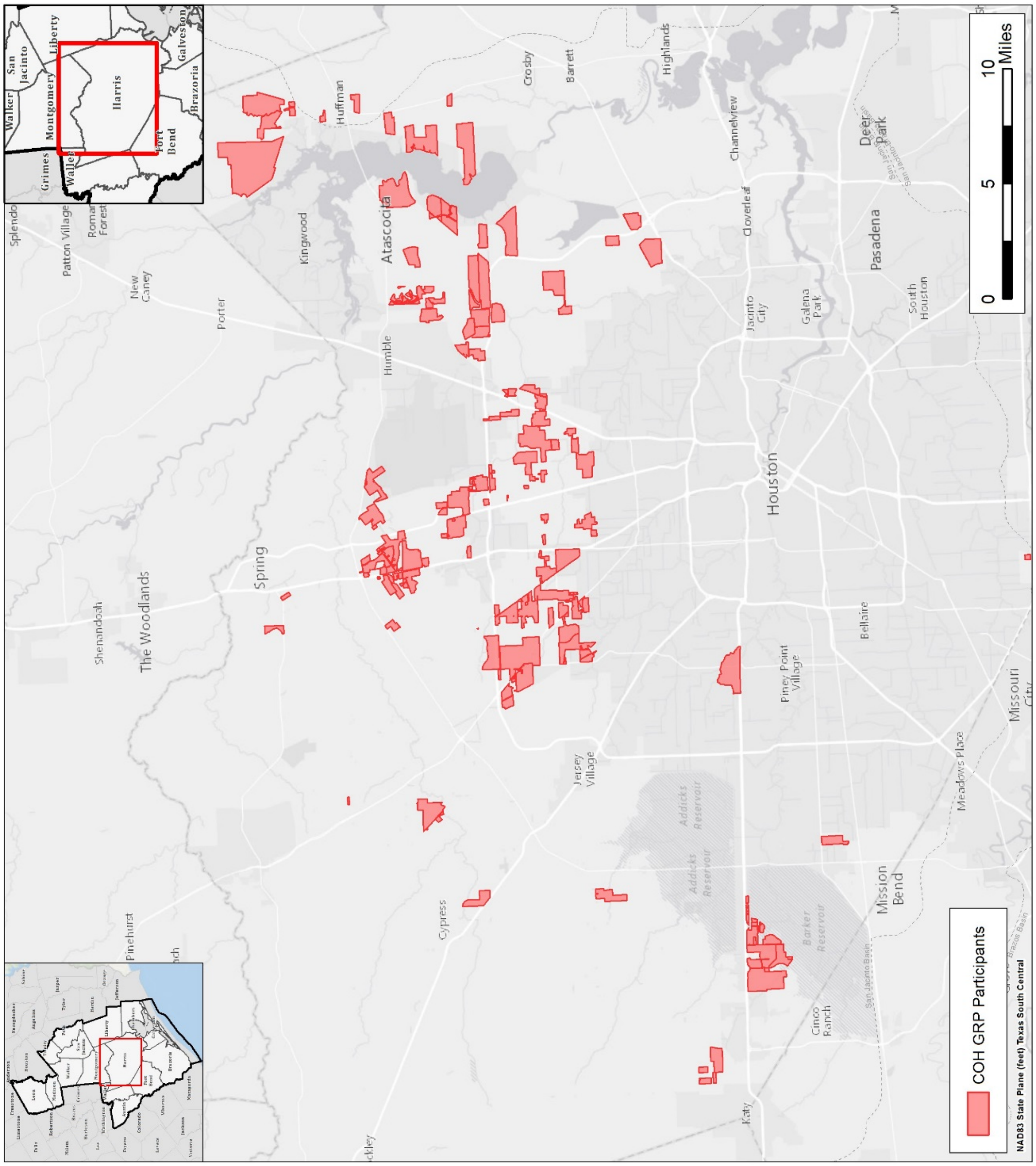
CRITERIA	RATING	EXPLANATION
Local Preference	5	Widespread support for project.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	5	Project ongoing along with development of additional surface water infrastructure projects.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The COH GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Requires conveyance infrastructure from source basin pipelines to demand centers.
Size	Sized to convey the requisite amount of source water.
Water Quality	Treated water of quality appropriate for municipal use.
Unit Cost	Included under other infrastructure projects.
Other Factors	Facilitates HGSD reduction compliance for multiple entities.

LOCATION MAP



City of Houston GRP
Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	City of Missouri City Groundwater Reduction Plan
Project ID:	GWRP-003
Project Type:	Various
Potential Supply Quantity (Rounded):	12,656 ac-ft/yr (11.3 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	5 years
Project Capital Cost:	$50,959,636 (Sept. 2013)
Unit Water Cost (Rounded):	$329 per ac-ft (during loan period) $33 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Fort Bend Subsidence District (FBSD) and Harris-Galveston Subsidence District (HGSD), in order to address the issue of land surface subsidence due to groundwater use within the counties under their jurisdiction, have enacted regulations limiting the percentage of overall supply that water users in certain portions of the county may produce from the Gulf Coast Aquifer. In order to meet this requirement, the City of Missouri City has developed a Ground Water Reduction Plan (GRP) to reduce ground water use by implementing phased surface water conversion and direct reuse.

PROJECT ANALYSES

The project analyses for the City of Missouri City GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The City of Missouri City has partnered with 29 surrounding entities for purposes of meeting the required groundwater reduction. The primary approach for meeting the required reduction is phased conversion to surface water, with additional direct reuse supplies contributing as well. Due to the physical and logistic challenges associated with converting all participants to partial surface water supply, the GRP specifies overconversion of a portion of the Missouri City service area, allowing other co-participant to continue growth on groundwater while allowing the aggregate water use of partnering entities to meet FBSD and HGSD requirements.

The City of Missouri City has contracted with the Gulf Coast Water Authority (GCWA) for 15 mgd (16,800 ac-ft) of raw surface water supply conveyed through GCWA's canal system. The initial 10 mgd surface water treatment facility and associated transmission infrastructure identified by the GRP for meeting the initial phase of conversion has been constructed and is operational; this portion of Missouri City's surface water supply is reflected as an existing supply in the Regional Plan. The GRP indicates that additional treatment capacity (potentially up to 33 mgd) and additional transmission infrastructure will be required prior to 2025.

Environmental Considerations

One impact associated with the implementation of this project is the increase in GCWA diversions from the Brazos River. Increased diversion of water from the Brazos River will result in some minimal decreases in instream flow downstream of the GCWA pump stations. However, these diversions will be made from existing water rights currently owned by the GCWA, contracted by the City of Missouri City, and no new water rights permits are required for this project. Otherwise implementation of this project should produce minimal environmental impacts.

The direct reuse of the effluent source supply would be expected to have some degree of impact in terms of reduction of instream flows downstream of the WWTP discharge point for any portion of the source supply originating from current levels of return flow. Any reuse from the portion of return flow generated from future demand growth would not be expected to create additional instream flow reductions, as this portion of potential supply is not yet generated or discharged.

Permitting and Development

Because the surface water supply source for this project is from existing water rights and would be delivered through GCWA's canal system, permitting of new surface water rights or modification of existing rights to add a diversion point will not be required. Construction of surface water treatment facility expansions will be required to utilize portions of the source supply, which may entail minor permitting.

Development of reuse supplies would require infrastructure development and, if in amounts exceeding current authorizations, permitting through TCEQ. Use of reclaimed wastewater effluent requires approval and permitting by the TCEQ under the requirements of 30 TAC §210. TCEQ classifies reclaimed water as Type 1 (higher quality for use where public contact is likely) or Type 2 (for uses with limited risk of human contact). Due to the potential for human contact, supplies for this project would have to be treated to Type 1 quality standards. If approved for use, the reclaimed water would have to be sampled and analyzed a minimum of twice per week.

Cost Analysis

Capital and engineering costs for expansion of surface water treatment plant and transmission capacity are summarized in the City of Missouri City GRP. Costs associated with environmental studies, mitigation, and interest during construction are not identified as separate items, but for purposes of the regional plan were estimated using standard Regional Planning costing reference data. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. The GRP also indicated potential future reuse; it was assumed for the Regional Plan that this increase would be within the capability of existing infrastructure. It was also assumed that development of direct reuse infrastructure would not require land or easement purchase or development of new transmission capacity. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – City of Missouri City GRP Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					February 14, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$35,810,000	$35,810,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$12,470,000	$12,470,000
3	LAND AND EASEMENTS	1	LS	$550,000	$550,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$550,000	$550,000
5	INTEREST DURING CONSTRUCTION	1	LS	$1,579,636	$1,579,636
	PROJECT COST				$50,959,636

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$3,749,699	$3,749,699	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$413,150	$413,150	$413,150	$413,150	$413,150	$413,150
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$4,162,849	$4,162,849	$413,150	$413,150	$413,150	$413,150

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$4,162,849	$4,162,849	$413,150	$413,150	$413,150	$413,150
2	YIELD	12,656	12,656	12,656	12,656	12,656	12,656
3	UNIT COST	$329	$329	$33	$33	$33	$33
	TOTAL UNIT COST						$131

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$3,670,000	$3,670,000
2	PIPELINES	1	LS	$2,180,000	$2,180,000
3	WATER TREATMENT PLANTS	1	LS	$29,960,000	$29,960,000
	PROJECT COST				$35,810,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$3,670,000	$91,750
2	PIPELINES	1.0	%	$2,180,000	$21,800
3	WATER TREATMENT PLANTS	1.0	%	$29,960,000	$299,600
	ANNUAL OPERATION AND MAINTENANCE COST				$413,150

PROJECT EVALUATION

Based on the analysis provided above, the City of Missouri City GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	Cost is relatively low.
Location	4	Some transmission infrastructure required.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	4	Minimal impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below diversion point. Diversion is from an existing water right.
Local Preference	4	No known opposition.
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	5	Sponsor has identified project and is in development.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

The City of Missouri City GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project is located in close proximity to intended points of use.
Size	Project is of appropriate size to utilize the City of Missouri City's surface water contracts.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is relatively low.
Other Factors	This project reduces groundwater dependence.

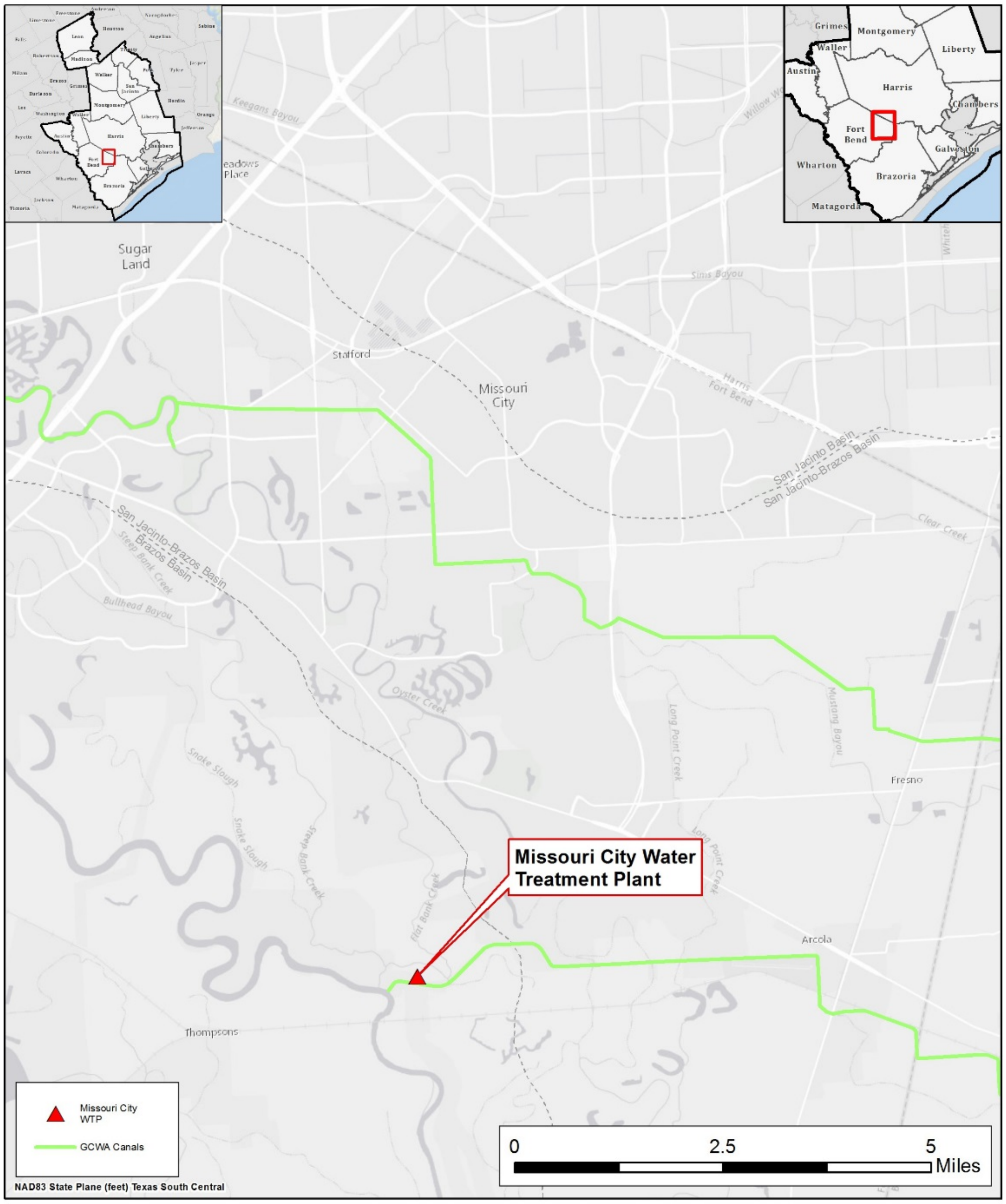
REFERENCES

Water Resources Management, LP. *City of Missouri City Joint Groundwater Reduction Plan*, prepared for City of Missouri City, October 2008.

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013.

LOCATION MAP



Missouri City
Groundwater Reduction Plan
Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	City of Richmond Groundwater Reduction Plan
Project ID:	GWRP-004
Project Type:	Various
Potential Supply Quantity (Rounded):	1,465 ac-ft/yr (1.3 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	5 years
Project Capital Cost:	$32,167,109 (Sept. 2013)
Unit Water Cost (Rounded):	$1,761 per ac-ft (during loan period) $146 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Fort Bend Subsidence District (FBSD), in order to address the issue of land surface subsidence due to groundwater use within Fort Bend County, has enacted regulations limiting the percentage of overall supply that water users in certain portions of the county may produce from the Gulf Coast Aquifer. In order to meet this requirement, the City of Richmond has developed a Ground Water Reduction Plan (GRP) to reduce ground water use by implementing surface water conversion.

PROJECT ANALYSES

The project analyses for the City of Richmond GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The City of Richmond has partnered with 12 surrounding entities for purposes of meeting the required groundwater reduction. The primary approach for meeting the required reduction is phased conversion to surface water. The City of Richmond has contracted with the Brazos River Authority (BRA) for 2,932 ac-ft/yr of raw surface water supply conveyed through the Brazos River. The initial surface water treatment facility and associated transmission infrastructure associated with this supply is in development and is reflected as an existing supply in the Regional Plan. The GRP indicates that additional distribution infrastructure and water plant facilities will be required by 2024; these expansions are reflected in the Regional Plan as conversion of additional GRP partner entities to surface water and increased surface water supply to already-converted partners.

Environmental Considerations

One impact associated with the implementation of this project is the increase in diversions from the Brazos River. Increased diversion of water from the Brazos River will result in some minimal decreases in instream flow downstream of the City of Richmond diversion point. However, these diversions will be made from existing water rights currently owned by the BRA, contracted by Richmond, and no new water rights permits are required for this project. Some surface disturbance may be associated with development of expanded water plant facilities and transmission infrastructure. However, this construction would occur primarily on existing plant sites or in previously urbanized area and would cause little disturbance to undeveloped habitat. Implementation of this project should produce minimal environmental impacts.

Permitting and Development

Because the surface water supply source for this project is from existing water rights and would be delivered through the bed and banks of the Brazos River to an authorized take point, permitting of new surface water rights or modification of existing rights to add a diversion point will not be required. Construction of surface water treatment facility and distribution system expansions will be required to utilize portions of the source supply, which may entail minor permitting.

Cost Analysis

Capital and engineering costs for expansion of surface water treatment plant and transmission capacity are summarized in the City of Richmond GRP. Capital costs associated with environmental studies, mitigation, and interest during construction and annualized costs (debt service, operations and maintenance, and energy) are not identified as separate items in the GRP and were estimated using standard Regional Planning costing reference data. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – City of Richmond GRP Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					February 14, 2015
ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$21,320,000	$21,320,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$9,270,000	$9,270,000
3	LAND AND EASEMENTS	1	LS	$290,000	$290,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$290,000	$290,000
5	INTEREST DURING CONSTRUCTION	1	LS	$997,109	$997,109
	PROJECT COST				**$32,167,109**

ITEM	**DESCRIPTION**	**ANNUAL TOTAL**					
ANNUAL COST SUMMARY		**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
1	DEBT SERVICE	$2,366,912	$2,366,912	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$213,200	$213,200	$213,200	$213,200	$213,200	$213,200
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	**$2,580,112**	**$2,580,112**	**$213,200**	**$213,200**	**$213,200**	**$213,200**

ITEM	**DESCRIPTION**	**ANNUAL TOTAL**					
ANNUAL COST SUMMARY		**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
1	ANNUAL COST	$2,580,112	$2,580,112	$213,200	$213,200	$213,200	$213,200
2	YIELD	1,465	1,465	1,465	1,465	1,465	1,465
3	UNIT COST	$1,761	$1,761	$146	$146	$146	$146
	TOTAL UNIT COST						**$684**

ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$1,160,000	$1,160,000
2	WATER TREATMENT PLANTS	1	LS	$17,940,000	$17,940,000
3	WATER STORAGE TANKS	1	LS	$2,220,000	$2,220,000
	PROJECT COST				**$21,320,000**

ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$1,160,000	$11,600
2	WATER TREATMENT PLANTS	1.0	%	$17,940,000	$179,400
3	WATER STORAGE TANKS	1.0	%	$2,220,000	$22,200
	ANNUAL OPERATION AND MAINTENANCE COST				**$213,200**

PROJECT EVALUATION

Based on the analysis provided above, the City of Richmond GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	Cost is high but decreases after completion of debt service.
Location	4	Some transmission infrastructure required.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	4	Minimal impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below diversion point. Diversion is from an existing water right.
Local Preference	4	No known opposition.
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	5	Sponsor has identified project and is in development.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

The City of Richmond GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

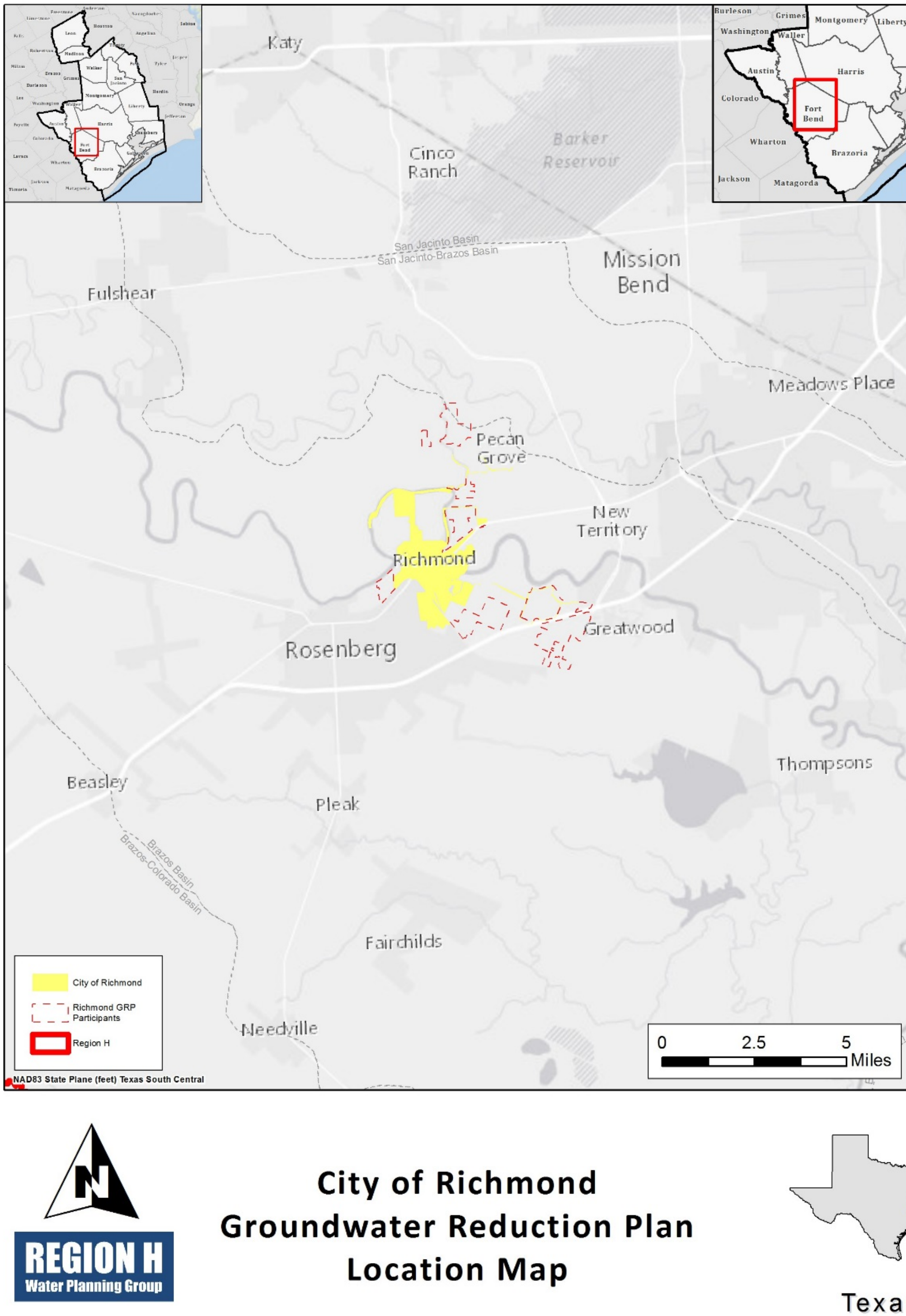
CRITERIA	WUG SUITABILITY
Proximity	Project is located in close proximity to intended points of use.
Size	Project is of appropriate size to utilize the City of Sugar Richmond's surface water contracts.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is high but decreases after completion of debt service.
Other Factors	This project reduces groundwater dependence.

REFERENCES

City of Richmond, TX. *City of Richmond Groundwater Reduction Plan*, September 2010.

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

LOCATION MAP



City of Richmond
Groundwater Reduction Plan
Location Map

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	City of Rosenberg Groundwater Reduction Plan
Project ID:	GWRP-005
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	826 ac-ft/yr (0.7 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	5 years
Project Capital Cost:	$12,469,012 (Sept. 2013)
Unit Water Cost (Rounded):	$1,242 per ac-ft (during loan period) $131 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Fort Bend Subsidence District (FBSD), in order to address the issue of land surface subsidence due to groundwater use within Fort Bend County, has enacted regulations limiting the percentage of overall supply that water users in certain portions of the county may produce from the Gulf Coast Aquifer. In order to meet this requirement, the City of Rosenberg has developed a Ground Water Reduction Plan (GRP) to reduce ground water use by implementing surface water conversion.

PROJECT ANALYSES

The project analyses for the City of Rosenberg GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The City of Rosenberg has partnered with five surrounding entities for purposes of meeting the required groundwater reduction for the participating entities and their water supply customers. The primary approach for meeting the required reduction is phased conversion to surface water. Due to the physical and logistic challenges associated with converting all participants to partial surface water supply, the GRP specifies overconversion of some co-participants, allowing other co-participant to continue growth on groundwater while allowing the aggregate water use of partnering entities to meet FBSD requirements. The City of Rosenberg is coordinating with the Brasosport Water Authority (BWA) for 3 mgd (3,360 ac-ft/yr) of treated water supply, which would be treated at BWA's existing facilities in Lack Jackson and conveyed via pipeline to the GRP participants' service area. The City of Rosenberg has also contracted with the Brazos River Authority (BRA) for 4,500 ac-ft/yr of raw surface water supply which could be treated through current and future BWA facilities and conveyed to Rosenberg. As surface water treatment facilities are in place and transmission infrastructure associated with the initial conversion phase of Rosenberg's GRP is in development, the initial surface water conversion for the GRP is reflected as an existing supply in the Regional Plan. The GRP indicates that additional transmission and distribution infrastructure will be required for the 2025 conversion phase; these expansions are reflected in the Regional Plan as conversion of additional GRP partner entities to surface water and increased surface water supply to already-converted partners.

Environmental Considerations

One impact associated with the implementation of this project is the increase in diversions from the Brazos River. Increased diversion of water from the Brazos River will result in some decreases in instream flow downstream of the diversion point. However, these diversions will be made from existing water rights currently owned by BWA or BRA, contracted by Rosenberg, and no new water rights permits are required for this project.

Some surface disturbance may be associated with development of expanded water plant facilities and transmission infrastructure. The majority of this impact would result from development of the pipeline infrastructure necessary to convey treated supplies from BWA facilities to the Rosenberg area. However, the proposed major transmission pipelines are expected to generally follow the paths of existing or future highway infrastructure, reducing overall impacts. Much of the area traversed by the pipelines is current or former agricultural land and has already experienced some degree of habitat impact that would not be expected to be significantly exacerbated by pipeline construction. Future distribution infrastructure development for the 2025 conversion phase will occur primarily on existing plant sites or in previously urbanized area and would cause little disturbance to undeveloped habitat. Implementation of this project should produce limited environmental impacts.

Permitting and Development

The surface water supply source for this project is from existing water rights, although authorization from TCEQ to add a diversion point may be required. Construction of surface water treatment facility and distribution system expansions will be required to utilize portions of the source supply, which may entail minor permitting.

Cost Analysis

Capital and engineering costs for future expansion of transmission capacity are summarized in the City of Rosenberg GRP. Capital costs associated with land acquisition, environmental studies, and mitigation are not identified as separate items in the GRP and are assumed to be included in the capital cost specified. Interest during construction and annualized costs (debt service, operations and maintenance, and energy) are not identified in the GRP and were estimated using standard Regional Planning costing reference data. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – City of Rosenberg GRP Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					February 17, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$9,170,000	$9,170,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$2,912,500	$2,912,500
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$386,512	$386,512
	PROJECT COST				$12,469,012

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$917,492	$917,492	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$108,350	$108,350	$108,350	$108,350	$108,350	$108,350
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$1,025,842	$1,025,842	$108,350	$108,350	$108,350	$108,350

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$1,025,842	$1,025,842	$108,350	$108,350	$108,350	$108,350
2	YIELD	826	826	826	826	826	826
3	UNIT COST	$1,242	$1,242	$131	$131	$131	$131
	TOTAL UNIT COST						$501

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$1,110,000	$1,110,000
2	PIPELINES	1	LS	$5,940,000	$5,940,000
3	WATER STORAGE TANKS	1	LS	$2,120,000	$2,120,000
	PROJECT COST				$9,170,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$1,110,000	$27,750
2	PIPELINES	1.0	%	$5,940,000	$59,400
3	WATER STORAGE TANKS	1.0	%	$2,120,000	$21,200
	ANNUAL OPERATION AND MAINTENANCE COST				$108,350

PROJECT EVALUATION

Based on the analysis provided above, the City of Rosenberg GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	2	Cost is high but decreases after completion of debt service.
Location	4	Some transmission infrastructure required.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Limited impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below diversion point. Diversion is from an existing water right.
Local Preference	4	No known opposition.
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	5	Sponsor has identified project and is in development.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

The City of Rosenberg GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

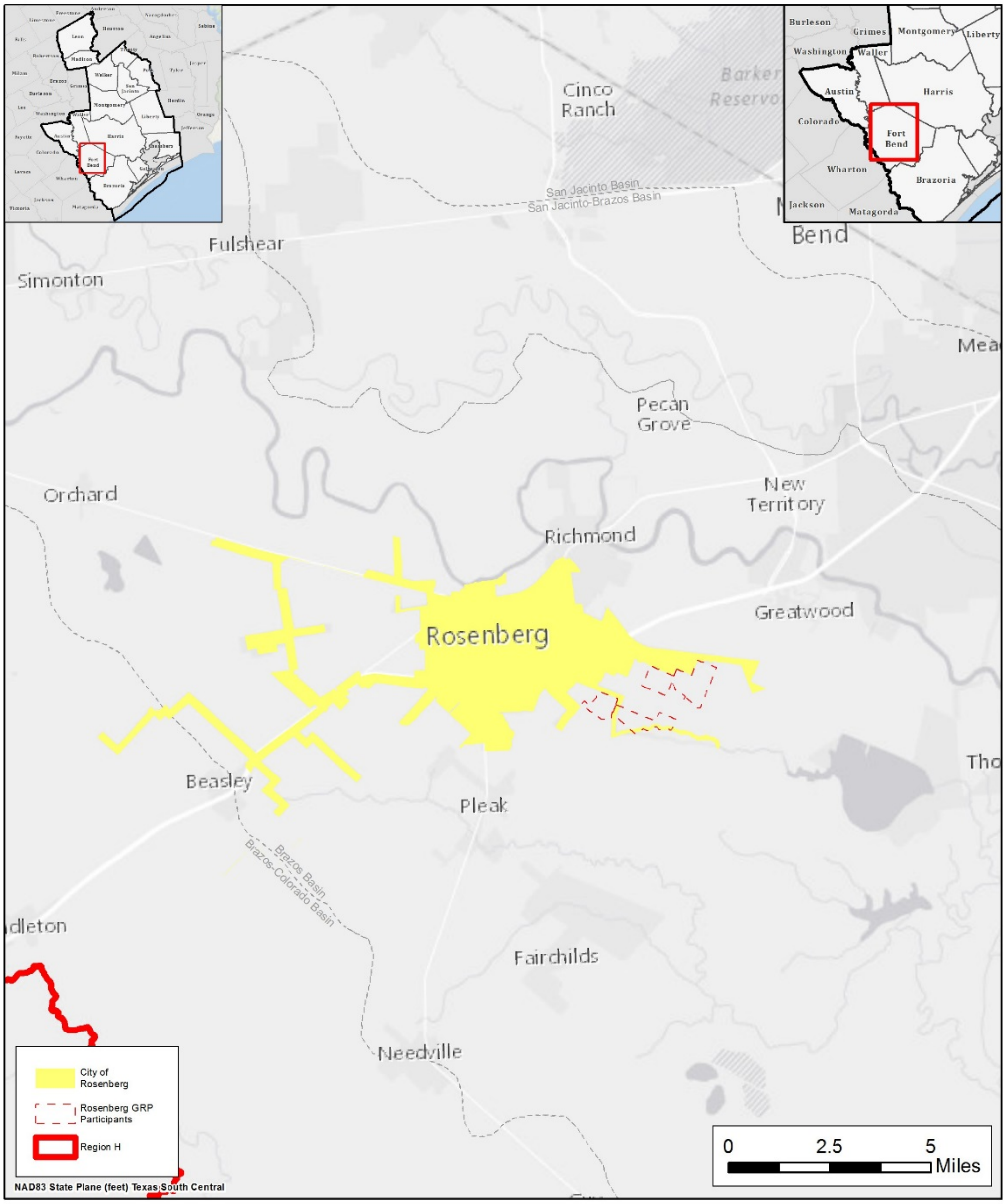
CRITERIA	WUG SUITABILITY
Proximity	Project requires major conveyance infrastructure from treatment facilities to points of use.
Size	Project is of appropriate size to utilize the City of Sugar Richmond's surface water contracts.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is high but decreases after completion of debt service.
Other Factors	This project reduces groundwater dependence.

REFERENCES

Jones and Carter, Inc. *City of Rosenberg Amended Groundwater Reduction Plan*, prepared for City of Rosenberg, TX, September 2014.

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

LOCATION MAP



City of Rosenberg Groundwater Reduction Plan Location Map

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	City of Sugar Land Groundwater Reduction Plan
Project ID:	GWRP-006
Project Type:	Various
Potential Supply Quantity (Rounded):	20,160 ac-ft/yr (18 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	5 years
Project Capital Cost:	$148,650,964 (Sept. 2013)
Unit Water Cost (Rounded):	$900 per ac-ft (during loan period) $283 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Fort Bend Subsidence District (FBSD), in order to address the issue of land surface subsidence due to groundwater use within Fort Bend County, has enacted regulations limiting the percentage of overall supply that water users in certain portions of the county may produce from the Gulf Coast Aquifer. In order to meet this requirement, the City of Sugar Land has developed a Ground Water Reduction Plan (GRP) to reduce ground water use by implementing phased surface water conversion and direct reuse.

PROJECT ANALYSES

The project analyses for the City of Sugar Land GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The City of Sugar Land has partnered with 18 surrounding entities for purposes of meeting the required groundwater reduction. The primary approach for meeting the required reduction is phased conversion to surface water, with additional direct reuse supplies contributing as well. Due to the physical and logistic challenges associated with converting all participants to partial surface water supply, the GRP specifies overconversion of a portion of the Sugar Land service area, allowing other co-participant to continue growth on groundwater while allowing the aggregate water use of partnering entities to meet FBSD requirements.

The City of Sugar Land has contracted with the Gulf Coast Water Authority (GCWA) for 20 mgd (22,400 ac-ft) of raw surface water supply conveyed through GCWA's canal system. Sugar Land has also contracted with the Brazos River Authority (BRA) for an additional 6,388 ac-ft/yr of raw surface water. The initial 9 mgd surface water treatment facility and associated transmission infrastructure identified by the GRP has been constructed and is operational; this portion of Sugar Land's surface water supply is reflected as an existing supply in the Regional Plan. The GRP indicates that additional 13 mgd in treatment capacity and additional transmission infrastructure will be required by 2025. The GRP also identifies approximately 5 mgd (5,600 ac-ft) in direct reuse projects.

Environmental Considerations

One impact associated with the implementation of this project is the increase in GCWA and BRA diversions from the Brazos River. Increased diversion of water from the Brazos River will result in some minimal decreases in instream flow downstream of the GCWA pump stations. However, these diversions will be made from existing water rights currently owned by the GCWA and BRA, contracted by Sugar Land, and no new water rights permits are required for this project. Otherwise implementation of this project should produce minimal environmental impacts.

The direct reuse of the effluent source supply would be expected to have some degree of impact in terms of reduction of instream flows downstream of the WWTP discharge point for any portion of the source supply originating from current levels of return flow. Any reuse from the portion of return flow generated from future demand growth would not be expected to create additional instream flow reductions, as this portion of potential supply is not yet generated or discharged.

Permitting and Development

Because the surface water supply source for this project is from existing water rights and would be delivered through GCWA's canal system, permitting of new surface water rights or modification of existing rights to add a diversion point will not be required. Construction of surface water treatment facility expansions will be required to utilize portions of the source supply, which may entail minor permitting.

Development of reuse supplies would require infrastructure development and permitting through the Texas Commission on Environmental Quality (TCEQ). Use of reclaimed wastewater effluent requires approval and permitting by the TCEQ under the requirements of 30 TAC §210. TCEQ classifies reclaimed water as Type 1 (higher quality for use where public contact is likely) or Type 2 (for uses with limited risk of human contact). Due to the potential for human contact, supplies for this project would have to be treated to Type 1 quality standards. If approved for use, the reclaimed water would have to be sampled and analyzed a minimum of twice per week.

Cost Analysis

Capital and engineering costs for expansion of surface water treatment plant and transmission capacity are summarized in the City of Sugar Land GRP. Costs associated with environmental studies, mitigation, and interest during construction are not identified as separate items, but for purposes of the regional plan it is assumed that these values are included in the estimates for other capital cost components. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. The GRP also indicated potential future reuse projects, including 2 projects of 0.5 mgd (560 ac-ft/yr) and one of 4 mgd (4,480 ac-ft/yr). Costs for these components were not included in the GRP and were estimated using standard Regional Planning costing reference data and assuming a facility peaking factor of 1.5. It was also assumed that development of direct reuse infrastructure would not require land or easement purchase or development of new transmission capacity. The costs presented in this memorandum do not include the purchase cost of water. Estimated costs are presented in *Table 1*.

Table 1 – Sugar Land GRP Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 12, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$117,937,186	$117,937,186
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$25,794,699	$25,794,699
3	LAND AND EASEMENTS	1	LS	$241,885	$241,885
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$69,342	$69,342
5	INTEREST DURING CONSTRUCTION	1	LS	$4,607,852	$4,607,852
	PROJECT COST				$148,650,964

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$12,439,013	$12,439,013	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$5,501,418	$5,501,418	$5,501,418	$5,501,418	$5,501,418	$5,501,418
3	PUMPING ENERGY COSTS	$206,667	$206,667	$206,667	$206,667	$206,667	$206,667
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$18,147,098	$18,147,098	$5,708,085	$5,708,085	$5,708,085	$5,708,085

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$18,147,098	$18,147,098	$5,708,085	$5,708,085	$5,708,085	$5,708,085
2	YIELD	20,160	20,160	20,160	20,160	20,160	20,160
3	UNIT COST	$900	$900	$283	$283	$283	$283
	TOTAL UNIT COST						$489

PROJECT EVALUATION

Based on the analysis provided above, the City of Sugar Land GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	2	Cost is relatively high but decreases substantially after completion of debt service.
Location	4	Some transmission infrastructure required.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	4	Minimal impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below diversion point. Diversion is from an existing water right.
Local Preference	4	No known opposition.

CRITERIA	RATING	EXPLANATION
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	5	Sponsor has identified project and is in development.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

The City of Sugar Land GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

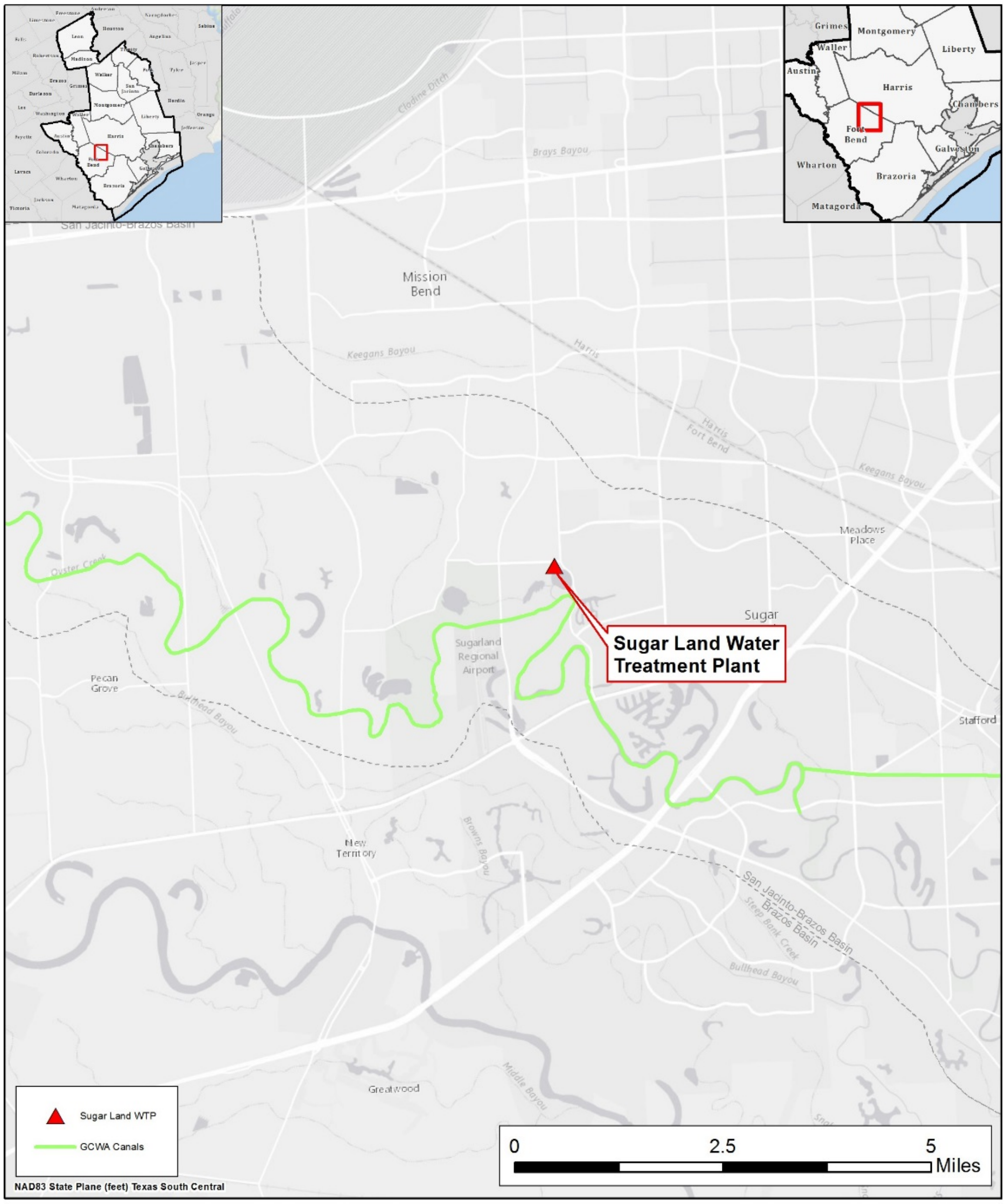
CRITERIA	WUG SUITABILITY
Proximity	Project is located in close proximity to intended points of use.
Size	Project is of appropriate size to utilize the City of Sugar Land's surface water contracts.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is moderately high but decreases substantially after completion of debt service.
Other Factors	This project reduces groundwater dependence.

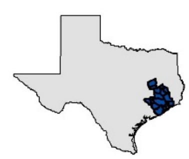
REFERENCES

City of Sugar Land, TX. *City of Sugar Land Groundwater Reduction Plan*, March 2008.

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

LOCATION MAP





City of Sugar Land
Groundwater Reduction Plan
Location Map

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Fort Bend County MUD No. 25 Groundwater Reduction Plan
Project ID:	GWRP-007
Project Type:	Various
Potential Supply Quantity (Rounded):	744 ac-ft/yr (0.66 mgd)
Implementation Decade:	2030 (2030)
Development Timeline:	<5 years
Project Capital Cost:	$2,148,043 (Sept. 2013)
Unit Water Cost (Rounded):	$282 per ac-ft (during loan period) $40 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Fort Bend Subsidence District (FBSD), in order to address the issue of land surface subsidence due to groundwater use within Fort Bend County, has enacted regulations limiting the percentage of overall supply that water users in certain portions of the county may produce from the Gulf Coast Aquifer. In order to meet this requirement, Fort Bend Municipal Utility District No. 25 (MUD 25) has developed a Ground Water Reduction Plan (GRP) to reduce ground water use by implementing reuse. The GRP also provides consideration for supplemental surface water use as well.

PROJECT ANALYSES

The project analyses for Fort Bend County MUD No. 25 GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Fort Bend MUD No. 25 has partnered with the Shadow Hawk Golf Course and the Orchard Lakes Development for purposes of meeting the required groundwater reduction. The primary approach for meeting the required reduction is direct reuse of effluent from MUD No. 25's WWTP for irrigation and filling of amenity lakes in the Shadow Hawk Golf Course and the Orchard Lakes Development instead of existing groundwater wells.

The GRP analysis examined historical groundwater use, along with per-capita usage rates and growth projections. Reuse potential was analyzed using a best case (low demand, high reuse availability), worst case (high demand, low reuse availability) and realistic scenario. Under worst case conditions, surface water conversion would be required beginning in 2015 and over-conversion credits would be depleted by 2029, requiring an additional 100 million gallons of surface water conversion credits per year beginning in 2029. For the best case scenario, over-conversion and other credits would meet requirements through 2030, with no need for surface water conversion. For the realistic case, surface water conversion credits would have to begin in 2026 for FBSD requirements to be met through 2030. MUD No. 25 also has surface water conversion credit agreements with the City of Sugar Land and includes has requested the opportunity to acquire surface water from the City of Sugar Land beginning between 2021 and 2030.

The reuse infrastructure associated with the GRP has been developed and is actively producing direct reuse supply. Based on levels of production during the relatively dry year 2010-2012 period, 405 ac-ft/yr of direct reuse is reflected in the Region H Plan as an existing water supply for MUD No. 255, with an additional 184 ac-ft/yr expected as project supply. Project supplies also include 560 ac-ft/yr (0.5 mgd) of contractual surface water.

Environmental Considerations

The direct reuse of the effluent source supply would be expected to have some degree of impact in terms of reduction of instream flows downstream of the WWTP discharge point for any portion of the source supply originating from current levels of return flow. Any reuse from the portion of return flow generated from future demand growth would not be expected to create additional instream flow reductions, as this portion of potential supply is not yet generated or discharged.

Permitting and Development

Because the reuse system infrastructure for the GRP is already developed, no additional permitting is anticipated for that supply source. Procurement of surface water supplies from the City of Sugar Land or an alternative supplier would require a new supply contract. The addition of surface water supplies may require minor additional conveyance infrastructure.

Cost Analysis

The GRP does not include a detailed estimate of cost for the project. It was assumed that additional direct reuse beyond existing levels would not generate additional costs as the necessary infrastructure is active. A preliminary planning estimate of cost associated with a contractual surface water supply was developed using standard cost estimate procedures for Region H. The costs presented in this memorandum do not include the purchase cost of water. *Table 1* summarizes the costs of key facilities. Costs are presented in September 2013 dollars and include a contingency of 35% including professional services. Debt service and costs for operations and maintenance shown in the table are calculated using the default Region H cost estimation methodology; debt service is assumed to occur at a 5.5 percent rate for a 20 year term.

Table 1 – Fort Bend MUD 25 GRP Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 15, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$968,040	$968,040
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$328,418	$328,418
3	LAND AND EASEMENTS	1	LS	$430,000	$430,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$355,000	$355,000
5	INTEREST DURING CONSTRUCTION	1	LS	$66,585	$66,585
	PROJECT COST				$2,148,043

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$179,747	$179,747	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$21,082	$21,082	$21,082	$21,082	$21,082
3	PUMPING ENERGY COSTS	$0	$8,819	$8,819	$8,819	$8,819	$8,819
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$209,648	$209,648	$29,901	$29,901	$29,901

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$209,648	$209,648	$29,901	$29,901	$29,901
2	YIELD	-	744	744	744	744	744
3	UNIT COST	$0	$282	$282	$40	$40	$40
	TOTAL UNIT COST						$137

PROJECT EVALUATION

Based on the analysis provided above, the Fort Bend MUD No. 25 GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	The unit cost of the project is low due to limited infrastructure and permitting requirements.
Location	4	Some conveyance infrastructure may be necessary to access contractual supplies.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	5	Limited or no known impacts.
Environmental Flows	2	Minor reduction in environmental flows.
Local Preference	4	Project identified in participant's Joint GRP. No known opposition.

CRITERIA	RATING	EXPLANATION
Institutional Constraints	3	Reuse system is complete. Surface water must be procured through a contract.
Development Timeline	5	Minimal development time (<5 years) required.
Sponsorship	4	Sponsor identified and project partially implemented.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the Fort Bend County MUD No. 25 GRP GRP project may be applied was evaluated based on the entities identified in the GRP document. This information was considered in context of the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the applicability of the project to the WUGs served.

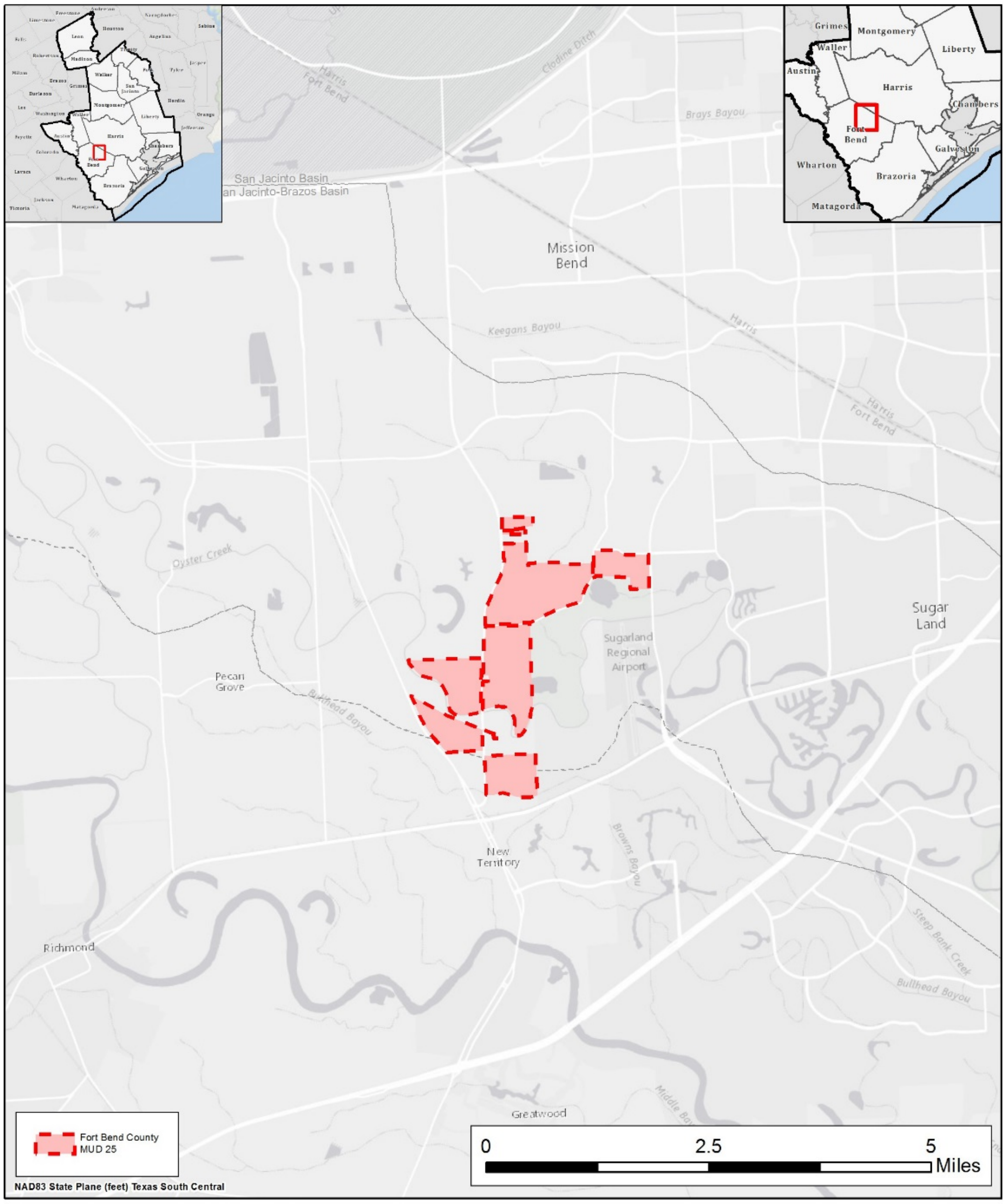
CRITERIA	WUG SUITABILITY
Proximity	The Project is located in close proximity to intended points of use.
Size	Overall project supply volume is appropriate to the target demands.
Water Quality	This project provides supplies of appropriate quality for intended uses.
Unit Cost	The cost of this project is low.
Other Factors	This project is partially implemented but may require limited infrastructure for future contractual supplies.

REFERENCES

CDM. *Fort Bend County MUD No. 25 Groundwater Reduction Plan*, prepared for Fort Bend County MUD No. 25, October 2008.

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

LOCATION MAP



Fort Bend County MUD 25 GRP
Location Map

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Fort Bend County WC&ID No. 2 Groundwater Reduction Plan
Project ID:	GWRP-008
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	3,360 – 6,720 ac-ft/yr (3 - 6 mgd)
Implementation Decade:	2020 (2017)
Development Timeline:	<5 years
Project Capital Cost:	$36,668,844 (Sept. 2013)
Unit Water Cost (Rounded):	$800 per ac-ft (during loan period) $343 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Fort Bend Subsidence District (FBSD), in order to address the issue of land surface subsidence due to groundwater use within Fort Bend County, has enacted regulations limiting the percentage of overall supply that water users in certain portions of the county may produce from the Gulf Coast Aquifer. In order to meet this requirement, Fort Bend Water Control & Improvement District No. 2 (WC&ID No. 2) has developed a Ground Water Reduction Plan (GRP) to reduce ground water use by implementing phased surface water conversion.

PROJECT ANALYSES

The project analyses for the Fort Bend WC&ID No. 2 GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The WC&ID No. 2 GRP summarizes the planned projects for meeting the Fort Bend Subsidence District's timeline for partial conversion to non-groundwater sources. WC&ID No. 2, which provides retail water supply service to the City of Stafford and portions of the City of Missouri City, is partnering in this endeavor with Harris County MUD No. 122, Fifth Street Water Supply Corporation, and City of Meadows Place. WC&ID No. 2 has contracted with Gulf Coast Water Authority (GCWA) for 10.5 mgd (11,760 ac-ft/yr) of raw surface water supply delivered through GCWA's canal system. WC&ID No. 2 has also obtained 80 acres of land adjacent to the GCWA canal for treatment plant development.

The initial 3 mgd surface water treatment facility identified by the GRP has been constructed and is operational; this portion of WC&ID No. 2's surface water supply is reflected as an existing supply in the Regional Plan. The GRP indicates that additional 3 mgd in treatment capacity will be required by 2025, although it is currently anticipated by WC&ID No. 2 that this facility may be constructed by 2017. A second 3 mgd expansion is anticipated by 2032.

Environmental Considerations

One impact associated with the implementation of this water management project is the increase in GCWA diversions from the Brazos River. Increased diversion of water from the Brazos River will result in some minimal decreases in instream flow downstream of the GCWA pump stations. However, these diversions will be made from existing water rights currently owned by the GCWA, contracted by Fort Bend County WC&ID No. 2, and no new water rights permits are required for this project. Otherwise implementation of this project should produce minimal environmental impacts.

Permitting and Development

Because the supply source for this project is from existing water rights and will be delivered through GCWA's canal system, permitting of new surface water rights or modification of existing rights to add a diversion point will not be required. Construction of treatment facility expansions will be required to utilize portions of the source supply, which may entail minor permitting.

Cost Analysis

The WC&ID No. 2 GRP included cost estimates for the initial development of surface water treatment facilities. A preliminary planning estimate of project cost for two future facility expansions was developed using standard cost estimate procedures for Region H. It was assumed for this estimate that 3,360 ac-ft of supply would be developed for year 2017 (2020), with an additional expansion reflected in 2032 (2030). It was assumed for both phases that all construction could be accommodated in existing easements, with minor costs for additional survey. The costs presented in this memorandum do not include the purchase cost of water. Costs presented in *Table 1*, including debt service and costs for operations and maintenance, were calculated using standard cost estimation procedures for Region H.

Table 1 – Fort Bend WCID 2 GRP Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 17, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$25,567,492	$25,567,492
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$8,905,972	$8,905,972
3	LAND AND EASEMENTS	1	LS	$150,727	$150,727
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$908,000	$908,000
5	INTEREST DURING CONSTRUCTION	1	LS	$1,136,653	$1,136,653
	PROJECT COST				$36,668,844

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$1,534,212	$3,068,424	$1,534,212	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,098,880	$2,197,760	$2,197,760	$2,197,760	$2,197,760	$2,197,760
3	PUMPING ENERGY COSTS	$54,088	$108,175	$108,175	$108,175	$108,175	$108,175
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$2,687,180	$5,374,360	$3,840,148	$2,305,936	$2,305,936	$2,305,936

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$2,687,180	$5,374,360	$3,840,148	$2,305,936	$2,305,936	$2,305,936
2	YIELD	3,360	6,720	6,720	6,720	6,720	6,720
3	UNIT COST	$800	$800	$571	$343	$343	$343
	TOTAL UNIT COST						$509

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$3,762,908	$3,762,908
2	PIPELINES	1	LS	$853,011	$853,011
3	WATER TREATMENT PLANTS	1	LS	$20,951,573	$20,951,573
	PROJECT COST				$25,567,492

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$3,762,908	$94,073
2	PIPELINES	1.0	%	$853,011	$8,530
3	WATER TREATMENT PLANTS	1.0	LS	$2,095,157	$2,095,157
	ANNUAL OPERATION AND MAINTENANCE COST				$2,197,760

PROJECT EVALUATION

Based on the analysis provided above, the Fort Bend WC&ID No. 2 GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Cost	2	Cost is moderately high but reduces considerably after debt service completion.
Location	5	Relatively near demand centers.
Water Quality	3	No known issues regarding water quality.
Environmental Land and Habitat	4	Minimal impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below diversion point. Diversion is from an existing water right.
Local Preference	4	No known opposition.
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	5	Sponsor identified and project is in development.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

The WC&ID No. 2 GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the project will only serve WC&ID No. 2 and any entities that it provides with water supply.

Criteria	WUG Suitability
Proximity	The project is located in close proximity to intended points of use.
Size	The project is of appropriate size to utilize WC&ID No. 2's surface water contracts.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is moderately high but decreases substantially after completion of debt service.

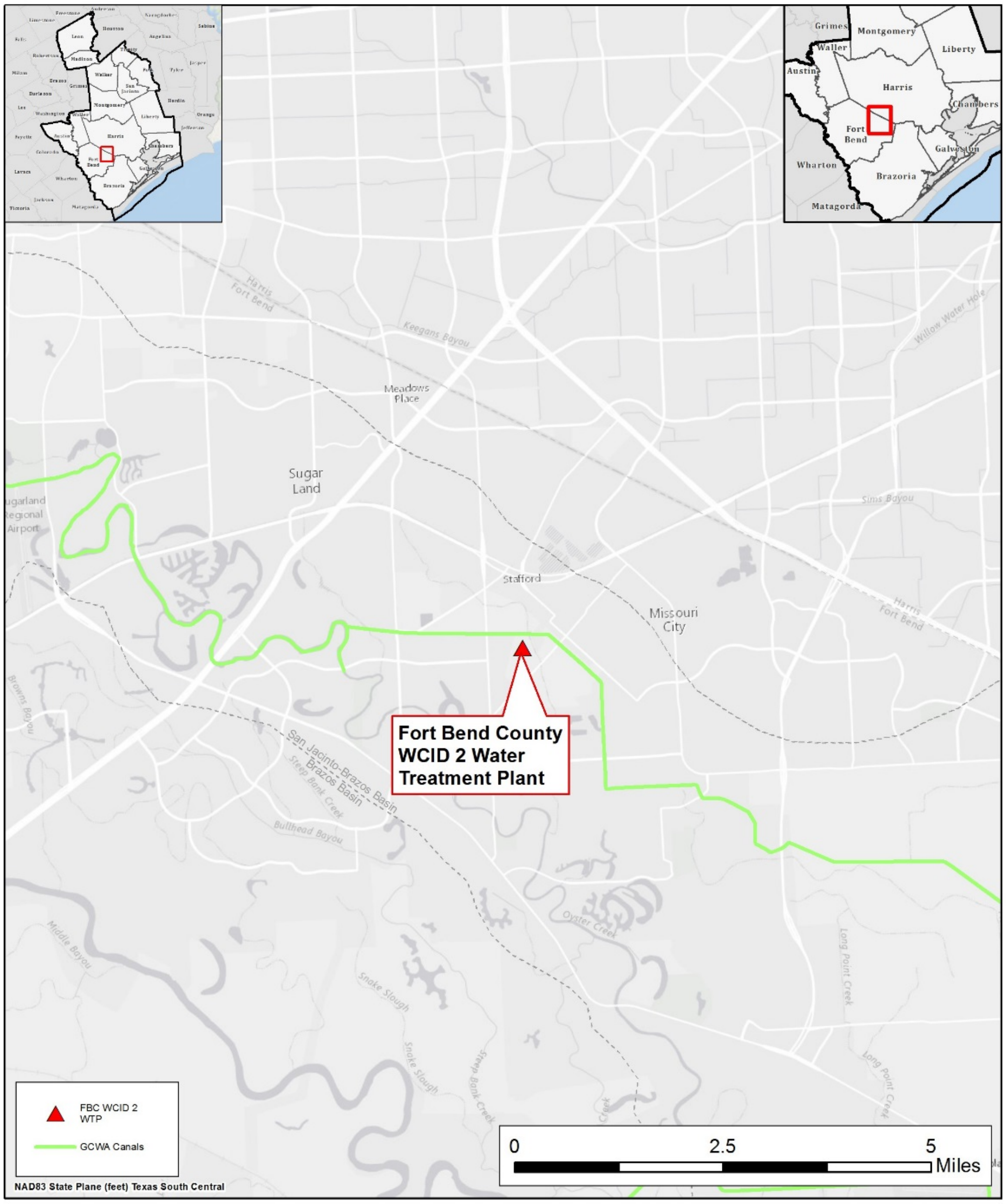
Criteria	WUG Suitability
Other Factors	This project reduces groundwater dependence.

REFERENCES

Jones and Carter, Inc. G*roundwater Reduction Plan: Fort Bend County W.C. and I.D. No. 2*, prepared for Fort Bend COUNTY WC&ID No. 2, February 2008.

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

LOCATION MAP



Fort Bend County WCID 2
Groundwater Reduction Plan
Location Map

Texas

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	North Fort Bend Water Authority Groundwater Reduction Plan
Project ID:	GWRP-009
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	62,496 ac-ft/yr (55.8 mgd)
Implementation Decade:	2020 (2024)
Development Timeline:	<10 years
Project Capital Cost:	Included under associated infrastructure projects
Unit Water Cost (Rounded):	Included under associated infrastructure projects

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the North Fort Bend Water Authority (NFBWA) has contracted with the City of Houston (COH) to receive treated surface water. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, NFBWA is participating in multiple infrastructure projects related to the treatment and distribution of surface water.

PROJECT ANALYSES

The project analyses for the NFBWA Groundwater Reduction Plan (GRP) include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The NFBWA will deliver surface water to the majority of the 69 MUDs and City of Fulshear within the Authority to meet the requirements of its GRP approved by the FBSD. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its GRP program. NFBWA is partnering with other Regional Water Authorities and COH in development of the Luce Bayou Interbasin Transfer

Project to convey supplies from the Trinity River to Lake Houston, and is also a participant in the expansion of the treatment capacity of the COH Northeast Water Purification Plant (NEWPP). The Authority has also increased its supply reservation from these facilities from an original reservation of 19.5 mgd (21,840 ac-ft/yr) currently applied in the Regional Plan as existing supply to 75.3 mgd (84,336 ac-ft/yr). NFBWA is partnering with West Harris County Regional Water Authority (WHRWA) to develop a new shared transmission pipeline system, referred to by the sponsors as the Second Source Transmission Line, which will convey increased treated surface water supplies from the NEWPP; a portion of this shared transmission is anticipated to be active in 2021, with the remainder completed by 2024. NFBWA is also developing its Phase 2 Distribution Expansion to extend the infrastructure network through which it supplies its member districts, allowing for greater overall volume conveyed and conversion of additional districts to surface water.

Environmental Considerations

The NFBWA has engaged in a variety of activities and investigations for projects within the Authority, as summarized below. Note that the following descriptions are not limited to studies of the NFBWA Phase 2 Distribution Segments and also include studies related to NFBWA and WHCRWA's proposed future shared transmission infrastructure. The Authority relies on COH and WHCRWA to address the environmental considerations of projects for which those entities are primarily responsible.

- Threatened and Endangered Species Study - There were no threatened and/or endangered species identified at the time of field investigation. This does not eliminate the possibility of threatened and/or endangered species inhabiting the proposed route area at the time of construction. Further, reconnaissance did identify some habitats conducive for threatened and/or endangered species. At the time of final design and construction, an additional investigation of the area will be required to verify these species have not inhabited the construction area.
- Cultural Resources Study – Investigation revealed limited potential for cultural/archeological resources within the portion along Buffalo Bayou. The majority of this route lies within residential development where any cultural/archeological resources have been previously handled by the land owner. It is anticipated that the Texas Historical Commission will require field investigations prior to construction to verify no archeological sites exist along the proposed route.
- Reconnaissance of Potential Wetlands and Waters of the United States - Historical aerial photography and National Wetland Inventory (NWI) maps identified areas displaying characteristics consistent with potential wetland habitats. Field reconnaissance identified these areas and verified that in the opinion of the environmental consultant, the landscape does not appear to contain any potential wetlands. Depending on the amount of time between the investigation and construction, the Authority may reconfirm this assessment. If conditions have changed, then permitting or avoidance (trenchless construction) of these aquatic resources would be decided at that time. Given that the on-site investigation did not reveal any obvious wetland features, any subtle or smaller wetlands determined to be in the construction zone will most likely be avoided via trenchless construction.
- Limited Phase 1 Environmental Site Assessment (ESA) - The PEA investigation documented environmental conditions that could impact future land use or planned development, including installation of water line segments. No known hazardous

material sites, or oil and gas sites were identified. The proposed alignments are within the vicinity of gas stations, however; the alignment is located to avoid close proximity to these gas stations. Segments have a low potential for presence of hazardous materials or substances based on research conducted for this report.

Permitting and Development

The North Fort Bend Water Authority is subject to requirements imposed by the City of Houston as well as the State of Texas. As indicated above, the Authority relies on the City of Houston and West Harris County Regional Water Authority to address the permitting and development requirements of projects for which those entities are primarily responsible. For the Authority's expansion of distribution infrastructure, at least some level of construction permitting would be anticipated.

Cost Analysis

The costs associated with developing this project are included under other infrastructure projects.

PROJECT EVALUATION

Based on the analysis provided above, the NFBWA GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Cost for project are related to the infrastructure projects which allow physical implementation of the GRP.
Location	3	Source supply requires an interbasin transfer of surface water and extensive conveyance infrastructure.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.

CRITERIA	RATING	EXPLANATION
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

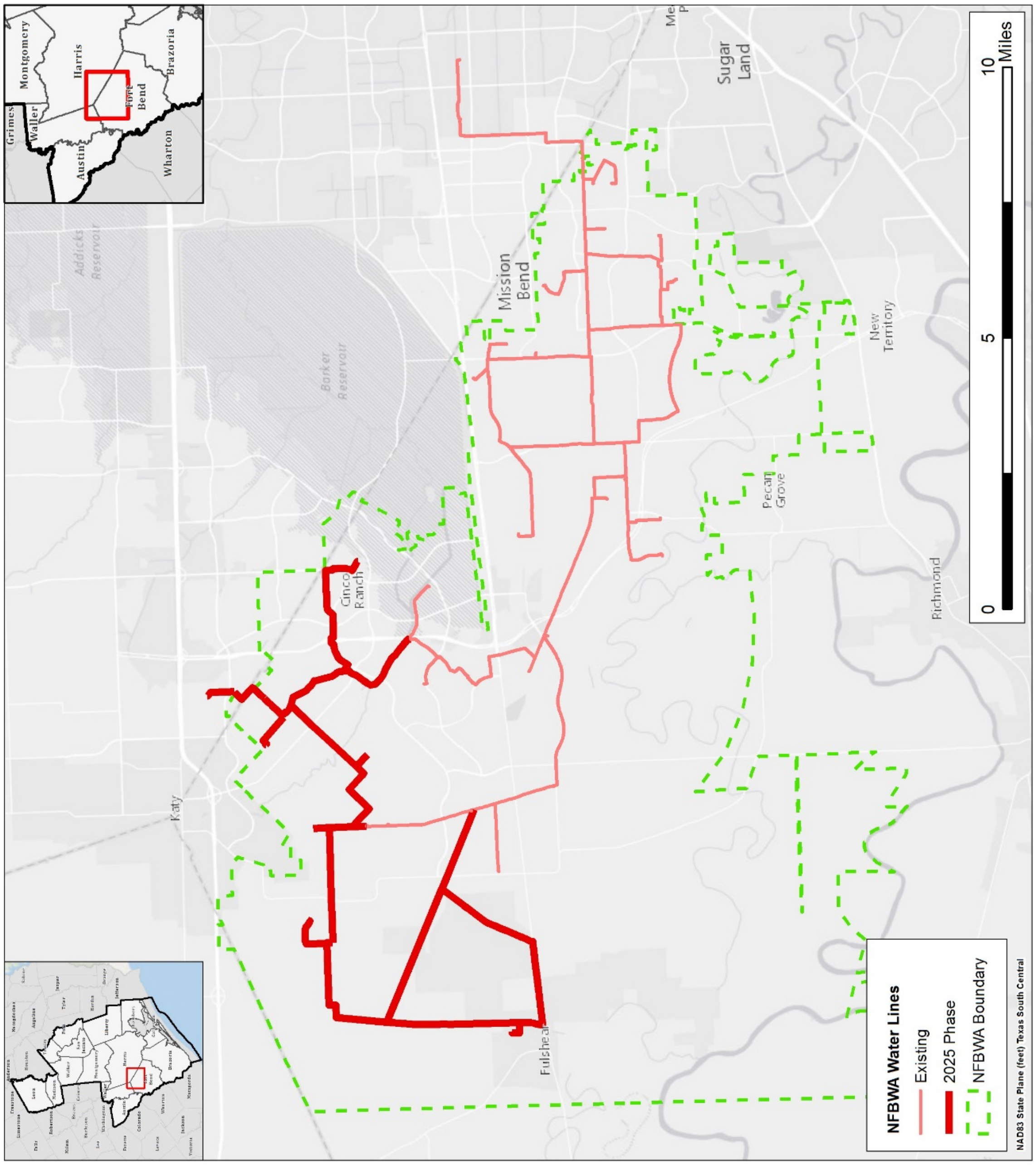
The NFBWA GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the project will only serve NFBWA, its wholesale customers, and GRP participants.

CRITERIA	WUG SUITABILITY
Proximity	Requires conveyance infrastructure from source basin pipelines to demand centers.
Size	Sized to convey the requisite amount of source water.
Water Quality	Treated water of quality appropriate for municipal use.
Unit Cost	Included under other infrastructure projects.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

LOCATION MAP



REGION H
Water Planning Group

NFBWA GRP
Location Map

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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	North Harris County Regional Water Authority Groundwater Reduction Plan
Project ID:	GWRP-010
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	143,360 ac-ft/yr (128 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	<10 years
Project Capital Cost:	Included under associated infrastructure projects
Unit Water Cost (Rounded):	Included under associated infrastructure projects

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the North Harris County Regional Water Authority (NHCRWA) has contracted with the City of Houston (COH) to receive treated surface water. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, NHCRWA is participating in multiple infrastructure projects related to the treatment and distribution of surface water.

PROJECT ANALYSES

The project analyses for the NHCRWA Groundwater Reduction Plan (GRP) include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The NHCRWA will continue to deliver surface water to districts within the Authority to meet the requirements of its GRP. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its GRP program. NHCRWA is partnering with other Regional Water Authorities and COH in development of the Luce Bayou Interbasin Transfer Project to convey supplies from the Trinity River to Lake Houston, and is also a participant in the expansion of the treatment capacity of the COH Northeast Water Purification Plant (NEWPP). The Authority has also increased its supply reservation from these facilities from an original reservation of 31 mgd (34,720 ac-ft/yr) currently applied in the Regional Plan as existing supply to 159 mgd (178,080 ac-ft/yr). NHCRWA is partnering with Central Harris County Regional Water Authority (CHCRWA) and COH to develop a new shared transmission pipeline system, referred to by the sponsors as the Second Source Transmission Line, which will convey increased treated surface water supplies from the NEWPP; NHCRWA is also developing an expansion of the infrastructure network through which it supplies its member districts.

Environmental Considerations

Any environmental impacts related to the GRP project are a factor of the associated source and infrastructure projects. Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the GRP is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

The permitting and development requirements necessary for implementation of the NHCRWA GRP are associated with the source supply and infrastructure projects. NHCRWA is subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Much of the permitting associated with implementation infrastructure, such as the Luce Bayou Interbasin Transfer Project and the NEWPP Expansion are primarily being addressed by COH.

Cost Analysis

The costs associated with developing this project are included under other infrastructure projects.

PROJECT EVALUATION

Based on the analysis provided above, the NHCRWA GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Cost for project are related to the infrastructure projects which allow physical implementation of the GRP.
Location	3	Source supply requires an interbasin transfer of surface water and extensive conveyance infrastructure.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.

CRITERIA	RATING	EXPLANATION
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The NHCRWA GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the project will only serve NHCRWA, its wholesale customers, and GRP participants.

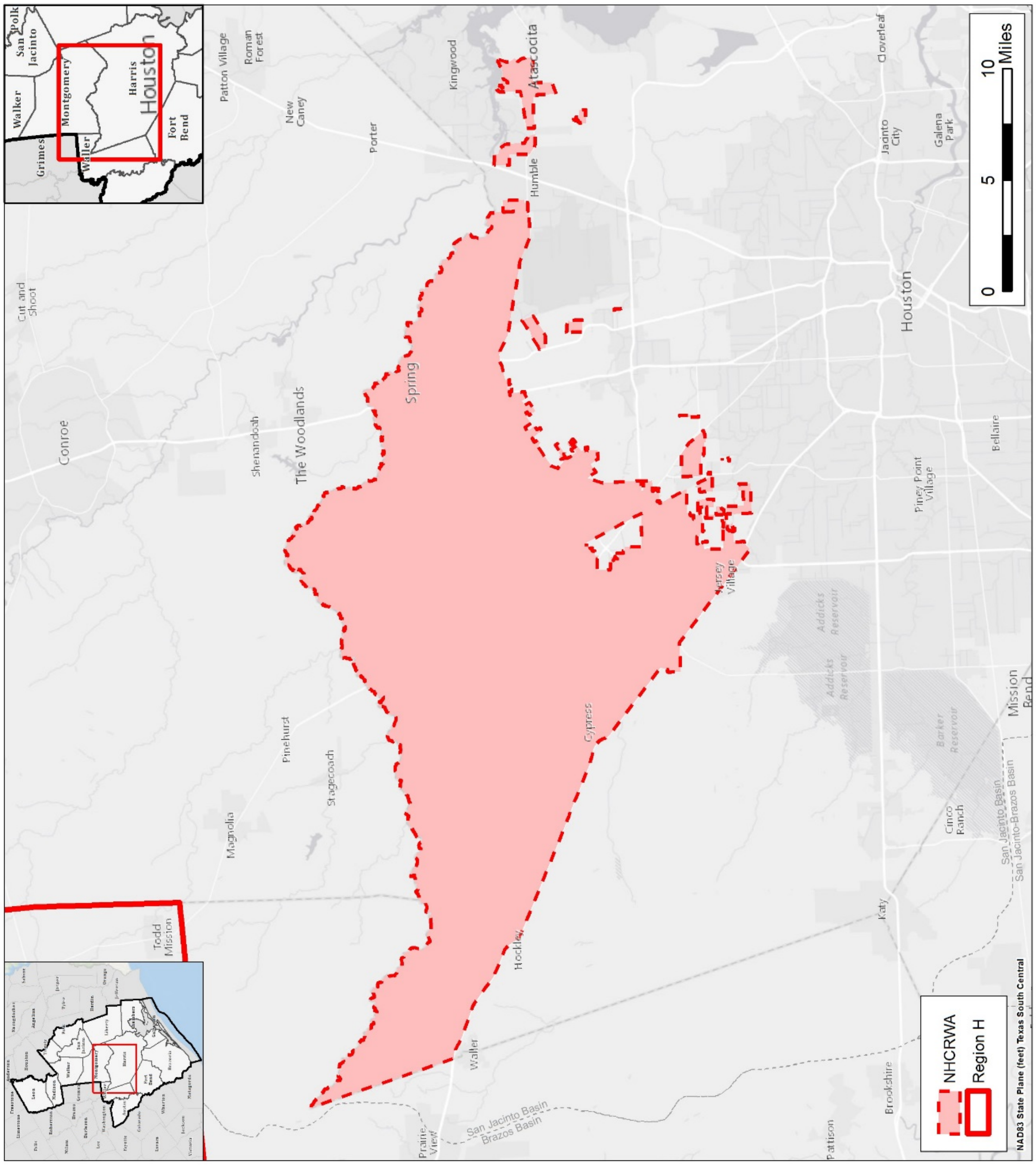
CRITERIA	WUG SUITABILITY
Proximity	Requires conveyance infrastructure from source basin pipelines to demand centers.
Size	Sized to convey the requisite amount of source water.
Water Quality	Treated water of quality appropriate for municipal use.
Unit Cost	Included under other infrastructure projects.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

REFERENCES

AECOM. *2014 North Harris County Regional Water Authority Groundwater Reduction Plan*, prepared for NHCRWA, June 2014.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013.

LOCATION MAP



NHCRWA GRP
Location Map

Texas

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	City of Panorama Village and City of Shenandoah Joint GRP
Project ID:	GWRP-011
Project Type:	Existing Groundwater Source
Potential Supply Quantity (Rounded):	472 ac-ft/yr (0.42 mgd)
Implementation Decade:	2040
Development Timeline:	5 years
Project Capital Cost:	$1,619,114 (Sept. 2013)
Unit Water Cost (Rounded):	$399 per ac-ft (during loan period) $112 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Lone Star Groundwater Conservation District (LSGCD), in order to protect the groundwater resources of Montgomery County, has enacted requirements for entities identified as Large Volume Groundwater Users (LVGUs) to reduce their production of groundwater from the Gulf Coast Aquifer to 70 percent of their Year 2009 permitted groundwater authorization. In order to meet this requirement, the City of Panorama Village in conjunction with the City of Shenandoah developed a Joint Groundwater Reduction Plan (GRP) assessing options for alternative water supply and detailing the planned approach to reducing Gulf Coast Aquifer usage. The Joint GRP participants will meet conversion requirements through the production of groundwater from the Catahoula Aquifer, and have already developed the infrastructure required to meet their initial obligations for source conversion. In order to maintain compliance with LSGCD regulations while meeting future demand growth, the GRP indicates the need for development of a second Catahoula Aquifer Well and associated infrastructure for the City of Shenandoah by Year 2040.

PROJECT ANALYSES

The project analyses for the Joint GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Assessment of supply for the additional future Catahoula Aquifer water supply was evaluated and summarized within the Joint GRP document and supporting analysis. Proposed infrastructure includes a 1,000 gpm groundwater well, a booster pump, and both elevated and ground storage tanks. Target production is 131 million gallons per year, or 402 ac-ft/year.

Environmental Considerations

Environmental impacts of the project are not examined in detail in the Joint GRP document but would be expected to be minimal as the supply source is groundwater from the Catahoula Aquifer and the majority of infrastructure development is anticipated to occur at existing water plant facilities. Return flows from increased groundwater production could result in minor increases in instream flow.

Permitting and Development

Because the Joint GRP participants are public water systems, a limited amount of permitting effort would be required through the Texas Commission on Environmental Quality (TCEQ). Groundwater well drilling and production authorization through LSGCD would be required.

Cost Analysis

The Joint GRP does not include cost estimates for the additional future Catahoula Aquifer well project, but does provide an estimate of costs for the initial Catahoula Aquifer project. Because the future project is similar in infrastructure to the existing Catahoula well supply, the data provided for the initial project was used as the basis for estimating cost for the Joint GRP project for Regional Planning purposes. *Table 2* summarizes the component costs of key facilities. Costs are presented in September 2013 dollars and include a contingency of 35% including professional services.

Table 2 – Panorama and Shenandoah Joint GRP Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					December 12, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$1,179,875	$1,179,875
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$412,956	$412,956
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$26,283	$26,283
	PROJECT CAPITAL COST				$1,619,114

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$135,486	$135,486	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$53,000	$53,000	$53,000	$53,000
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$188,486	$188,486	$53,000	$53,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$188,486	$188,486	$53,000	$53,000
2	YIELD	-	-	472	472	472	472
3	UNIT COST	$0	$0	$399	$399	$112	$112
	TOTAL UNIT COST						$256

PROJECT EVALUATION

Based on the analysis provided above, the Panorama and Shenandoah Joint GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	Proposed project is expected to deliver at a moderate cost.
Location	5	Source located near points of demand with minimal conveyance infrastructure required.
Water Quality	3	No known issues regarding water quality.
Environmental Land and Habitat	5	No impacts / minimal impacts.
Environmental Flows	4	Minor increase in environmental flows.
Local Preference	4	Project identified in participant's Joint GRP. No known opposition.
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	4	Project is identified as a component of the sponsors' GRP.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the Joint GRP project may be applied was evaluated based on the entities identified in the GRP document. This information was considered in context of the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the applicability of the project to the WUGs served.

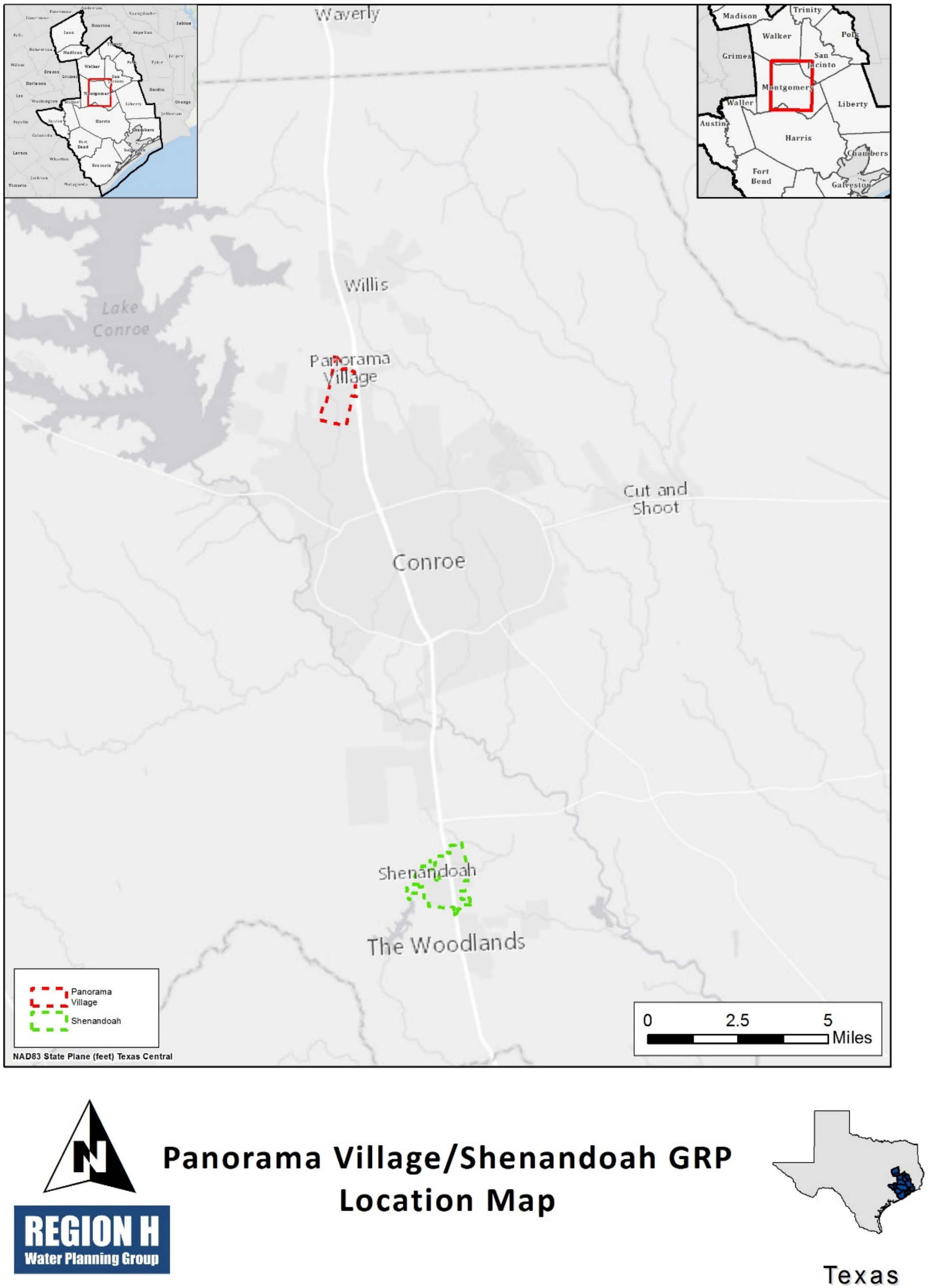
CRITERIA	WUG SUITABILITY
Proximity	Project is located in close proximity to intended points of use.
Size	Overall project supply volume is relatively small but is appropriate to the conversion target demands identified in the GRP.

CRITERIA	WUG SUITABILITY
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is moderate and decreases substantially after completion of debt service.
Other Factors	This project will require permitting through LSGCD.

REFERENCES

Bleyl and Associates, *The City of Panorama Village and The City of Shenandoah Joint Groundwater Reduction Plan*, prepared for City of Panorama Village, March 2011.

LOCATION MAP



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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Porter SUD Joint Groundwater Reduction Plan
Project ID:	GWRP-012
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	2,240 ac-ft/yr (2.0 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$22,061,536 (Sept. 2013)
Unit Water Cost (Rounded):	$1,250 per ac-ft (during loan period) $426 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Lone Star Groundwater Conservation District (LSGCD), in order to protect the groundwater resources of Montgomery County, has enacted requirements for entities identified as Large Volume Groundwater Users (LVGUs) to reduce their production of groundwater from the Gulf Coast Aquifer to 70 percent of their Year 2009 permitted groundwater authorization. In order to meet this requirement, Porter SUD in conjunction with Chateau Woods MUD and Crystal Springs Water Company developed a Joint Groundwater Reduction Plan (GRP) assessing options for alternative water supply and detailing the planned approach to reducing Gulf Coast Aquifer usage. The Joint GRP participants will meet conversion requirements through the construction of a surface water treatment plant and associated infrastructure. The project will be supplied through a contract with the City of Conroe to purchase groundwater-based effluent discharged by Conroe and conveyed to the Porter SUD Joint GRP participants using the bed and banks of the West Fork of the San Jacinto River.

PROJECT ANALYSES

The project analyses for the Joint GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Assessment of supply for the additional future Catahoula Aquifer water supply was evaluated and summarized within the Joint GRP document and subsequent analysis commissioned by the Joint GRP participants. Porter SUD currently has a contract with the City of Conroe for up to 2 mgd (2,240 ac-ft/yr) of groundwater-based effluent from the City's wastewater discharge. Analysis included in the GRP indicates that this supply is reliable, although discharge amounts are anticipated to vary with seasonal conditions. Proposed infrastructure includes a 1.5 mgd water treatment plant, booster pump station, and both elevated and ground storage tanks. A subsequent expansion of treatment capacity by year 2029 is anticipated to be necessary to meet demand growth. The contract with the City of Conroe also grants Porter SUD first right of refusal on the sale of additional supply from the reuse source, which could be used to meet any needs beyond those met by the 2 mgd contract. Any additional amount would require treatment either through the proposed GRP infrastructure or, if large enough in volume, through additional treatment capacity development beyond that specified in the Joint GRP. The assessment presented in this memorandum is limited to infrastructure and contractual supplies presented in the GRP.

Environmental Considerations

Environmental impacts of the project are not examined in detail in the Joint GRP document. Some potential impacts are possible due to infrastructure construction but would likely be minor. The diversion of the groundwater-based effluent source supply would also be expected to have some degree of impact in terms of reduction of instream flows downstream of the diversion point for any portion of the source supply originating from currently-levels of return flow. A more detailed analysis of environmental impacts and legal constrains would be considered during the permit application and review process, which has been initiated.

Permitting and Development

Permitting efforts directly associated with the Porter SUD Joint GRP infrastructure development are anticipated to be limited. Because the participants are public water systems, coordination and potential permitting or review by TCEQ will be required. If site selection results in the potential for impacts to wetlands, permitting through the US Army Corps of Engineers would also be required. In addition to permitting associated with construction, the use of a State watercourse to convey the effluent supply to Porter SUD will require a bed and banks authorization from TCEQ. The City of Conroe has applied for such an authorization.

Cost Analysis

The Joint GRP as amended includes a summary of estimated capital cost for infrastructure associated with the development of a surface water treatment plant for the participants' initial phase of conversion to surface water, as well as subsequent expansion by year 2029. *Table 1* summarizes the costs of key facilities. Costs are presented in September 2013 dollars and include a contingency of 35% including professional services. Debt service and costs for operations and maintenance shown in the table are calculated using the default Region H cost estimation methodology; debt service is assumed to occur at a 5.5 percent rate for a 20 year term. Pumping energy costs were not included as they were not shown in the GRP and will vary based on specific intake and distribution system design.

Table 1 –Porter SUD Joint GRP Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					October 21, 2013
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$15,818,000	$15,818,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$5,536,300	$5,536,300
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$23,377	$23,377
5	INTEREST DURING CONSTRUCTION	1	LS	$683,859	$683,859
	PROJECT CAPITAL COST				$22,061,536

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$1,846,095	$1,846,095	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$749,997	$749,997	$749,997	$749,997	$749,997	$749,997
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$204,374	$204,374	$204,374	$204,374	$204,374	$204,374
	TOTAL ANNUAL COST	$2,800,465	$2,800,465	$954,371	$954,371	$954,371	$954,371

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$2,800,465	$2,800,465	$954,371	$954,371	$954,371	$954,371
2	YIELD	2,240	2,240	2,240	2,240	2,240	2,240
3	UNIT COST	$1,250	$1,250	$426	$426	$426	$426
	TOTAL UNIT COST						$701

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	WATER TREATMENT PLANTS	1	LS	$7,875,000	$7,875,000
2	WATER STORAGE TANKS	1	LS	$1,000,000	$1,000,000
3	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	1	LS	$1,103,000	$1,103,000
4	OTHER TREATMENT COMPONENTS	1	LS	$5,840,000	$5,840,000
	PROJECT COST				$15,818,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	WATER TREATMENT PLANTS	1.0	LS	$670,567	$670,567
2	WATER STORAGE TANKS	1.0	%	$1,000,000	$10,000
3	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	1.0	%	$1,103,000	$11,030
4	OTHER TREATMENT COMPONENTS	1.0	%	$5,840,000	$58,400
	ANNUAL OPERATION AND MAINTENANCE COST				$749,997

PROJECT EVALUATION

Based on the analysis provided above, the Porter SUD Joint GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	Proposed project is expected to deliver at a high cost, but will decrease substantially after debt service completion.
Location	4	Bed and banks conveyance to treatment facility required
Water Quality	3	No known issues regarding water quality.
Environmental Land and Habitat	4	Minimal known impacts.
Environmental Flows	2	Diversion of discharges would create reduction in environmental flows.
Local Preference	4	Project identified in participant's Joint GRP. Minimal opposition.
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	5	Project is identified as a component of the sponsors' GRP.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the Joint GRP project may be applied was evaluated based on the entities identified in the GRP document. This information was considered in context of the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the applicability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project diversion point located in close proximity to intended points of use.
Size	Overall project supply volume is appropriate to the conversion target demands identified in the GRP.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is high but decreases substantially after completion of debt service.

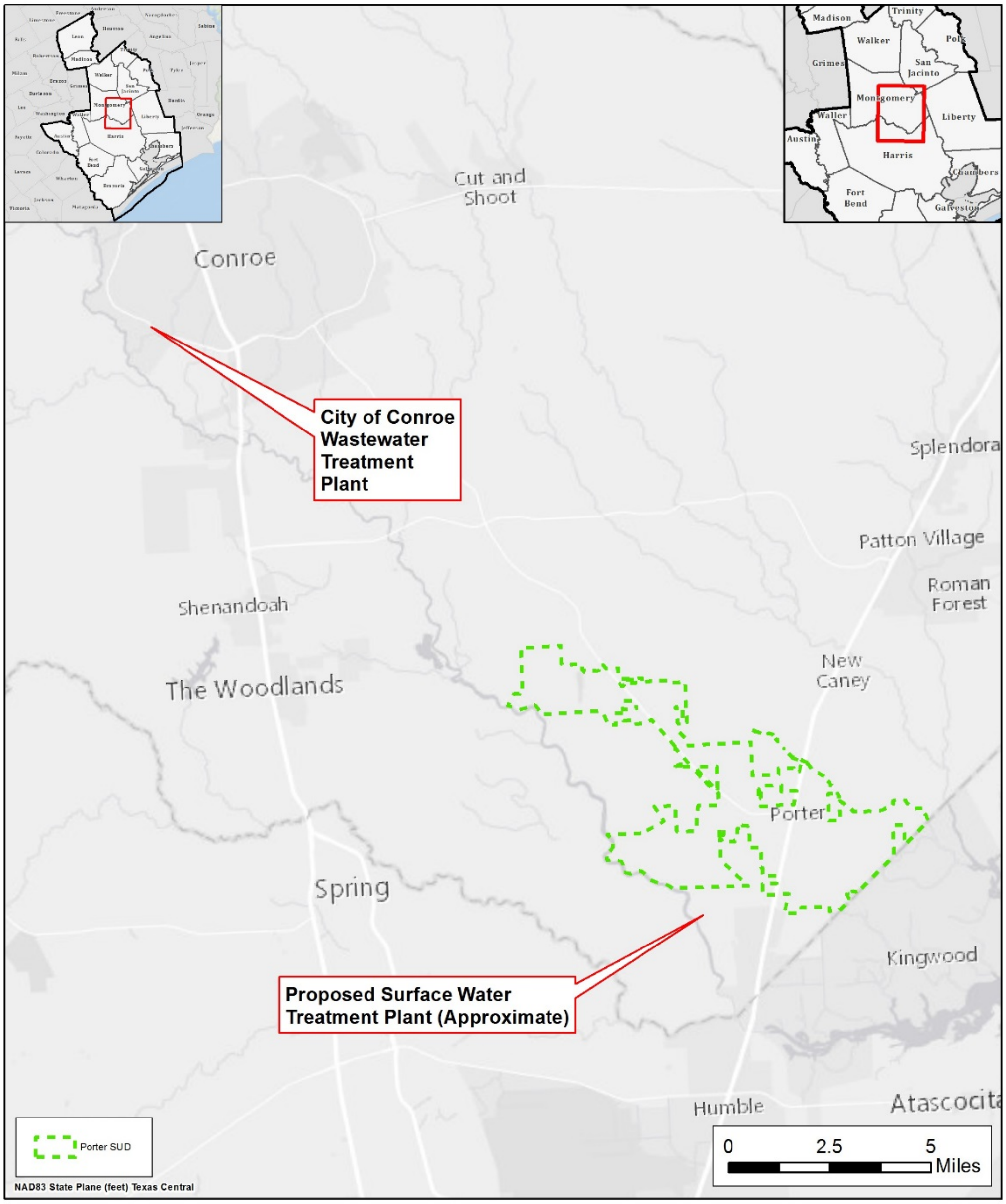
CRITERIA	WUG SUITABILITY
Other Factors	This project will require permitting through LSGCD and TCEQ.

REFERENCES

Bleyl and Associates, *Porter Special Utility District, Chateau Woods Municipal Utility District, Crystal Springs Water Company Joint Groundwater Reduction Plan*, prepared for Porter SUD, March 2011.

Bleyl and Associates, *Porter SUD Joint GRP Amendment No. 1 Revised*, prepared for Porter SUD, July 2014.

LOCATION MAP



Porter SUD Joint GRP
Location Map

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	River Plantation and East Plantation Joint Groundwater Reduction Plan
Project ID:	GWRP-013
Project Type:	Reuse
Potential Supply Quantity (Rounded):	92 ac-ft/yr (30 mgd)
Implementation Decade:	2030
Development Timeline:	5 years
Project Capital Cost:	$0 (Sept. 2013)
Unit Water Cost (Rounded):	$0 per ac-ft (during loan period) $0 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Lone Star Groundwater Conservation District (LSGCD), in order to protect the groundwater resources of Montgomery County, has enacted requirements for entities identified as Large Volume Groundwater Users (LVGUs) to reduce their production of groundwater from the Gulf Coast Aquifer to 70 percent of their Year 2009 permitted groundwater authorization. In order to meet this requirement, River Plantation MUD in conjunction with East Plantation UD and the River Plantation Country Club developed a Joint Groundwater Reduction Plan (GRP) assessing options for alternative water supply and detailing the planned approach to reducing groundwater dependence. The Joint GRP participants will meet conversion requirements through use of reclaimed water to offset groundwater use for golf course and green space irrigation. River Plantation MUD has operated reuse infrastructure since 1988 and is already producing sufficient volumes of reuse water to meet the initial conversion requirements established by LSGCD. Due to future demand water demand growth in the Joint GRP participant service areas, it is anticipated that the amount of reuse applied to irrigation demands will need to be increased from current levels of 60 million gallons of year (mgy) to 90 mgy by Year 2030.

PROJECT ANALYSES

The project analyses for River Plantation and East Plantation Joint GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Assessment of supply availability for the River Plantation and East Plantation Joint GRP was evaluated and summarized within the GRP document and supporting analysis. River Plantation MUD has operated reuse infrastructure since 1998 and currently produces approximately 60 million gallons per year of reclaimed water for irrigation, with the capacity to convey up to 100 million gallons per year to its reuse irrigation system. The GRP indicates that the source wastewater treatment plant currently regularly produces over 100 million gallons of effluent per year.

Environmental Considerations

Environmental impacts of the project would be examined in detail during the Texas Commission on Environmental Quality (TCEQ) permitting or permit amendment process. The study includes areas within the San Jacinto River Basin, which is subject to environmental flow requirements, including those established in accordance with 30 TAC §298 which establish seasonal requirements for flows. Any increase in reuse of current levels of wastewater flows would cause some reduction in return flows. Any portion of the supply based on return flow from future growth rather than existing development would not be expected to further reduce streamflow.

Infrastructure required for implementation of this project would consist primarily of limited conveyance infrastructure to connect to points of use. Use of existing easements or replacement of existing groundwater supply conveyances would minimize habitat impacts.

Permitting and Development

Use of reclaimed wastewater effluent requires approval and permitting by the TCEQ under the requirements of 30 TAC §210. TCEQ classifies reclaimed water as Type 1 (higher quality for use where public contact is likely) or Type 2 (for uses with limited risk of human contact). Due to the potential for human contact, supplies for this project would have to be treated to Type 1 quality standards. If approved for use, the reclaimed water would have to be sampled and analyzed a minimum of twice per week.

Cost Analysis

The River Plantation and East Plantation Joint GRP indicates that costs associated with future expanded reuse for irrigation have not yet been determined but are expected to be minimal as much of the treatment and transmission infrastructure is currently in place. Implementation of this project would result in additional annual costs for increased volume of advanced treatment, pumping energy, and O&M, although increased annual costs for a project of the scale specified are likely minimal as well.

PROJECT EVALUATION

Based on the analysis provided above, the River Plantation and East Plantation Joint GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Proposed project is expected to deliver at a very low cost due limited need for additional infrastructure.

CRITERIA	RATING	EXPLANATION
Location	5	Source located near points of demand with minimal conveyance infrastructure required.
Water Quality	3	No known issues regarding water quality.
Environmental Land and Habitat	5	No impacts / minimal impacts.
Environmental Flows	2	Minor reduction in environmental flows.
Local Preference	4	Project identified in participant's Joint GRP. No known opposition.
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	4	Project is identified as a component of the sponsors' GRP.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

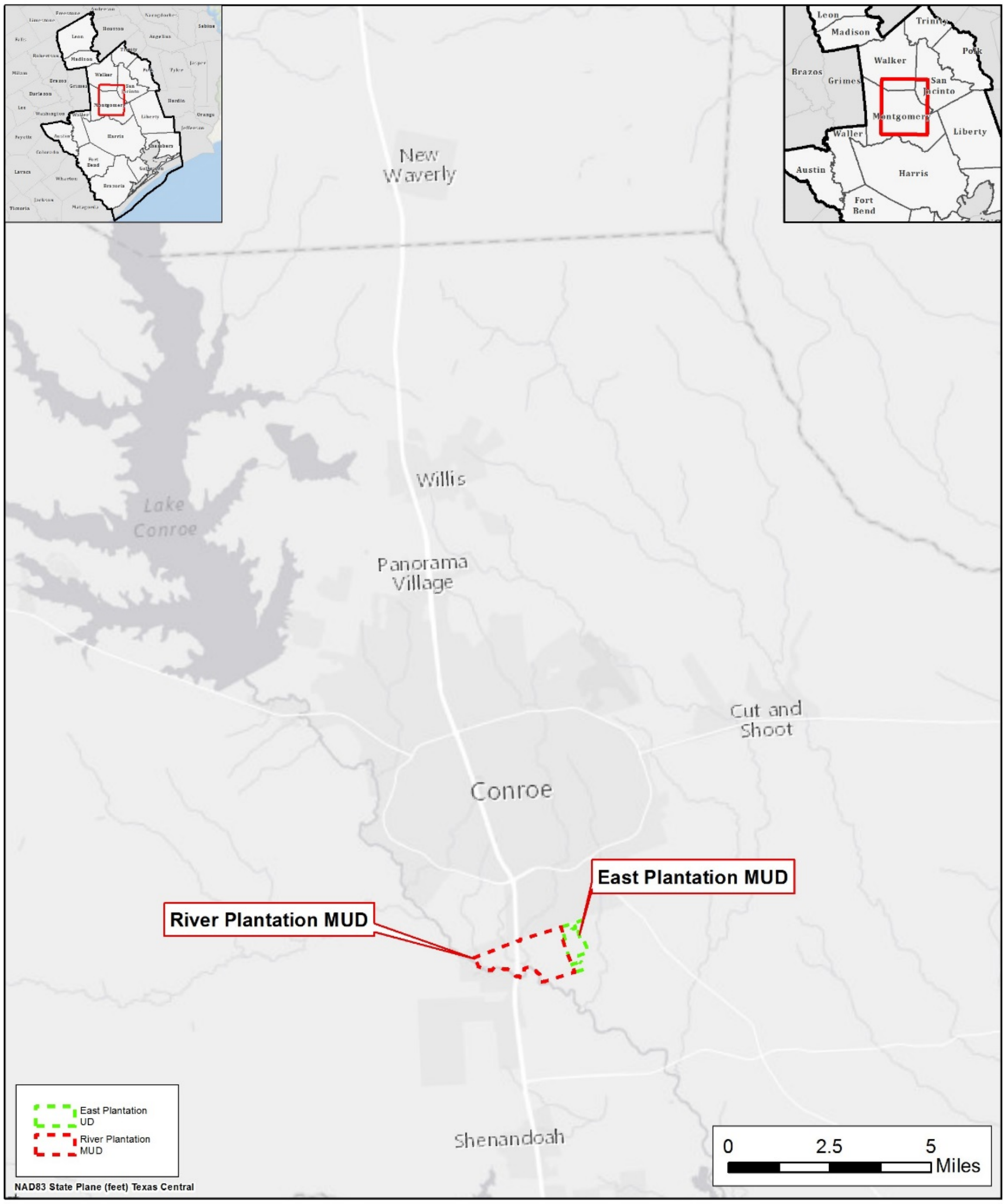
Determination of the Water User Groups (WUGs) to which the River Plantation and East Plantation Joint GRP project may be applied was evaluated based on the entities identified in the GRP document. This information was considered in context of the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the applicability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project is located in close proximity to intended points of use.
Size	Overall project supply volume is relatively small but is appropriate to the target greenspace and golf course irrigation demands.
Water Quality	This project provides a high-quality raw water source that may be used to meet greenspace and golf course demands.
Unit Cost	The cost of this project is minimal and appropriate to the target use.
Other Factors	Some reuse permitting or permit amendment effort may be necessary for the sponsor WUGs to implement this project.

REFERENCES

Bleyl and Associates, *River Plantation Municipal Utility District, East Plantation Utility District, River Plantation Country Club Joint Groundwater Reduction Plan*, prepared for River Plantation MUD, March 2011.

LOCATION MAP



REGION H
Water Planning Group

River Plantation and East Plantation GRP Location Map

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	SJRA Groundwater Reduction Plan
Project ID:	GWRP-014
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	100,000 ac-ft/yr (89 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	5 years
Project Capital Cost:	$834,931,018 (Sept. 2013)
Unit Water Cost (Rounded):	$608 per ac-ft (during loan period) $81 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Lone Star Groundwater Conservation District (LSGCD), in order to protect the groundwater resources of Montgomery County, has enacted requirements for entities identified as Large Volume Groundwater Users (LVGUs) to reduce their production of groundwater from the Gulf Coast Aquifer to 70 percent of their Year 2009 permitted groundwater authorization. In order to meet this requirement, the San Jacinto River Authority (SJRA) has developed a Ground Water Reduction Plan (GRP) to reduce ground water use by implementing surface water conversion.

PROJECT ANALYSES

The project analyses for the SJRA GRP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The SJRA has partnered with over 100 entities in Montgomery County for purposes of meeting the required groundwater reduction. The primary approach for meeting the required reduction is phased conversion to surface water from Lake Conroe, with other surface water sources potentially integrated during later decades. Due to the physical and logistic challenges associated with converting all participants to partial surface water supply, the GRP specifies overconversion of a portion of the SJRA service area, allowing other co-participant to continue growth on groundwater while allowing the aggregate water use of partnering entities to meet LSGCD requirements. The GRP also includes provision for potential future inclusion of additional partner entities as less-developed areas urbanize and transition to LVGU status. The surface water treatment facility and associated transmission infrastructure associated with the initial year 2016 conversion stage this supply is in development and is reflected as an existing supply in the Regional Plan. The GRP indicates that additional treatment and transmission facilities will be required to meet the growth in population and water demand projected for Montgomery County; these expansions are reflected in the Regional Plan as conversion of additional GRP partner entities to surface water and increased surface water supply to already-converted partners. The GRP indicates potential infrastructure expansion phases of varying nature and capital cost for years 2025, 2035, 2045, and 2055.

Environmental Considerations

One impact associated with the implementation of this project is the increase in diversions from the San Jacinto River and Lake Conroe. Increased diversion of water will result in some decreases in instream flow downstream of the Lake Conroe diversion point. However, these diversions will be made from existing water rights currently owned by the SJRA and the City of Houston, and no new water rights permits are required for this project. Some surface disturbance may be associated with development of expanded water plant facilities and transmission infrastructure. However, this construction would occur primarily on existing plant sites or in previously urbanized area and would cause little disturbance to undeveloped habitat. Implementation of this project should produce limited additional environmental impacts.

Permitting and Development

Because the surface water supply source for this project is from existing water rights, permitting of new surface water rights or modification of existing rights to add a diversion point will not be required. If additional water supply sources are incorporated in later decades, permitting efforts specific to those sources ort source types may be required. Construction of surface water treatment facility and distribution system expansions will be required to utilize portions of the source supply, which may entail minor permitting.

Cost Analysis

Capital costs for decadal phased expansion of surface water treatment plant and transmission capacity are summarized in the SJRA GRP. Capital costs associated with engineering and legal services, land acquisition, environmental studies, and mitigation are not identified as separate items in the GRP and were assumed for the Regional Plan to be included in the indicated capital cost. Costs for the year 2055 phase of surface water conversion, which represent the largest single decadal capital cost, were assumed to be inclusive of costs for major transmission infrastructure reflected under other projects in the Regional Plan. To prevent double-counting of capital costs, costs for the 2055 conversion phase were assumed to be similar to those from the 2035 phase of conversion. Interest during construction and annualized costs (debt service, operations and maintenance, and energy) are not identified as separate items in the GRP and were estimated using standard Regional Planning costing reference data. Capital costs were scaled to a September 2013 equivalent cost using the Construction Cost Index in accordance with TWDB guidance. Estimated costs are presented in *Table 1*.

Table 1 – SJRA GRP Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					February 18, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$809,050,000	$809,050,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$0	$0
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$25,881,018	$25,881,018
	PROJECT COST				$834,931,018

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$5,402,817	$26,856,139	$34,579,547	$34,579,547	$21,453,322	$0
2	OPERATION AND MAINTENANCE (O&M)	$711,500	$3,536,700	$5,265,300	$8,090,500	$8,090,500	$8,090,500
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$6,114,317	$30,392,839	$39,844,847	$42,670,047	$29,543,822	$8,090,500

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$6,114,317	$30,392,839	$39,844,847	$42,670,047	$29,543,822	$8,090,500
2	YIELD	25,000	50,000	75,000	100,000	100,000	100,000
3	UNIT COST	$245	$608	$531	$427	$295	$81
	TOTAL UNIT COST						$348

PROJECT EVALUATION

Based on the analysis provided above, the SJRA GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	3	Cost is moderate and decreases in later decades after debt service completion.
Location	4	Transmission infrastructure required to convert additional entities to surface water.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	4	Minimal impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below diversion point. Diversion is from an existing water right.
Local Preference	4	No known opposition.

CRITERIA	RATING	EXPLANATION
Institutional Constraints	3	Minimal permitting challenges or opposition expected for future conversion infrastructure.
Development Timeline	5	Individual phases of project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	5	Sponsor has identified project and is in development.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

The SJRA GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

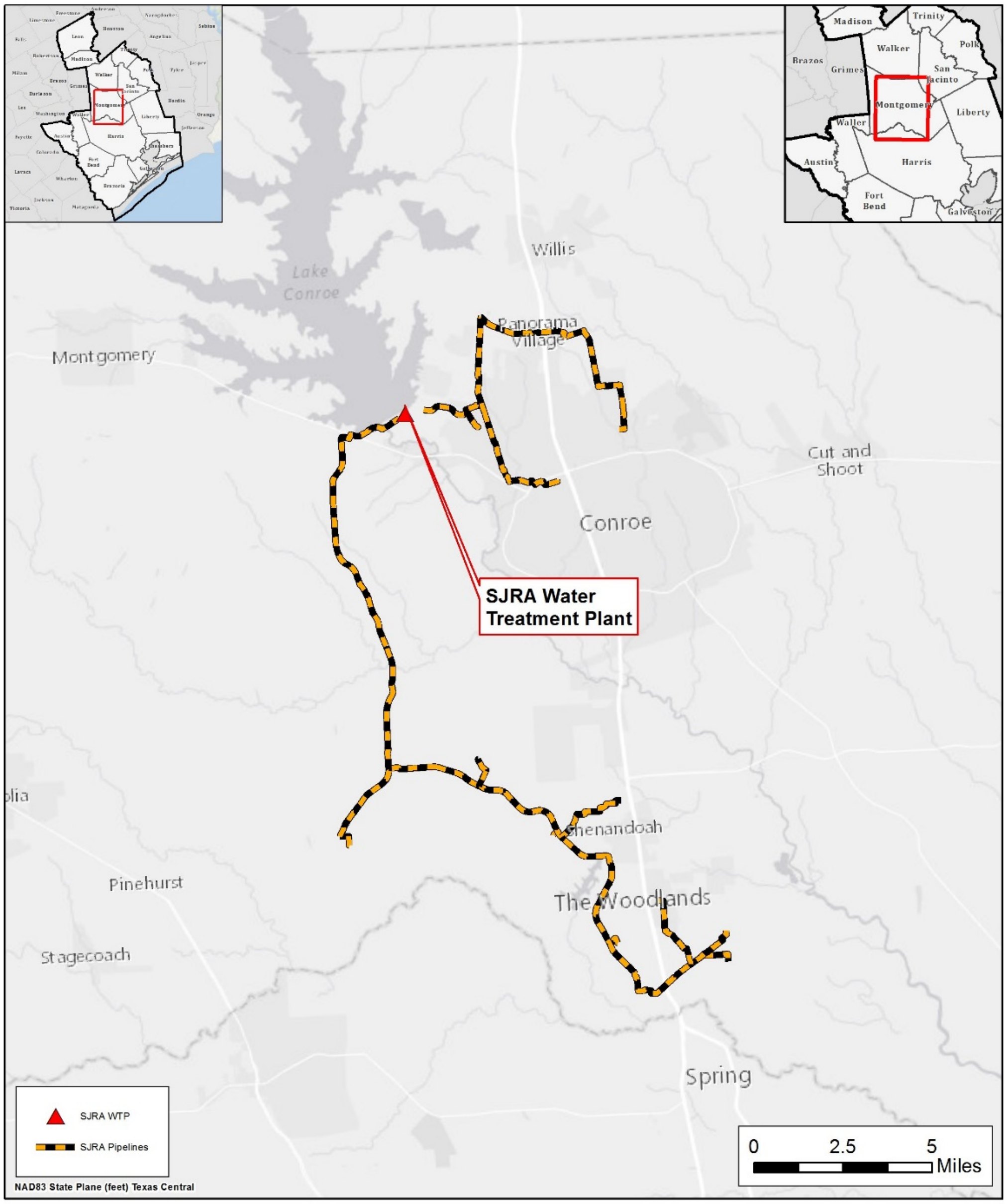
CRITERIA	WUG SUITABILITY
Proximity	Project is located in close proximity to intended points of use. Some major transmission infrastructure is required.
Size	Project is of appropriate size to meet LSGCD conversion requirements.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is moderate and decreases after completion of debt service.
Other Factors	This project allows large number of entities in Montgomery County to meet LSGCD requirements.

REFERENCES

Brown and Gay Engineers, Inc. *San Jacinto River Authority Joint Groundwater Reduction Plan*, prepared for SJRA, March 2011.

Lone Star Groundwater Conservation District. *District Regulatory Plan Phase II(B)*, November 2013.

LOCATION MAP



REGION H
Water Planning Group

San Jacinto River Authority
Groundwater Reduction Plan
Location Map

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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	West Harris County Regional Water Authority Groundwater Reduction Plan
Project ID:	GWRP-015
Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	91,896 ac-ft/yr (82.1 mgd)
Implementation Decade:	2020 (2024)
Development Timeline:	<10 years
Project Capital Cost:	Included under associated infrastructure projects
Unit Water Cost (Rounded):	Included under associated infrastructure projects

PROJECT DESCRIPTION

The Harris-Galveston Subsidence District (HGSD) and Fort Bend Subsidence District (FBSD) have established requirements for entities within their boundaries to limit groundwater pumpage to a specified percentage of total water use to address the issue of land surface subsidence caused by prolonged heavy pumping from the Gulf Coast Aquifer; as demands are expected to grow with time, the allowable percentage from groundwater is scheduled to decrease. In order to meet these requirements, the West Harris County Regional Water Authority (WHCRWA) has contracted with the City of Houston (COH) to receive treated surface water. The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH. In order to utilize sufficient supplies to meet future surface water conversion obligations, WHCRWA is participating in multiple infrastructure projects related to the treatment and distribution of surface water.

PROJECT ANALYSES

The project analyses for the WHCRWA Groundwater Reduction Plan (GRP) include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The Authority has already developed transmission and distribution infrastructure to its initial obligations for reducing groundwater demand and are receiving water from COH, which is reflected in the Regional Plan as an existing supply. In order to meet future water demands and regulatory conversion obligations, the Authority has continued development and implementation of its GRP program. WHCRWA is partnering with other Regional Water Authorities and COH in development of the Luce Bayou Interbasin Transfer Project to convey supplies from the Trinity River to Lake Houston, and is also a participant in the expansion of the treatment capacity of the COH Northeast Water Purification Plant (NEWPP). The Authority has also increased its supply reservation from these facilities from an original reservation of 28.25 mgd (31,640 ac-ft/yr) currently applied in the Regional Plan as existing supply to 110.3 mgd (123,536 ac-ft/yr). WHCRWA is partnering with North Fort Bend Water Authority (NFBWA) to develop a new shared transmission pipeline system, referred to by the sponsors as the Second Source Transmission Line, which will convey increased treated surface water supplies from the NEWPP; a portion of this shared transmission is anticipated to be active in 2021, with the remainder completed by 2024. WHCRWA is also developing an expansion of the infrastructure network through which it supplies its member districts, allowing for greater overall volume conveyed and conversion of additional districts to surface water.

Environmental Considerations

Any environmental impacts related to the GRP project are a factor of the associated source and infrastructure projects. Infrastructure development may result in some construction disturbance which could require mitigation. The most significant impact associated with the GRP is the source supply, which requires the interbasin transfer of surface water supplies.

Permitting and Development

The permitting and development requirements necessary for implementation of the WHCRWA GRP are associated with the source supply and infrastructure projects. WHCRWA is subject to contractual requirements established by COH as well as any relevant permitting required by the State of Texas and HGSD. Much of the permitting associated with implementation infrastructure, such as the Luce Bayou Interbasin Transfer Project and the NEWPP Expansion are primarily being addressed by COH.

Cost Analysis

The costs associated with developing this project are included under other infrastructure projects.

PROJECT EVALUATION

Based on the analysis provided above, the WHCRWA GRP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Cost for project are related to the infrastructure projects which allow physical implementation of the GRP.
Location	3	Source supply requires an interbasin transfer of surface water and extensive conveyance infrastructure.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Environmental impacts can be mitigated. Limited concerns.

CRITERIA	RATING	EXPLANATION
Environmental Flows	3	Project does not directly impact flows. Source projects will result in decreased instream flows downstream of diversion location in source basin.
Local Preference	4	Local support. Limited opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	4	Project to be developed within 10 years.
Sponsorship	5	Sponsors identified and project is in development.
Vulnerability	5	Minimal risk from natural and man-made disasters.
Impacts on Other Projects	3	No known significant impacts to other projects.

WATER USER GROUP APPLICATION

The WHCRWA GRP project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served. It is anticipated that the project will only serve WHCRWA, its wholesale customers, and GRP participants.

CRITERIA	WUG SUITABILITY
Proximity	Requires conveyance infrastructure from source basin pipelines to demand centers.
Size	Sized to convey the requisite amount of source water.
Water Quality	Treated water of quality appropriate for municipal use.
Unit Cost	Included under other infrastructure projects.
Other Factors	Reduces dependence on Gulf Coast Aquifer groundwater.

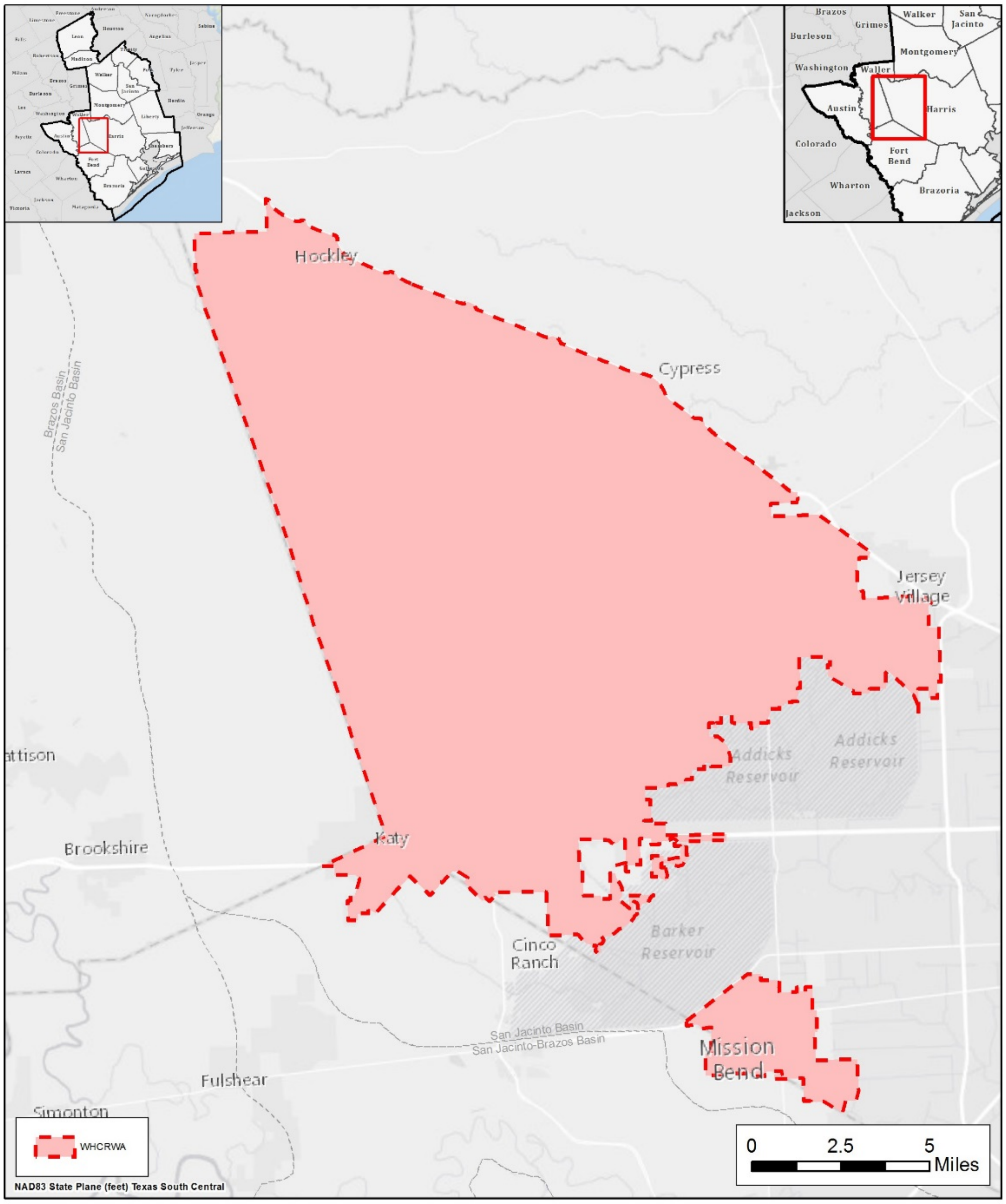
REFERENCES

Dannenbaum Engineering Corporation. *West Harris County Regional Water Authority Groundwater Reduction Plan*, prepared for WHCRWA, June 2014.

Fort Bend Subsidence District. *Fort Bend Subsidence District 2013 Regulatory Plan*, August 2013.

Harris-Galveston Subsidence District. *Harris-Galveston Subsidence District 2013 District Regulatory Plan*, May 2013.

LOCATION MAP



WHCRWA GRP
Location Map

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	City of Conroe Reuse
Project ID:	REUS-001
Project Type:	Reuse
Potential Supply Quantity (Rounded):	2,496 – 3,694 ac-ft/yr (2.2 – 3.3 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$0 (Sept. 2013)
Unit Water Cost (Rounded):	$0

PROJECT DESCRIPTION

The City of Conroe, which is located adjacent to Lake Conroe along the West Fork of the San Jacinto River, currently produces significant volumes of wastewater discharge originating from the City's self-supplied groundwater. The City, recognizing the potential for these discharges to serve as a potential source of new supply within the region, has filed a permit application with the Texas Commission on Environmental Quality (TCEQ) to use the bed and banks of the West Fork to convey these return flows for downstream use. This permit application is currently in the process of being evaluated by TCEQ. The City of Conroe has also contract to supply Porter SUD with 2 mgd of indirect reuse supply, contingent upon TCEQ approval of the supply right.

PROJECT ANALYSES

The project analyses for the City of Conroe Reuse project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Assessment of potential return flow supply was based on Regional Planning estimates of overall allowable groundwater pumpage for the City of Conroe. The City is a participant in the San Jacinto River Authority (SJRA) Joint Groundwater Reduction Plan (GRP) and is anticipated to convert from use of Gulf Coast Aquifer supplies to use of 60 percent alternate water supply by year 2016, with subsequent additional conversion to alternate supplies. The terms of the GRP contract specify that ownership of return flows generated from supplies provided by SJRA are held by SJRA rather than the surface water recipient. Therefore, the City of Conroe Reuse project is limited to effluent originating from Conroe's self-supplied groundwater. In addition to the City's self-supplied groundwater from the Gulf Coast Aquifer and alternate supply provided by SJRA, the City anticipates development of 5 mgd (5,600 ac-ft/yr) in alternate water supply from the Catahoula aquifer. Total potential return flows from the City were determined using projected water demands and applying a return flow rate of 45 percent based on observations of return flows in Region H and a 5 percent channel loss factor for delivery to end users. The portion of this supply available to the City was then estimated by applying a ratio of projected self-supplied groundwater to total water supply. Results of this analysis are summarized in *Table 1*.

Table 1 – City of Conroe Potential Reuse Summary

Reuse Availability	Flow Volume (ac-ft)					
	2020	2030	2040	2050	2060	2070
Water Demand	13,336	15,705	17,863	19,899	22,144	24,564
Total Return Flow	5,701	6,714	7,636	8,507	9,467	10,501
Projected Supply	18,979	21,348	23,506	25,542	27,787	30,008
Lake Conroe	10,669	12,564	14,290	15,919	17,715	19,452
Gulf Coast Aquifer	2,710	3,184	3,616	4,023	4,472	4,956
Catahoula Aquifer	5,600	5,600	5,600	5,600	5,600	5,600
Groundwater %	43.8%	41.1%	39.2%	37.7%	36.2%	35.2%
Potential City Reuse	2,496	2,763	2,994	3,205	3,432	3,694

Environmental Considerations

The diversion of the groundwater-based effluent source supply would be expected to have some degree of impact in terms of reduction of instream flows downstream of the diversion point for any portion of the source supply originating from current levels of return flow. A more detailed analysis of environmental impacts and legal constrains would be considered during the permit application and review process, which has been initiated.

Permitting and Development

Permitting efforts associated with development of the City of Conroe Reuse project are in progress. The City has applied for authorization to use the bed and banks of the West Fork of the Trinity River to convey reuse supplies for subsequent diversion downstream.

Cost Analysis

The costs associated with developing this project are included under the infrastructure development project or projects for points of use, including the Porter SUD Joint GRP.

PROJECT EVALUATION

Based on the analysis provided above, the City of Conroe Reuse project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	This project provides a raw water supply though permit that would rely upon other infrastructure to perfect it as a source of supply.
Location	4	Bed and banks conveyance to treatment facility required
Water Quality	3	The project takes advantage of existing discharges in the San Jacinto basin.
Environmental Land and Habitat	5	No impacts from permit project.
Environmental Flows	2	Diversion of discharges would create reduction in environmental flows.
Local Preference	3	No known opposition to the proposed project.
Institutional Constraints	4	Permit application in progress.
Development Timeline	5	Permit could be developed in a relatively short period of time.
Sponsorship	5	Sponsor is identified and committed to the project.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other project.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the project may be applied was evaluated based on the factors below. Currently, the only identified WUGs are those participating in a Joint Groundwater Reduction Plan with Porter SUD, which has contracted with the City of Conroe for 2 mgd of Conroe's groundwater-based wastewater discharge.

CRITERIA	WUG SUITABILITY
Proximity	Project diversion point located in close proximity to intended points of use.
Size	Overall project supply volume is appropriate to the conversion target demands identified by contract recipients.
Water Quality	This project provides a raw water source that may be used to meet demands through future treatment projects.
Unit Cost	The project is a low cost project although other infrastructure projects would be required to fully utilize its potential.

CRITERIA	WUG SUITABILITY
Other Factors	Implementation of supply from this project requires a bed-and-banks permit for downstream use, which is currently under review.

REFERENCES

Bleyl and Associates, *Porter Special Utility District, Chateau Woods Municipal Utility District, Crystal Springs Water Company Joint Groundwater Reduction Plan*, prepared for Porter SUD, March 2011.

Bleyl and Associates, *Porter SUD Joint GRP Amendment No. 1 Revised*, prepared for Porter SUD, July 2014.

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	City of Houston Reuse
Project ID:	REUS-002
Project Type:	Reuse
Potential Supply Quantity (Rounded):	Up to 256,285 ac-ft/yr (Up to 229 mgd)
Implementation Decade:	2040
Development Timeline:	5-10 years
Project Capital Cost:	$134,169,397 (Sept. 2013)
Unit Water Cost (Rounded):	$42-149 per ac-ft (during loan period) $9-27 per ac-ft (after loan period)

PROJECT DESCRIPTION

The City of Houston (COH) holds Water Right 5827 that allows the diversion and reuse of up to 580,923 ac-ft/yr in the San Jacinto River Basin or in the Trinity, Trinity-San Jacinto, and San Jacinto Brazos basins through interbasin transfer. This permit relates to 35 individual wastewater treatment plant (WWTP) discharges located on the Houston Ship Channel, Greens Bayou, Buffalo Bayou, Cole Creek, Berry Bayou, Keegans Bayou, Brickhouse Gully, White Oak Bayou, Evans Gull., and Lake Houston. In an effort to protect and maintain freshwater inflows to Galveston Bay, the permit limits diversion to 50% of the volume discharged on a daily basis form each wastewater treatment plant.

Although this permit was granted in 2011, COH has not yet implemented this permit through infrastructure development as alternative water supplies have been readily available. Currently, the permit is only used to account for diversions from Lake Houston. This project examines various alternatives for utilizing this water as a supply in the 2016 Region H RWP. Four major options for water supply development were considered in detail after a comprehensive review of the permit and potential demands:

1. Greens Bayou Diversion
2. East Water Purification Plant Reuse Supply Diversion
    a. 69th Street WWTP Diversion
    b. Sims Bayou North WWTP Diversion
3. Sale of Southwest WWTP Diversion

Option 1 provides for the diversion of water at the site of the Northeast WWTP from 10 different WWTPs as a source of water to the West Canal to supply industrial customers downstream as well as the EWPP. This diversion rate is as much as 41.6 MGD.

Option 2 is a blended, direct potable reuse alternative to provide water to the EWPP. Water from the 69th Street WWTP and/or the Sims Bayou WWTP diversion points, each of which receive flow from seven WWTPs upstream, may be conveyed through pipeline to the EWP where it would be blended with water from Lake Houston or the Trinity River basin before being treated for use as a potable supply. This potential diversion rates amount to 241.9 and 128.8 MGD from the 69th Street and Sims Bayou North WWTPs, respectively.

Finally, Option 3 allows for the Sale of the Southwest WWTP Diversion to another Wholesale Water Provider (WWP), Gulf Coast Water Authority (GCWA). Water would be diverted at the Southwest WWTP and conveyed in a pipeline through a corridor owned by CenterPoint Energy to the American Canal owned by GCWA where it could be provided to meet demands in northern Brazoria County or Galveston County where it may be used as raw water for industrial purposes or treated for municipal use. This diversion point is permitted for an instantaneous diversion rate of as much as 121.6 MGD.

Another alternative for the development of reclaimed water supplies utilizing flows captured in this permit is the development of a reclaimed water supply to industrial customers along the Houston Ship Channel originating from the 69th Street and Sims Bayou North and South WWTPs. This alternative has been studied in past RWPs and has not been included in this technical memorandum. For information on this project, please see the technical memorandum titled *Wastewater Reclamation for Industry.*

PROJECT ANALYSES

The project analyses for COH Reuse include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The potential supply available from each of the take points is limited by a number of different factors including:

- Discharge rate of upstream WWTPs as varying over the course of the planning horizon,
- Consideration for bay and estuary inflows as stipulated by WR 5827,
- The instantaneous diversion rate as specified by WR 5827 and infrastructure in place to capture flows,
- Instream flow requirements as specified by WR 5827, and
- Basin hydrology.

In order to evaluate these factors and their impacts on the options presented above, a model was developed based on existing data sources in order to predict availability over time. This model was used for the evaluation of water availability from all project options.

Naturalized flows from the Texas Commission on Environmental Quality (TCEQ) San Jacinto Basin Water Availability Model (WAM) were extracted to provide a basis for natural stream flows on a monthly basis for a historic period from January 1940 through December 1996. These flows represent naturalized conditions without diversions and discharges made following development of the basin. This data could be developed for all four of the proposed diversion points considered by Options 1 through 3. Daily streamflow data was investigated for each diversion point as a basis with which to disaggregate these monthly flow values into daily flow records. Only two points, the 69th Street and Southwest WWTP diversion points, were found to have nearby sources of daily streamflow records that provided an adequate data set for assessment. Daily records for the 69th Street Plant were used in the analysis of the Northeast and Sims Bayou North WWTP points to provide a pattern of daily flow variation although the monthly magnitude for both of these sites was taken from the unique WAM output for each site.

Flows from WWTPs associated with WR 5827 were identified for the year 2010 using information from Environmental Protection Agency (EPA) Discharge Monitoring Report (DMR) data. These discharges were compared against the discharges permitted in WR 5827 to determine the remaining capacity remaining in each plant. The COH population for the decades from 2010 through 2070 were used to scale the total wastewater flow from these WWTPs over time and the total increase in flow was apportioned to the individual WWTPs based on their remaining capacity in 2010. In that way, plants with larger shares of the remaining WWTP capacity were assumed to bear more of the burden as wastewater flows increased over time. These discharges for plants upstream of a diversion point could be added to the naturalized flows identified above to represent actual flow in the channels.

Finally, diversions were assumed to be limited by a number of factors including the maximum diversion rate at the identified diversion point, a limit of 50 percent of the upstream diversions to protect bay and estuary inflows, and the instream flow limits associated with each diversion point. Diversions of effluent from upstream were limited in such a way that diversions could not cause the downstream instream flow targets to not be met on any given day.

Output from the model provided the potential yield that could be developed from the various alternatives at each decade from 2010 through 2070 and also provided a distribution of daily diversion rates at each site over time for use in sizing pump station and pipeline infrastructure. The detailed model reports are provided as attachments to this memorandum. *Tables 1* and *2*, below, summarize the potential firm yield of each option and the required plant capacity to develop the supply, respectively.

Table 1 – Potential Firm Yield by Option (ac-ft/yr)

OPTION		2020	2030	2040	2050	2060	2070
1	Greens Bayou	3,131	3,972	5,049	6,379	8,245	10,629
2a	69th Street WWTP	107,813	112,601	117,313	122,029	126,855	131,823
2b	Sims Bayou North WWTP	23,383	29,674	35,865	42,061	48,412	55,015
3	Southwest WWTP	44,853	47,630	50,363	53,099	55,902	58,818
TOTAL		**179,180**	**193,877**	**208,590**	**223,568**	**239,414**	**256,285**

Table 2 – Required Pump Station Capacity by Option (MGD)[1]

OPTION		2020	2030	2040	2050	2060	2070
1	Greens Bayou Diversion	15	15	15	15	20	20
2a	69th Street WWTP	100	105	110	110	115	120
2b	Sims Bayou North WWTP	25	30	35	40	45	50
3	Southwest Diversion	40	45	45	50	50	55

[1] In 5 MGD increments.

Environmental Considerations

The majority of the infrastructure required for development of the COH Reuse options would be constructed in developed areas. For instance, Options 2a and 2b both involve construction in industrial areas along the Ship Channel and are not likely to significantly impact habitat. Option 1 has the greatest potential to impact undeveloped areas although the majority of this conveyance is to be constructed within existing right-of-way. *Table 3* lists the threatened and endangered species of Harris and Fort Bend Counties as well as other species of concern.

Table 3 – Threatened and Endangered Species of Harris and Fort Bend Counties

AMPHIBIANS		FEDERAL STATUS	STATE STATUS
Houston toad	*Anaxyrus houstonensis*	LE	E

BIRDS		FEDERAL STATUS	STATE STATUS
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	
Attwater's Greater Prairie-Chicken	*Tympanuchus cupido attwateri*	LE	E
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Black Rail	*Laterallus jamaicensis*		
Brown Pelican	*Pelecanus occidentalis*	DL	
Henslow's Sparrow	*Ammodramus henslowii*		
Interior Least Tern	*Sterna antillarum athalassos*	LE	E
Mountain Plover	*Charadrius montanus*		
Peregrine Falcon	*Falco peregrinus*	DL	T
Red-cockaded Woodpecker	*Picoides borealis*	LE	E
Snowy Plover	*Charadrius alexandrinus*		
Southeastern Snowy Plover	*Charadrius alexandrinus tenuirostris*		
Sprague's Pipit	*Anthus spragueii*	C	
Western Burrowing Owl	*Athene cunicularia hypugaea*		
White-faced Ibis	*Plegadis chihi*		T
White-tailed Hawk	*Buteo albicaudatus*		T

BIRDS		FEDERAL STATUS	STATE STATUS
Whooping Crane	*Grus americana*	LE	E
Wood Stork	*Mycteria americana*		T

FISHES		FEDERAL STATUS	STATE STATUS
American eel	*Anguilla rostrata*		
Creek chubsucker	*Erimyzon oblongus*		T
Smalltooth sawfish	*Pristis pectinata*	LE	E
Sharpnose shiner	*Notropis oxyrhynchus*	C	

MAMMALS		FEDERAL STATUS	STATE STATUS
Louisiana black bear	*Ursus americanus luteolus*	LT	T
Plains spotted skunk	*Spilogale putorius interrupta*		
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*		T
Red wolf	*Canis rufus*	LE	E
Southeastern myotis bat	*Myotis austroriparius*		

MOLLUSKS		FEDERAL STATUS	STATE STATUS
False spike mussel	*Quadrula mitchelli*		T
Little spectaclecase	*Villosa lienosa*		
Louisiana pigtoe	*Pleurobema riddellii*		T
Sand pocketbook	*Lampsilis satura*		T
Smooth pimpleback	*Quadrula houstonensis*	C	T
Texas fawnsfoot	*Truncilla macrodon*	C	T
Texas pigtoe	*Fusconaia askewi*		T
Wabash pigtoe	*Fusconaia flava*		

REPTILES		FEDERAL STATUS	STATE STATUS
Alligator snapping turtle	*Macrochelys temminckii*		T
Green sea turtle	*Chelonia mydas*	LT	T
Gulf Saltmarsh snake	*Nerodia clarkia*		
Kemp's Ridley sea turtle	*Lepidochelys kempii*	LE	E

REPTILES		FEDERAL STATUS	STATE STATUS
Leatherback sea turtle	*Dermochelys coriacea*	LE	E
Loggerhead sea turtle	*Caretta caretta*	LT	T
Smooth green snake	*Liochlorophis vernalis*		T
Texas horned lizard	*Phrynosoma cornutum*		T

PLANTS		FEDERAL STATUS	STATE STATUS
Coastal gay-feather	*Liatris bracteata*		
Florida ladies-tresses	*Spiranthes brevilabris var. floridana*		
Giant sharpstem umbrella-sedge	*Cyperus cephalanthus*		
Houston daisy	*Rayjacksonia aurea*		
Neglected coneflower	*Echinacea paradoxa var. neglecta*		
Panicled indigobush	*Amorpha paniculata*		
Texas ladies'-tresses	*Spiranthes brevilabris var. brevilabris*		
Texas meadow-rue	*Thalictrum texanum*		
Texas prairie dawn	*Hymenoxys texana*	LE	E
Texas windmill-grass	*Chloris texensis*		
Threeflower broomweed	*Thurovia triflora*		

LE, LT - Federally Listed Endangered/Threatened; SAE, SAT - Federally Listed Endangered/Threatened by Similarity of Appearance; C - Federal Candidate for Listing; DL, PDL - Federally Delisted/Proposed for Delisting; NL - Not Federally Listed; E, T - State Listed Endangered/Threatened; "blank" - Rare, but with no regulatory listing status.

Permitting and Development

The existing WR 5827 provides for the discharge, conveyance, and diversion of effluent throughout the COH service area. However, the use of this water may require additional permitting depending upon use. Of particular concerns are options that will make use of reclaimed water for potable uses through blending with alternative supplies. This approach to water management is an emerging source of supply and projects will require some consideration of how to safely and effectively incorporate these projects into existing water portfolios.

Based on a preliminary desktop review, the following environmental permits and permitting activities are likely to apply:

- U.S. Army Corps of Engineers (USACE) Section 404 Permit – All proposed pipeline rights-of-way (ROW), temporary workspace, and access road locations should be delineated for waters of the U.S., including wetlands. The proposed pipeline construction would likely be permitted under Nationwide Permit (NWP) 12-Utility Line Activities either with or without a Pre-construction Notification (PCN) to the USACE depending on the amount of impacts to waters of the U.S. The proposed pipeline that would cross the Houston Ship Channel would require a PCN and a Section 10 permit since the Houston Ship Channel is considered a navigable water of the U.S. by the USACE.
- Texas Historical Commission (THC) Coordination - Projects sponsored by public entities that affect a cumulative area greater than five acres or that disturb more than 5,000 cubic yards

require advance consultation with the Texas Antiquities Committee according to Section 191.0525 (d) of the Antiquities Code of Texas. Because the proposed project may exceed these thresholds, coordination with the THC would be required. The THC may determine that archeological and/or historical surveys are needed.

- Threatened and Endangered Species – All proposed pipeline ROW, temporary workspace, and access road locations should be surveyed for potential threatened and endangered species habitat. If preferred habitat for threatened or endangered species is present, presence/absence surveys for the species would be required.

The construction of pipelines would likely require a Stormwater Pollution Prevention Plan (SWPPP) and a TCEQ Construction General Permit (TXR 150000).

Cost Analysis

Costs were developed for Options 1 through 3 using default costing methods for regional plan development. Detailed estimates are attached to this memorandum and are summarized in *Table 4*, below. Costs were developed based on basic costing guidelines as outlined by TWDB guidance. Costs for Options, 1, 2a, 2b, and 3 are shown In *Tables 5* through *8*, respectively.

At this time, it is assumed that flows diverted from the channel will not require additional treatment before being blended with other raw water sources and treated to potable standards.

Table 4 – Project Cost Summary

OPTION		PROJECT COST	POTENTIAL FIRM YIELD (ac-ft/yr)	AVERAGE UNIT COST ($/ac-ft)
1	Greens Bayou	$3,829,372	10,629	$149
2a	69th Street WWTP	$44,566,895	131,823	$42
2b	Sims Bayou North WWTP	$29,724,882	55,015	$95
3	Southwest WWTP	$56,048,248	58,818	$123
TOTAL		**$134,169,397**	**256,285**	

Table 5 – Option 1 Project Cost Summary

OPINION OF PROBABLE CONSTRUCTION COST					January 7, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$2,248,965	$2,248,965
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$773,727	$773,727
3	LAND AND EASEMENTS	1	LS	$409,545	$409,545
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$334,972	$334,972
5	INTEREST DURING CONSTRUCTION	1	LS	$62,163	$62,163
	PROJECT CAPITAL COST				$3,829,372

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$320,439	$320,439	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$52,201	$52,201	$52,201	$52,201
3	PUMPING ENERGY COSTS	$0	$0	$94,066	$94,066	$94,066	$94,066
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$466,706	$466,706	$146,267	$146,267

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$466,706	$466,706	$146,267	$146,267
2	YIELD	-	-	5,049	6,379	8,245	10,629
3	UNIT COST	$0	$0	$92	$73	$18	$14
	TOTAL UNIT COST						$40

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$1,980,756	$1,980,756
2	PIPELINES	1	LS	$201,439	$201,439
3	PIPELINE CROSSINGS	1	LS	$66,771	$66,771
	PROJECT COST				$2,248,965

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$1,980,756	$49,519
2	PIPELINES	10	%	$201,439	$2,014
3	PIPELINE CROSSINGS	10	%	$66,771	$668
	ANNUAL OPERATION AND MAINTENANCE COST				$52,201

Table 6 – Option 2a Project Cost Summary

OPINION OF PROBABLE CONSTRUCTION COST					January 7, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$30,672,351	$30,672,351
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$9,398,050	$9,398,050
3	LAND AND EASEMENTS	1	LS	$2,640,606	$2,640,606
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$474,413	$474,413
5	INTEREST DURING CONSTRUCTION	1	LS	$1,381,475	$1,381,475
	PROJECT CAPITAL COST				$44,566,895

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$3,729,328	$3,729,328	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$365,627	$365,627	$365,627	$365,627
3	PUMPING ENERGY COSTS	$0	$0	$854,233	$854,233	$854,233	$854,233
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$4,949,188	$4,949,188	$1,219,860	$1,219,860

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$4,949,188	$4,949,188	$1,219,860	$1,219,860
2	YIELD	-	-	117,313	122,029	126,855	131,823
3	UNIT COST	$0	$0	$42	$41	$10	$9
	TOTAL UNIT COST						$25

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$3,926,887	$3,926,887
2	PIPELINES	1	LS	$24,575,556	$24,575,556
3	PIPELINE CROSSINGS	1	LS	$2,169,908	$2,169,908
	PROJECT COST				$30,672,351

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$3,926,887	$98,172
2	PIPELINES	10	%	$24,575,556	$245,756
3	PIPELINE CROSSINGS	10	%	$2,169,908	$21,699
	ANNUAL OPERATION AND MAINTENANCE COST				$365,627

Table 7 – Option 2b Project Cost Summary

OPINION OF PROBABLE CONSTRUCTION COST					January 7, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$19,650,364	$19,650,364
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$6,223,226	$6,223,226
3	LAND AND EASEMENTS	1	LS	$2,466,364	$2,466,364
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$463,523	$463,523
5	INTEREST DURING CONSTRUCTION	1	LS	$921,406	$921,406
	PROJECT CAPITAL COST				$29,724,882

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$2,487,358	$2,487,358	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$294,939	$294,939	$294,939	$294,939
3	PUMPING ENERGY COSTS	$0	$0	$615,542	$615,542	$615,542	$615,542
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$3,397,839	$3,397,839	$910,480	$910,480

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$3,397,839	$3,397,839	$910,480	$910,480
2	YIELD	-	-	35,865	42,061	48,412	55,015
3	UNIT COST	$0	$0	$95	$81	$19	$17
	TOTAL UNIT COST						$48

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$6,562,344	$6,562,344
2	PIPELINES	1	LS	$10,791,677	$10,791,677
3	PIPELINE CROSSINGS	1	LS	$2,296,343	$2,296,343
	PROJECT COST				$19,650,364

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$6,562,344	$164,059
2	PIPELINES	10	%	$10,791,677	$107,917
3	PIPELINE CROSSINGS	10	%	$2,296,343	$22,963
	ANNUAL OPERATION AND MAINTENANCE COST				$294,939

Table 8 – Option 3 Project Cost Summary

OPINION OF PROBABLE CONSTRUCTION COST					January 7, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$35,912,133	$35,912,133
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$11,200,171	$11,200,171
3	LAND AND EASEMENTS	1	LS	$7,039,345	$7,039,345
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$571,477	$571,477
5	INTEREST DURING CONSTRUCTION	1	LS	$1,325,120	$1,325,120
	PROJECT CAPITAL COST				$56,048,248

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$4,690,080	$4,690,080	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$485,468	$485,468	$485,468	$485,468
3	PUMPING ENERGY COSTS	$0	$0	$1,004,738	$1,004,738	$1,004,738	$1,004,738
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$6,180,286	$6,180,286	$1,490,206	$1,490,206

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$6,180,286	$6,180,286	$1,490,206	$1,490,206
2	YIELD	-	-	50,363	53,099	55,902	58,818
3	UNIT COST	$0	$0	$123	$116	$27	$25
	TOTAL UNIT COST						$70

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$8,423,129	$8,423,129
2	PIPELINES	1	LS	$19,516,863	$19,516,863
3	PIPELINE CROSSINGS	1	LS	$7,864,642	$7,864,642
4	OTHER	1	LS	$107,500	$107,500
	PROJECT COST				$35,912,133

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$8,423,129	$210,578
2	PIPELINES	10	%	$19,516,863	$195,169
3	PIPELINE CROSSINGS	10	%	$7,864,642	$78,646
4	OTHER	10	%	$107,500	$1,075
	ANNUAL OPERATION AND MAINTENANCE COST				$485,468

PROJECT EVALUATION

Based on the analysis provided above, the COH Reuse project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	The project is very economical compared to alternative raw water supply projects.
Location	4	Water supplies are already permitted for use in the identified basins of need. Infrastructure is required to convey water to demand centers.
Water Quality	3	The project takes advantage of existing and planned discharges in the Houston area.
Environmental Land and Habitat	4	Majority of projects are to be constructed in already-developed areas or existing rights-of-way.
Environmental Flows	2	Projects will reduce the level of flows returned to streams to a level planned for during permitting process.
Local Preference	4	Support for reuse and water-efficient projects in the area.
Institutional Constraints	3	Property acquisition required for project development.
Development Timeline	4	Larger alternatives may take approximately 10 years to implement although others may be developed much sooner.
Sponsorship	4	City of Houston is committed to reuse as a long-term project.
Vulnerability	4	Potential impacts from water quality events upstream and the opportunity for damage to critical infrastructure.
Impacts on Other Projects	2	This project competes with water that may be utilized by the Wastewater Reclamation for Manufacturing Use project.

WATER USER GROUP APPLICATION

The COH Reuse project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Use of the identified reclaimed source is generally limited to the permitted diversion points. However, use of existing and proposed infrastructure may make the supply available for use by COH and its customers. In addition, GCWA may also benefit from the supply identified as Option 4.
Size	The concentration of reclaimed supplies through bed and banks transfer makes it possible to develop this project to fairly significant volumes of

CRITERIA	WUG SUITABILITY
	water commensurate with the demands projected for COH and its service area.
Water Quality	The reclaimed water source will provide raw water which may be treated and used for meeting any potential need. Treatment will be considered under a separate project.
Unit Cost	The unit cost for the project varies based on capacity and the specifics of each option. However, the identified unit costs of water are very economical compared to other long-term raw water options.
Other Factors	This project requires the use of reclaimed water blended with other sources as a potable drinking water supply. This is an emerging practice and may take some time to be fully adopted.

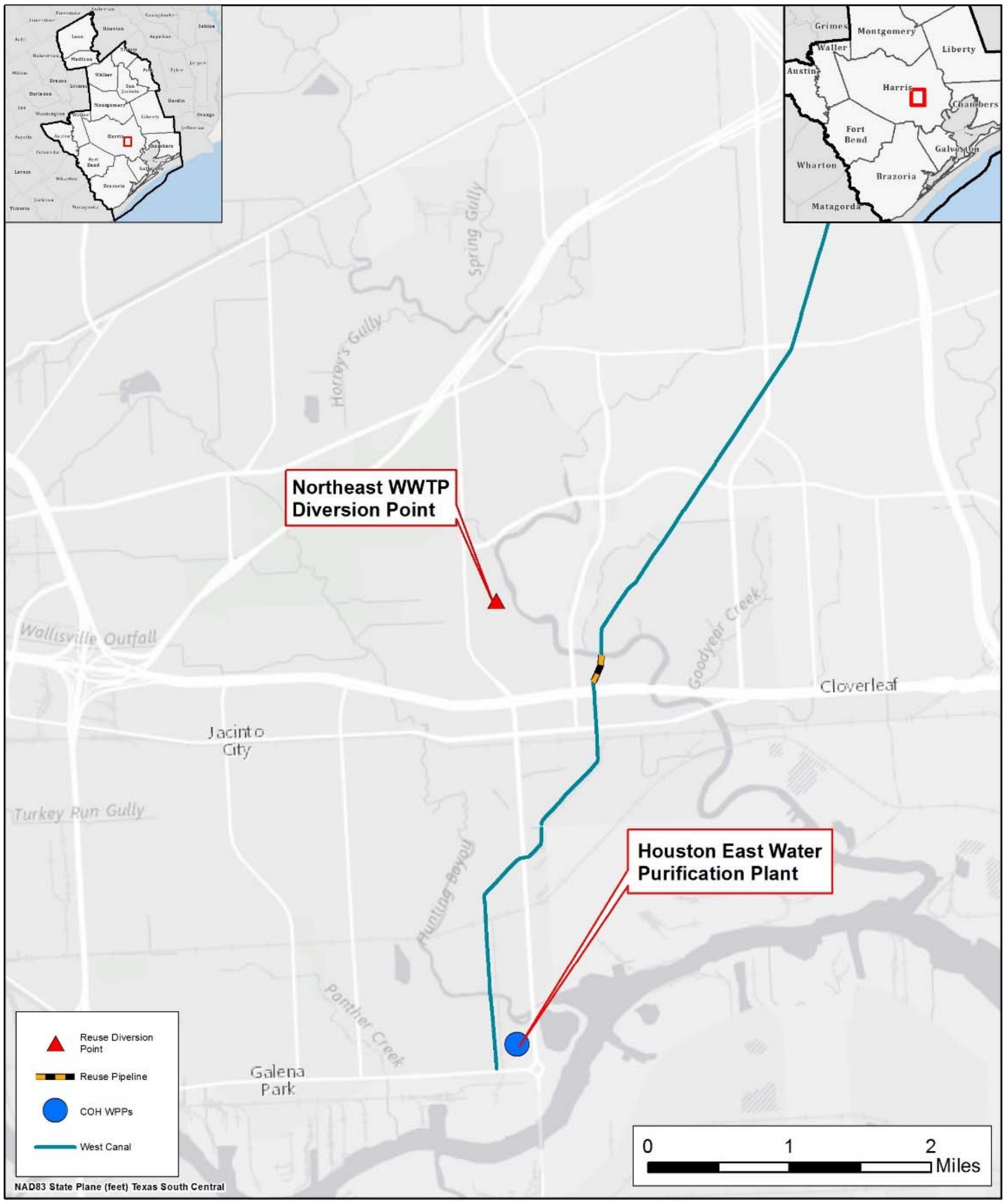
REFERENCES

Texas Commission on Environmental Quality Water Right Permit Number 5827, May 2011.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Fort Bend, Accessed January 9, 2014.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Harris, Accessed January 9, 2014.

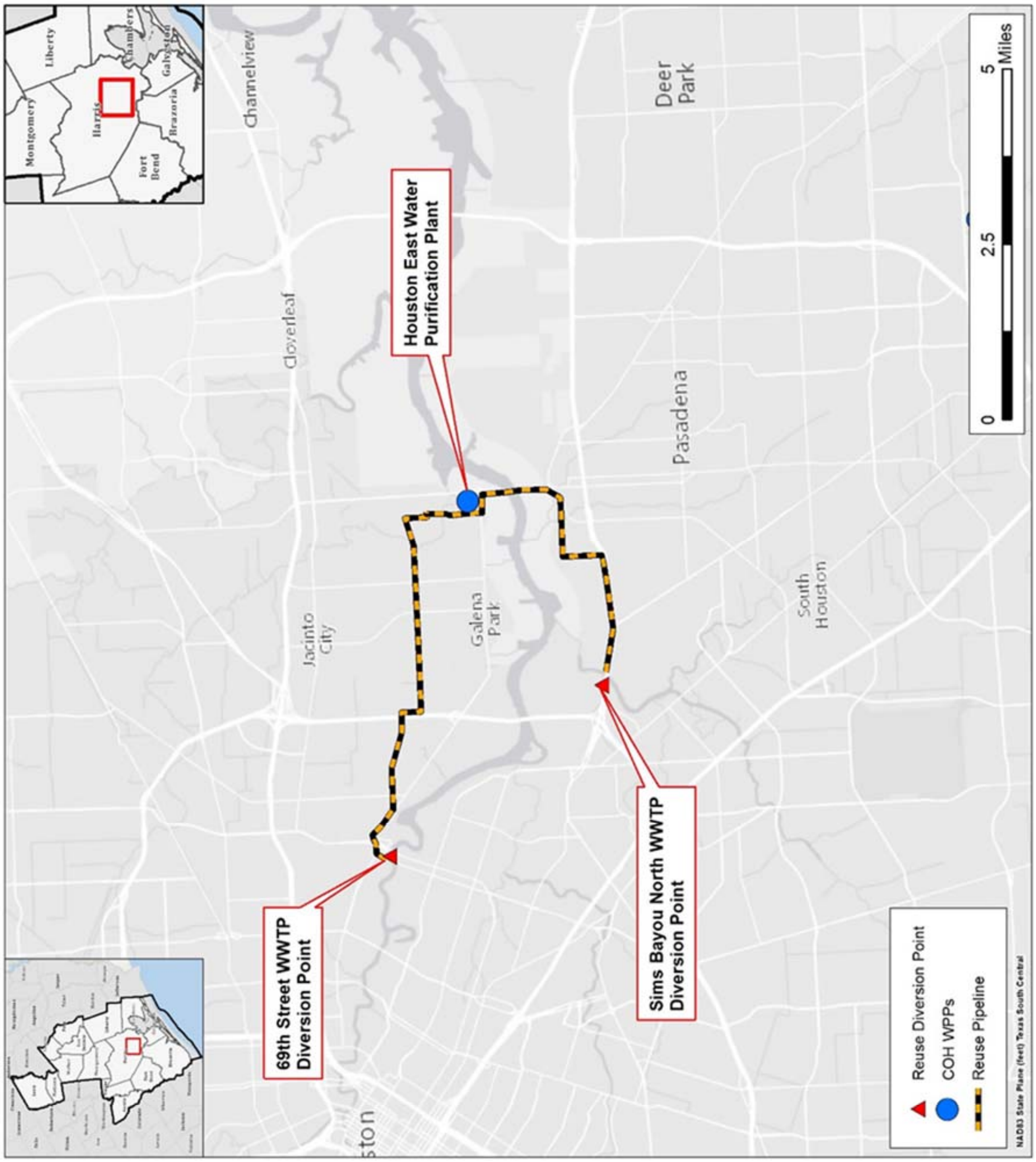
LOCATION MAP – OPTION 1



Houston Reuse Option 1
Location Map

REGION H
Water Planning Group

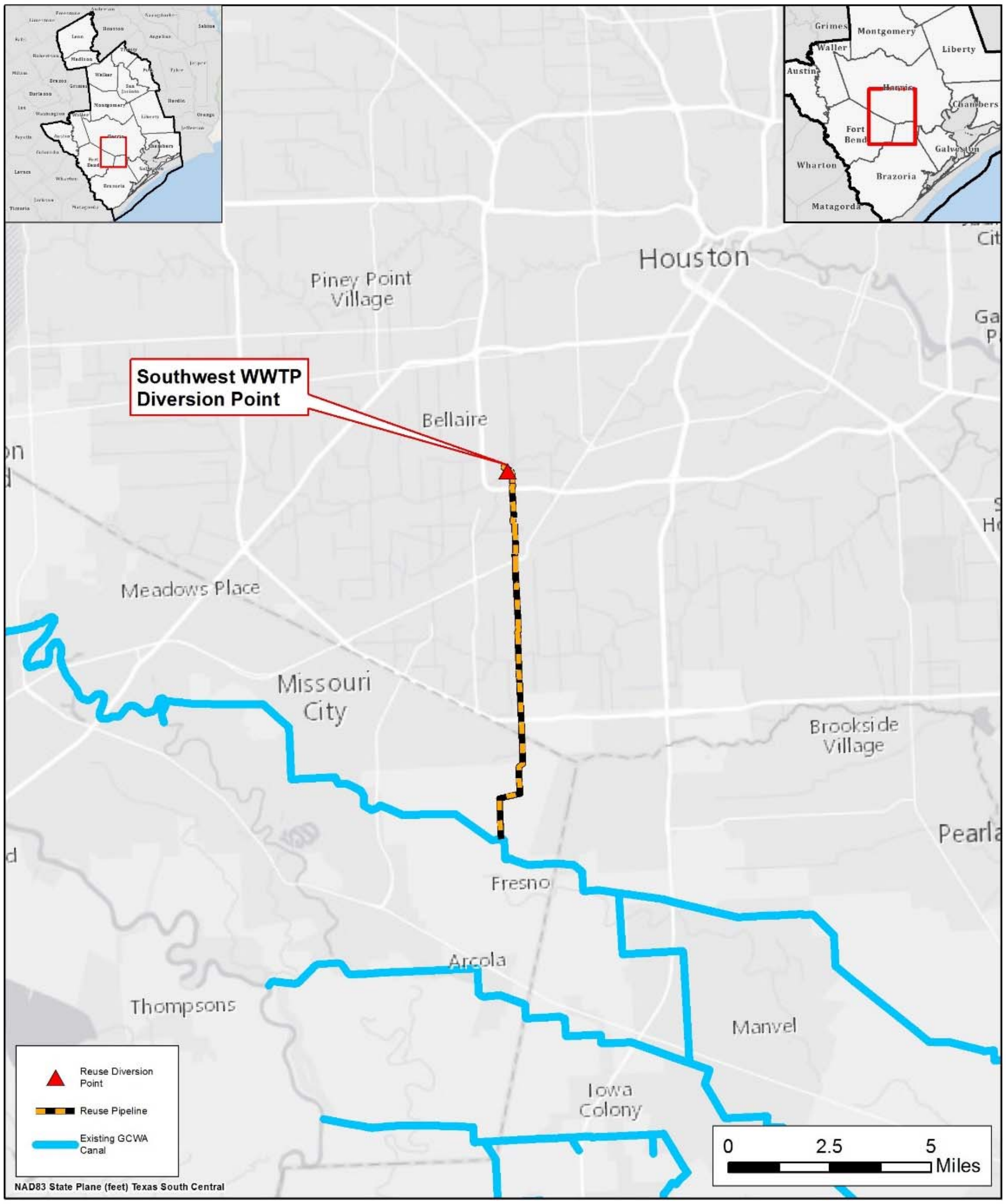
LOCATION MAP – OPTION 2



REGION H Water Planning Group

Houston Reuse Option 2 Location Map

LOCATION MAP – OPTION 3



Houston Reuse Option 3 Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	City of Pearland Reuse
Project ID:	REUS-003
Project Type:	Reuse
Potential Supply Quantity (Rounded):	314 - 1,154 ac-ft/yr (0.25 - 1 mgd)
Implementation Decade:	2020
Development Timeline:	<5 years
Project Capital Cost:	$5,895,808 (Sept. 2013)
Unit Water Cost (Rounded):	$517 per ac-ft (during loan period) $90 per ac-ft (after loan period)

PROJECT DESCRIPTION

To plan for future growth and reduce dependence on groundwater, the City of Pearland has identified opportunities to meet irrigation and other demands through effluent reuse from its existing wastewater treatment facilities. The City has initiated development of a reuse project for industrial supply which will be active by 2016 and anticipates development of additional reuse for irrigation by Year 2020.

PROJECT ANALYSES

The project analyses for the City of Pearland Reuse project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The City of Pearland has five wastewater treatment plants (WWTPs) which are capable of producing Type 1 effluent for reuse. Type 1 indicates a high quality effluent treated to acceptable standards for application where contact with the public is likely. Pearland plans to utilize a portion of this effluent for municipal irrigation at two locations by year 2020; one site will use approximately 0.25 MGD (280 ac-ft/yr) while the other smaller location will receive 0.03 MGD (34 ac-ft/yr). The City of Pearland anticipates increasing this amount in subsequent decades. While Pearland has not yet established a target volume for this expanded reuse, for purposes of the Regional Plan it was assumed that at a minimum it would be possible to for Pearland to supply three additional irrigation locations with 280 ac-ft of reuse supply each. Considered in context of the City of Pearland's projected year 2020 water demand of 16,530 ac-ft, this is intended to serve as a conservative estimate and it is possible that Pearland could elect to utilize reuse in excess of this amount.

Environmental Considerations

The direct reuse of the effluent source supply would be expected to have some degree of impact in terms of reduction of instream flows downstream of the WWTP discharge point for any portion of the source supply originating from current levels of return flow. Any reuse from the portion of return flow generated from future demand growth would not be expected to create additional instream flow reductions, as this portion of potential supply is not yet generated or discharged.

Permitting and Development

The source WWTP facilities for the project already generate effluent treated to the required standards for the intended use and therefore limited permitting effort is anticipated. Some minor permitting effort may be required as part of transmission infrastructure development.

Cost Analysis

A detailed estimate of project cost is not available for the project at this time. A preliminary planning estimate of project cost was developed using standard cost estimate procedures for Region H. It was assumed for this estimate that 314 ac-ft of supply would be developed for year 2020, with infrastructure limited to three miles of 6-inch pipeline. Future reuse expansion was estimated with three additional reuse areas, each requiring three miles of 6-inch pipe. It was assumed for both phases that all construction could be accommodated in existing easements. Costs presented in *Table 1*, including debt service and costs for operations and maintenance, were calculated using standard cost estimation procedures for Region H.

Table 1 – City of Pearland Reuse Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					December 17, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$3,989,349	$3,989,349
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$1,338,694	$1,338,694
3	LAND AND EASEMENTS	1	LS	$42,504	$42,504
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$342,504	$342,504
5	INTEREST DURING CONSTRUCTION	1	LS	$182,757	$182,757
	PROJECT CAPITAL COST				$5,895,808

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$128,845	$493,357	$364,512	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$20,615	$82,460	$82,460	$82,460	$82,460	$82,460
3	PUMPING ENERGY COSTS	$5,291	$21,165	$21,165	$21,165	$21,165	$21,165
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$154,751	$596,982	$468,137	$103,625	$103,625	$103,625

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$154,751	$596,982	$468,137	$103,625	$103,625	$103,625
2	YIELD	314	1,154	1,154	1,154	1,154	1,154
3	UNIT COST	$493	$517	$406	$90	$90	$90
	TOTAL UNIT COST						$252

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$2,837,784	$2,837,784
2	PIPELINES	1	LS	$1,151,565	$1,151,565
	PROJECT COST				$3,989,349

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$2,837,784	$70,945
2	PIPELINES	1.0	%	$1,151,565	$11,516
	ANNUAL OPERATION AND MAINTENANCE COST				$82,460

PROJECT EVALUATION

Based on the analysis provided above, the City of Pearland Reuse project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	3	Costs are moderate during debt service and are reduced considerably after completion of debt service.
Location	4	Source located near points of demand with some conveyance infrastructure required.
Water Quality	3	No known issues regarding water quality.
Environmental Land and Habitat	4	Minimal impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below WWTPs.
Local Preference	4	No known opposition.
Institutional Constraints	5	Minimal or no permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	4	Sponsor is identified and committed to project.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the project may be applied was evaluated based on the criteria below. This information was considered in context of the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the applicability of the project to the WUGs served. It is anticipated that the project will only serve the City of Pearland and any entities that it provides with water supply.

CRITERIA	WUG SUITABILITY
Proximity	Project is located in close proximity to intended points of use, with some limited conveyance infrastructure required.
Size	Project begins with a relatively small volume but is anticipated to expand with time.
Water Quality	This WWTPs which would provide the effluent supply for this project are able to produce high quality Type 1 effluent.

CRITERIA	WUG SUITABILITY
Unit Cost	The cost of this project is moderately high and decreases substantially after completion of debt service.
Other Factors	This project reduces groundwater dependence.

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	GCWA Reclaimed Water from COH
Project ID:	REUS-004
Project Type:	Reuse
Potential Supply Quantity (Rounded):	Up to 56,896 ac-ft/yr (Up to 50.8 mgd)
Implementation Decade:	2020 (2018)
Development Timeline:	3 years
Project Capital Cost:	$56,379,232 for Direct Intake Option $73,584,559 (Sept. 2013) for Combined Intake Option
Unit Water Cost (Rounded):	$151 - $187 per ac-ft (during loan period) $43 - $47 per ac-ft (after loan period)

PROJECT DESCRIPTION

In 2004, the City of Houston (COH) applied for a water right permit to utilize the effluent from 32 wastewater treatment plants (WWTPs) in the greater-Houston area. This permit, number 5827, allows for the use of 580,923 ac-ft of water at various locations around Houston assuming several criteria are met:

- 50% of the permitted volume is to be dedicated to bay and estuary inflows and is to be retained in the channels for discharge to Galveston Bay,
- Permitted discharge and diversion rates at WWTP outfall locations and diversion points are maintained, and
- Instream flow targets are met for the diversion of any water from the bayous.

Of the potential diversion points associated with this permit, the Southwest WWTP (SWWWTP) provides a unique opportunity to provide supply outside of the immediate COH service area by way of a right-of-way owned by CenterPoint Energy that runs from the vicinity of the SWWWTP south to a point in the area of McHard Road and Farm to Market 521. This terminus is also near the Gulf Coast Water Authority (GCWA) American Canal which provides water to customers in Brazoria and Galveston Counties. Please see *Location Map* for an overview of these locations.

The SWWWTP is identified in Permit 5827 as both a source of effluent and a diversion point for use of treated water discharged upstream and conveyed through the bed and banks of Brays Bayou. Four additional WWTPs (Beltway, Keegans Bayou, Upper Brays, and WCID 111 WWTPs) lie upstream of the SWWWTP and their effluent is made available at the SWWWTP through Permit 5827. For that reason and for the opportunity presented by the existing CenterPoint corridor, the SWWWTP presents a prime opportunity for water supply development for GCWA's long-term water needs.

PROJECT ANALYSES

The project analyses for GCWA Reclaimed Water from COH include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

In order to evaluate these factors and their impacts on the options presented above, a model was developed based on existing data sources in order to predict availability over time. Plant discharge records from the SWWWTP were reviewed to determine the potential yield that could be diverted directly from the plant. This supply would be limited by the overall terms of the permit related to bay and estuary inflows but not the instream flow requirements associated with diversions form Brays Bayou.

Naturalized flows from the Texas Commission on Environmental Quality (TCEQ) San Jacinto Basin Water Availability Model (WAM) were extracted to provide a basis for natural stream flows on a monthly basis for a historic period from January 1940 through December 1996. These flows represent naturalized conditions without diversions and discharges made following development of the basin. Daily streamflow data was investigated as a basis with which to disaggregate these monthly flow values into daily flow records. The Southwest WWTP diversion point, was found to have nearby sources of daily streamflow records that provided an adequate data set for assessment.

Flows from WWTPs associated with WR 5827 were identified for the year 2010 using information from Environmental Protection Agency (EPA) Discharge Monitoring Report (DMR) data. These discharges were compared against the discharges permitted in WR 5827 to determine the remaining capacity remaining in each plant. The COH population for the decades from 2010 through 2070 were used to scale the total wastewater flow from these WWTPs over time and the total increase in flow was apportioned to the individual WWTPs based on their remaining capacity in 2010. In that way, plants with larger shares of the remaining WWTP capacity were assumed to bear more of the burden as wastewater flows increased over time. These discharges for plants upstream of a diversion point could be added to the naturalized flows identified above to represent actual flow in the channels.

Finally, diversions were assumed to be limited by a number of factors including the maximum diversion rate at the identified diversion point, a limit of 50 percent of the upstream diversions to protect bay and estuary inflows, and the instream flow limits associated with each diversion point. Diversions of effluent from upstream were limited in such a way that diversions could not cause the downstream instream flow targets to not be met on any given day.

Output from the model provided the potential yield that could be developed from two scenarios. One alternative diverted effluent directly from the SWWWTP and was not subject to instream flow requirements associated with the bed and banks transfer of Permit 5827. The other alternative utilized a combined intake configuration that would divert flow from Brays Bayou when those diversions were allowed under permit and revert to direct diversions from the SWWWTP when conditions prevented the use of this water. These options were identified as the Direct and Combined Intake Alternatives, respectively.

Environmental Considerations

A preliminary environmental review of the project was conducted to identify possible obstacles to project development. Based on a review of the United States Fish and Wildlife Service (USFWS) Online Endangered Species list, five species may be present in the vicinity of the project area. These include the whooping crane (*Grus americana*), Texas prairie dawn-flower (*Hymenoxys texana*), West Indian Manatee (*Trichechus manatus*), Least tern (*Sterna antillarum*), and Piping Plover (*Charadrius melodus*). Care would be required in development of the project to protect these resources during construction and operation.

Three water bodies (Brays Bayou, Sims Bayou, and Clear Creek) were identified as waters of the United States (US) and would be regulated by the US Army Corps of Engineers (USACE) and this determination may possibly apply to others, smaller water sources within the scope of the project as well as numerous wetlands identified in the proposed corridor.

Projects sponsored by public entities that affect a cumulative area greater than five acres or that disturb more than 5,000 cubic yards require advance consultation with the Texas Historical Commission (THC) according to Section 191.0525 (d) of the Antiquities Code of Texas. Because the proposed project may exceed these thresholds, coordination with THC is likely required.

Proposed project activities at the project site would all occur within Floodways and Zone X and Zone AE of existing floodplains (Flood Insurance Rate Map {FIRM} 48201C1005L and 48201C0865L). Activities within these areas may require a permit from or coordination with the local floodplain administrator and must comply with applicable FEMA-approved state or local floodway and floodplain requirements.

Permitting and Development

Water rights permitting for this project has already been accomplished for the development of permit number 5827, meaning additional permitting will not be required for diversion. Guidance pertaining to the regulation of blending reclaimed effluent in raw water canals as proposed in this project are not specific and may require additional permitting steps in order to accomplish.

Construction of an intake in Brays Bayou as well as the various crossings identified may be covered under Nationwide Permit (NWP) 12. A determination will be required in order to assess the need for a pre-construction notification (PCN) for activities related to the conveyance system. Furthermore, the named streams may also be State owned riverbeds, which may also require an easement form the General Land Office (GLO) prior to proceeding with construction.

Cost Analysis

Costs were developed for both the combined intake and direct intake alternatives, although the combined intake alternative was used for the description of this project in the 2016 RWP. The combined and direct intake alternative costs are shown in *Tables 1* and *2*, respectively.

Table 1 – GCWA Reclaimed Water from COH Cost Estimate (Combined Intake)

OPINION OF PROBABLE CONSTRUCTION COST					November 30, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$45,245,000	$45,245,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$14,426,600	$14,426,600
3	LAND AND EASEMENTS	1	LS	$5,816,000	$5,816,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$5,816,000	$5,816,000
5	INTEREST DURING CONSTRUCTION	1	LS	$2,280,959	$2,280,959
	PROJECT CAPITAL COST				$73,584,559

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2010	2020	2030	2040	2050	2060
1	DEBT SERVICE	$0	$6,157,507	$6,157,507	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$1,751,961	$1,751,961	$1,751,961	$1,751,961	$1,751,961
3	PUMPING ENERGY COSTS	$0	$681,871	$681,871	$681,871	$681,871	$681,871
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$8,591,339	$8,591,339	$2,433,832	$2,433,832	$2,433,832

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2010	2020	2030	2040	2050	2060
1	ANNUAL COST	$0	$8,591,339	$8,591,339	$2,433,832	$2,433,832	$2,433,832
2	YIELD	-	56,896	56,896	56,896	56,896	56,896
3	UNIT COST	$0	$151	$151	$43	$43	$43
	TOTAL UNIT COST						$86

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$11,506,000	$11,506,000
2	PIPELINES	1	LS	$28,183,000	$28,183,000
3	WASTEWATER RECLAMATION PLANTS	1	LS	$5,556,000	$5,556,000
	PROJECT COST				$45,245,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$11,506,000	$287,650
2	PIPELINES	1.0	%	$28,183,000	$281,830
3	WASTEWATER RECLAMATION PLANTS	1.0	LS	$1,182,481	$1,182,481
	ANNUAL OPERATION AND MAINTENANCE COST				$1,751,961

Table 2 – GCWA Reclaimed Water from COH Cost Estimate (Direct Intake)

OPINION OF PROBABLE CONSTRUCTION COST					November 30, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$33,602,000	$33,602,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$10,503,600	$10,503,600
3	LAND AND EASEMENTS	1	LS	$5,263,000	$5,263,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$5,263,000	$5,263,000
5	INTEREST DURING CONSTRUCTION	1	LS	$1,747,632	$1,747,632
	PROJECT CAPITAL COST				$56,379,232

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2010	2020	2030	2040	2050	2060
1	DEBT SERVICE	$0	$4,717,776	$4,717,776	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$1,072,770	$1,072,770	$1,072,770	$1,072,770	$1,072,770
3	PUMPING ENERGY COSTS	$0	$500,082	$500,082	$500,082	$500,082	$500,082
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$6,290,628	$6,290,628	$1,572,852	$1,572,852	$1,572,852

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2010	2020	2030	2040	2050	2060
1	ANNUAL COST	$0	$6,290,628	$6,290,628	$1,572,852	$1,572,852	$1,572,852
2	YIELD	-	33,712	33,712	33,712	33,712	33,712
3	UNIT COST	$0	$187	$187	$47	$47	$47
	TOTAL UNIT COST						$103

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$4,854,000	$4,854,000
2	PIPELINES	1	LS	$25,142,000	$25,142,000
3	WASTEWATER RECLAMATION PLANTS	1	LS	$3,606,000	$3,606,000
	PROJECT COST				$33,602,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$4,854,000	$121,350
2	PIPELINES	1.0	%	$25,142,000	$251,420
3	WASTEWATER RECLAMATION PLANTS	1.0	LS	$700,000	$700,000
	ANNUAL OPERATION AND MAINTENANCE COST				$1,072,770

PROJECT EVALUATION

Based on the analysis provided above, the GCWA Reclaimed Water from COH project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	The project is very economical compared to alternative raw water supply projects.
Location	4	Water is already permitted for use in adjoining basin. Conveyance required.
Water Quality	3	The project takes advantage of existing and planned discharges in the Houston area. Water quality in receiving canal systems is currently under investigation.
Environmental Land and Habitat	4	Project is primarily developed in existing corridors.
Environmental Flows	2	Project will reduce the level of flows returned to streams to a level planned for during permitting process.
Local Preference	4	Project is supported by local stakeholders.
Institutional Constraints	4	Activities already under way to acquire access to right-of-way for pipeline corridor.
Development Timeline	5	Project may be implemented in less than five years.
Sponsorship	5	GCWA is currently developing the project.
Vulnerability	4	Potential impacts from water quality events upstream (combined intake alternative) and the opportunity for damage to critical infrastructure.
Impacts on Other Projects	2	This project competed with other projects that may utilize water from permit 5827.

WATER USER GROUP APPLICATION

The GCWA Reclaimed Water from COH project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

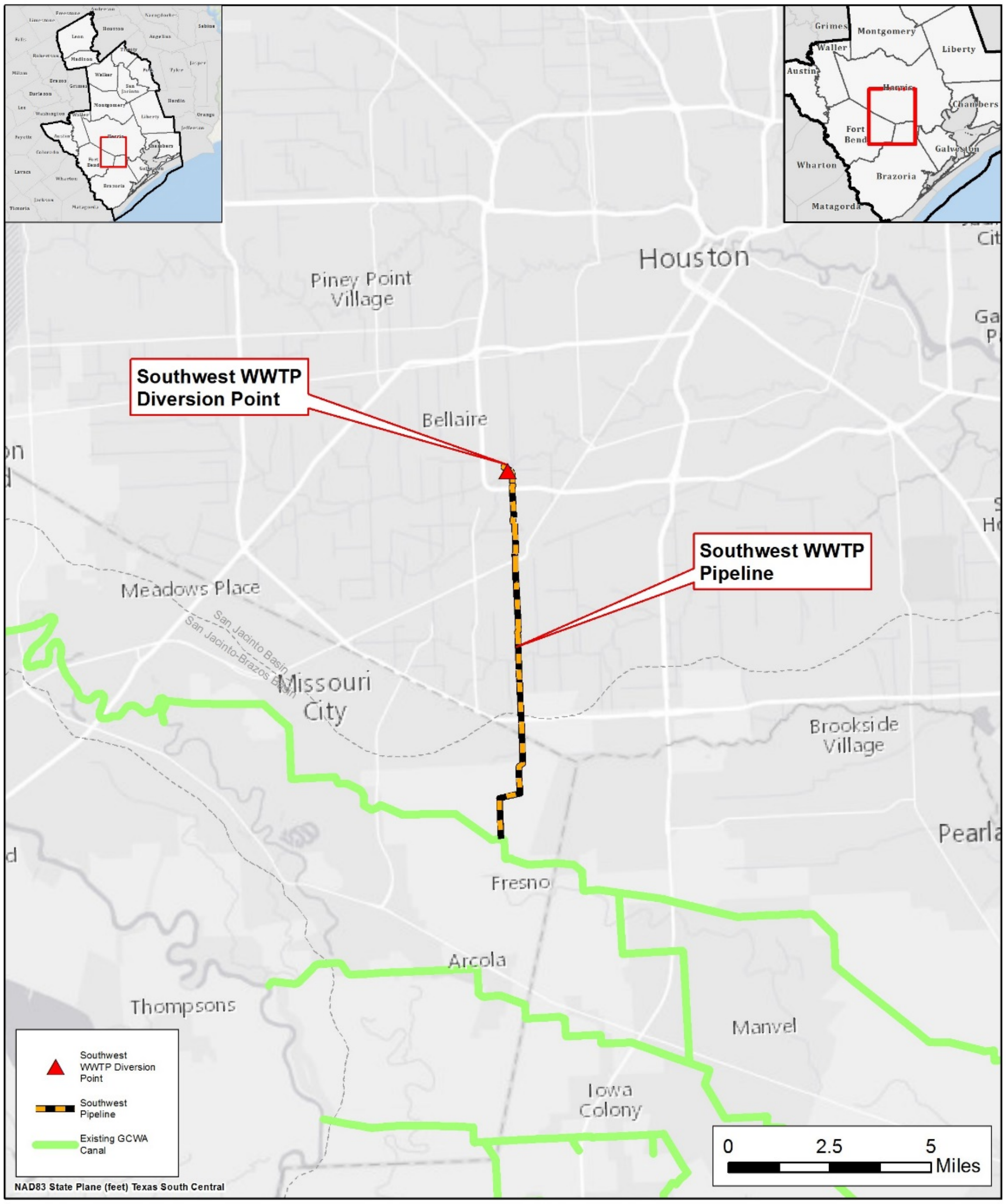
CRITERIA	WUG SUITABILITY
Proximity	The project connects a point source of supply to the existing GCW canal system where the water may be used to meet needs within the GCWA service area in Brazoria and Galveston Counties.

CRITERIA	WUG SUITABILITY
Size	The configuration of this project provides a large volume of water that may be used to serve a variety of needs of different magnitudes throughout the GCWA service area.
Water Quality	The reclaimed water source will provide raw water which may be treated and used for meeting any potential need. Treatment will be considered under a separate project.
Unit Cost	The identified unit costs of water are very economical compared to other long-term raw water options.
Other Factors	Water from this project will be utilized by most GCWA customers due to the configuration of the canal system which will blend these supplies with other waters.

REFERENCES

Freese and Nichols, Inc., *Long Range Water Supply Study – Detailed Evaluation of Selected Strategies*, Prepared for Gulf Coast Water Authority, September 2014.

LOCATION MAP



GCWA Reclaimed Water From Houston Location Map

Texas

REGION H Water Planning Group

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Grand Lakes Reclaimed Water System
Project ID:	REUS-005
Project Type:	Reuse
Potential Supply Quantity (Rounded):	661 ac-ft/yr (0.59 mgd)
Implementation Decade:	2020 (2017)
Development Timeline:	3 years
Project Capital Cost:	$13,148,843 (Sept. 2013)
Unit Water Cost (Rounded):	$2,276 per ac-ft (during loan period) $612 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Grand Lakes Reclaimed Water System will treat the effluent from the Grand Lakes Regional Wastewater Treatment Plant to Type I Standards and distribute the water throughout Grand Lakes MUDs 1, 2 and 4 for irrigation of green spaces and to maintain levels in the amenity lakes throughout the MUDs.

PROJECT ANALYSES

The project analyses for the Grand Lakes Reclaimed Water System project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The Grand Lakes Municipal Utility Districts rely on the North Fort Bend Water Authority (NFBWA) for all surface water, and wells for their groundwater. This project will create a new supply of water for irrigation and to maintain amenity lake water surface elevations. The project facilities will produce effluent of Type 1 quality. This system will supply 0.59 million gallons of water per day through approximately 52,000 linear feet of purple pipe.

Environmental Considerations

The diversion of the effluent source supply would be expected to have some degree of impact in terms of reduction of instream flows downstream of plant facilities for any portion of the source supply originating from current levels of return flow. Any reuse from the portion of return flow generated from future demand growth would not be expected to create additional instream flow reductions, as this portion of potential supply is not yet generated or discharged.

Permitting and Development

Use of reclaimed wastewater effluent requires approval and permitting by the TCEQ under the requirements of 30 TAC §210. TCEQ classifies reclaimed water as Type 1 (higher quality for use where public contact is likely) or Type 2 (for uses with limited risk of human contact). Due to the potential for human contact, supplies for this project would have to be treated to Type 1 quality standards. If approved for use, the reclaimed water would have to be sampled and analyzed a minimum of twice per week.

Cost Analysis

Capital and engineering and contingency costs for costs for wastewater treatment and distribution infrastructure were provided by NFBWA. Costs for land acquisition, environmental studies, and mitigation were not identified as separate components and for purposes of the Regional Water Plan are assumed included in the total capital cost. Costs for interest during construction and annualized costs (debt service, operations and maintenance, and energy) were estimated using standard Regional Planning costing reference data. Estimated costs are presented in *Table 1*.

Table 1 – Grand Lakes Reuse Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					February 18, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$8,000,000	$8,000,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$3,328,000	$3,328,000
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$540,843	$540,843
6	GRAND LAKES REIMBURSEMENT	1	LS	$1,280,000	$1,280,000
	PROJECT CAPITAL COST				$13,148,843

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$1,100,286	$1,100,286	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$394,856	$394,856	$394,856	$394,856	$394,856	$394,856
3	PUMPING ENERGY COSTS	$9,370	$9,370	$9,370	$9,370	$9,370	$9,370
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$1,504,512	$1,504,512	$404,226	$404,226	$404,226	$404,226

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$1,504,512	$1,504,512	$404,226	$404,226	$404,226	$404,226
2	YIELD	661	661	661	661	661	661
3	UNIT COST	$2,276	$2,276	$612	$612	$612	$612
	TOTAL UNIT COST						$1,166

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$6,000,000	$6,000,000
2	WASTEWATER RECLAMATION PLANTS	1	LS	$2,000,000	$2,000,000
	PROJECT COST				$8,000,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$6,000,000	$60,000
2	WASTEWATER RECLAMATION PLANTS	1.0	LS	$334,856	$334,856
	ANNUAL OPERATION AND MAINTENANCE COST				$394,856

PROJECT EVALUATION

Based on the analysis provided above, the Grand Lakes Reclaimed Water System project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	Cost is high but decreases after completion of debt service.

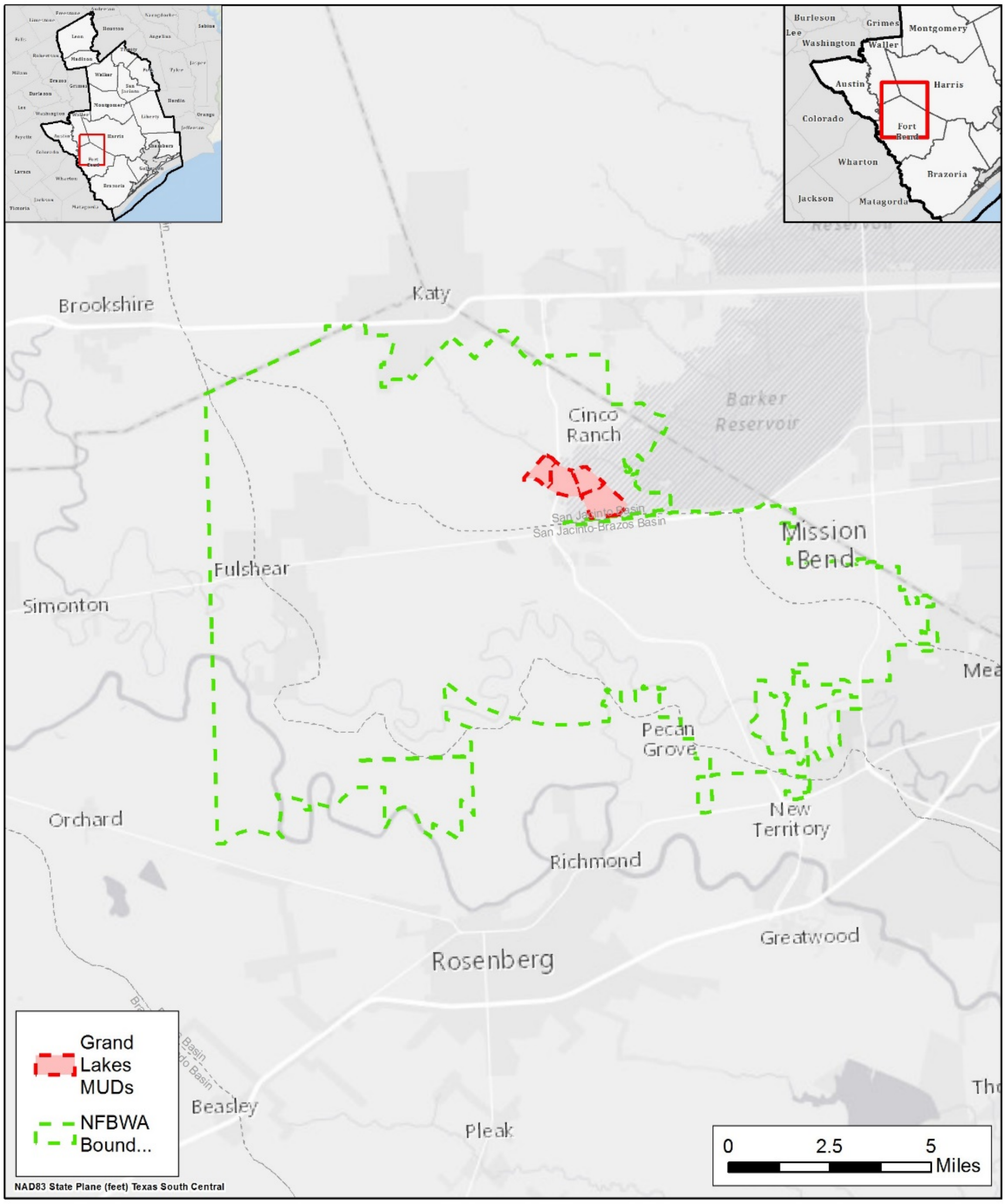
CRITERIA	RATING	EXPLANATION
Location	4	Some transmission infrastructure required.
Water Quality	3	The project is expected to produce Type 1 effluent suitable for the intended use.
Environmental Land and Habitat	4	Minimal impacts anticipated.
Environmental Flows	2	Diversion of discharges would create reduction in environmental flows.
Local Preference	3	No known opposition to the proposed project.
Institutional Constraints	3	Permit expected with minimal problems.
Development Timeline	5	Permit could be developed in a relatively short period of time.
Sponsorship	4	Sponsors identified and committed to project.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other project.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the project may be applied was evaluated based on the factors below. Currently, the only identified WUG is NFBWA, which includes Grand Lakes MUDs 1, 2 and 4.

CRITERIA	WUG SUITABILITY
Proximity	Project diversion point located in close proximity to intended points of use.
Size	Overall project supply volume is appropriate to the intended use.
Water Quality	The project is expected to produce Type 1 effluent suitable for the intended use.
Unit Cost	Cost is high but decreases after completion of debt service.
Other Factors	Implementation of supply from this project requires permitting through TCEQ.

LOCATION MAP



REGION H Water Planning Group

Grand Lakes Reclaimed Water Location Map

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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Montgomery County MUDs #8 and #9 Reuse
Project ID:	REUS-006
Project Type:	Reuse
Potential Supply Quantity (Rounded):	1,680 ac-ft/yr (1.5 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$15,351,774 (Sept. 2013)
Unit Water Cost (Rounded):	$1,360 per ac-ft (during loan period) $595 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Lone Star Groundwater Conservation District (LSGCD), in order to protect the groundwater resources of Montgomery County, has enacted requirements for entities identified as Large Volume Groundwater Users (LVGUs) to reduce their production of groundwater from the Gulf Coast Aquifer to 70 percent of their Year 2009 permitted groundwater authorization. In order to meet this requirement, Montgomery County Municipal Utility Districts (MUDS) #8 and #9 have undertaken various measures, including production of groundwater from the Catahoula Aquifer and development of water treatment infrastructure to treat supplies from the Catahoula Aquifer and other supplies. As part of their efforts to convert to alternative supply sources, the MUDs have applied to the Texas Commission on Environmental Quality (TCEQ) for a bed-and-banks permit for conveyance of their own effluent as well as contracted effluent supplies purchased from the City of Huntsville.

PROJECT ANALYSES

The project analyses for the Montgomery County MUDs #8 and #9 Reuse project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Montgomery County MUDs #8 and #9 have entered into a contract with the City of Huntsville for up to 2 mgd (2,240 ac-ft/yr) of effluent produced by Huntsville and conveyed to the MUDs through the West Fork of the San Jacinto River and Lake Conroe; additionally, the MUDs are pursuing indirect reuse of a portion of their own wastewater discharges less amounts credited to other entities through agreements. The MUDs have applied to TCEQ for a bed-and-banks permit to convey these supplies to the point of diversion. Supply availability estimated for Regional Planning purposes is summarized in *Table 1*. The calculations reflected in the table assume a return flow factor of 45 percent and 26 percent commitment of MD effluent to others. There are no losses associated with the City of

Huntsville supply, as the amount contracted is specified with respect to the point of diversion rather than discharge.

Table 1 – Montgomery County MUDs #8 and #9 Potential Reuse Summary

Reuse Availability	Flow Volume (ac-ft)					
	2020	2030	2040	2050	2060	2070
MUD Water Demand	952	982	1,090	1,205	1,327	1,590
Total MUD Return Flow	428	442	491	542	597	716
MUD Return Share	326	336	373	412	454	544
Contract Effluent	2,240	2,240	2,240	2,240	2,240	2,240
Potential Reuse	**2,566**	**2,576**	**2,613**	**2,652**	**2,694**	**2,784**

The Joint Groundwater Reduction Plan (GRP) for the MUDs includes proposed development of treatment facilities, including a treatment train for water diverted at Lake Conroe with an initial capacity of 1 mgd with potential for future expansion to 1.5 mgd (1,680 ac-ft/yr). For purposes of the Regional Plan, it was assumed that the maximum supply volume applied for the project would be equal to this 1,680 ac-ft/yr capacity.

Environmental Considerations

The diversion of the effluent source supply would be expected to have some degree of impact in terms of reduction of instream flows downstream of the diversion point for any portion of the source supply originating from current levels of return flow. A more detailed analysis of environmental impacts and legal constrains would be considered during the permit application and review process, which has been initiated. Any impacts would be anticipated to occur from reuse of effluent generated from current levels of discharge; diversion of the portion attributable to future growth would not be expected to cause additional impact. It should also be noted that the proposed diversions would occur upstream of the monitoring points for Senate Bill 3 environmental flow standards and could potentially be subject to associated restrictions.

Permitting and Development

Permitting efforts associated with development of the Montgomery County MUDs #8 and #9 Reuse project are in progress. The City has applied for authorization to use the bed and banks of Lake Conroe to convey reuse supplies for subsequent diversion.

Cost Analysis

The estimated costs for the project are presented in *Table 2*. The values presented in the table were developed from standard Regional Planning costing reference data and assume construction of a small pump station with intake, a short pipeline, and a conventional treatment facility. The costs presented in this memorandum do not include the purchase cost of water.

Table 2 – Montgomery County MUDs #8 and #9 Reuse Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					April 10, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$10,919,354	$10,919,354
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$3,809,768	$3,809,768
3	LAND AND EASEMENTS	1	LS	$10,614	$10,614
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$136,167	$136,167
5	INTEREST DURING CONSTRUCTION	1	LS	$475,871	$475,871
	PROJECT CAPITAL COST				$15,351,774

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$1,284,626	$1,284,626	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$973,035	$973,035	$973,035	$973,035	$973,035	$973,035
3	PUMPING ENERGY COSTS	$26,456	$26,456	$26,456	$26,456	$26,456	$26,456
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$2,284,117	$2,284,117	$999,491	$999,491	$999,491	$999,491

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$2,284,117	$2,284,117	$999,491	$999,491	$999,491	$999,491
2	YIELD	1,680	1,680	1,680	1,680	1,680	1,680
3	UNIT COST	$1,360	$1,360	$595	$595	$595	$595
	TOTAL UNIT COST						$850

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$1,297,201	$1,297,201
2	PIPELINES	1	LS	$240,111	$240,111
3	WATER TREATMENT PLANTS	1	LS	$9,382,042	$9,382,042
	PROJECT COST				$10,919,354

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$1,297,201	$32,430
2	PIPELINES	1.0	%	$240,111	$2,401
3	WATER TREATMENT PLANTS	1.0	LS	$938,204	$938,204
	ANNUAL OPERATION AND MAINTENANCE COST				$973,035

PROJECT EVALUATION

Based on the analysis provided above, the Montgomery County MUDs #8 and #9 Reuse project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	This project provides water at a high cost, particularly during debt service, but generates treated rather than raw supply.
Location	4	Bed and banks conveyance to treatment facility required
Water Quality	3	The project takes advantage of existing and future discharges in the San Jacinto basin.
Environmental Land and Habitat	4	Majority of projects are to be constructed in already-developed areas or existing rights-of-way.
Environmental Flows	2	Diversion of discharges would create reduction in environmental flows.
Local Preference	3	Limited opposition to project.
Institutional Constraints	4	Permit application in progress.
Development Timeline	5	Permit could be developed in a relatively short period of time.
Sponsorship	4	Sponsors are identified and have initiated permitting efforts.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the project may be applied was evaluated based on the factors below. Currently, the only identified WUGs are Montgomery County MUDs #8 and #9.

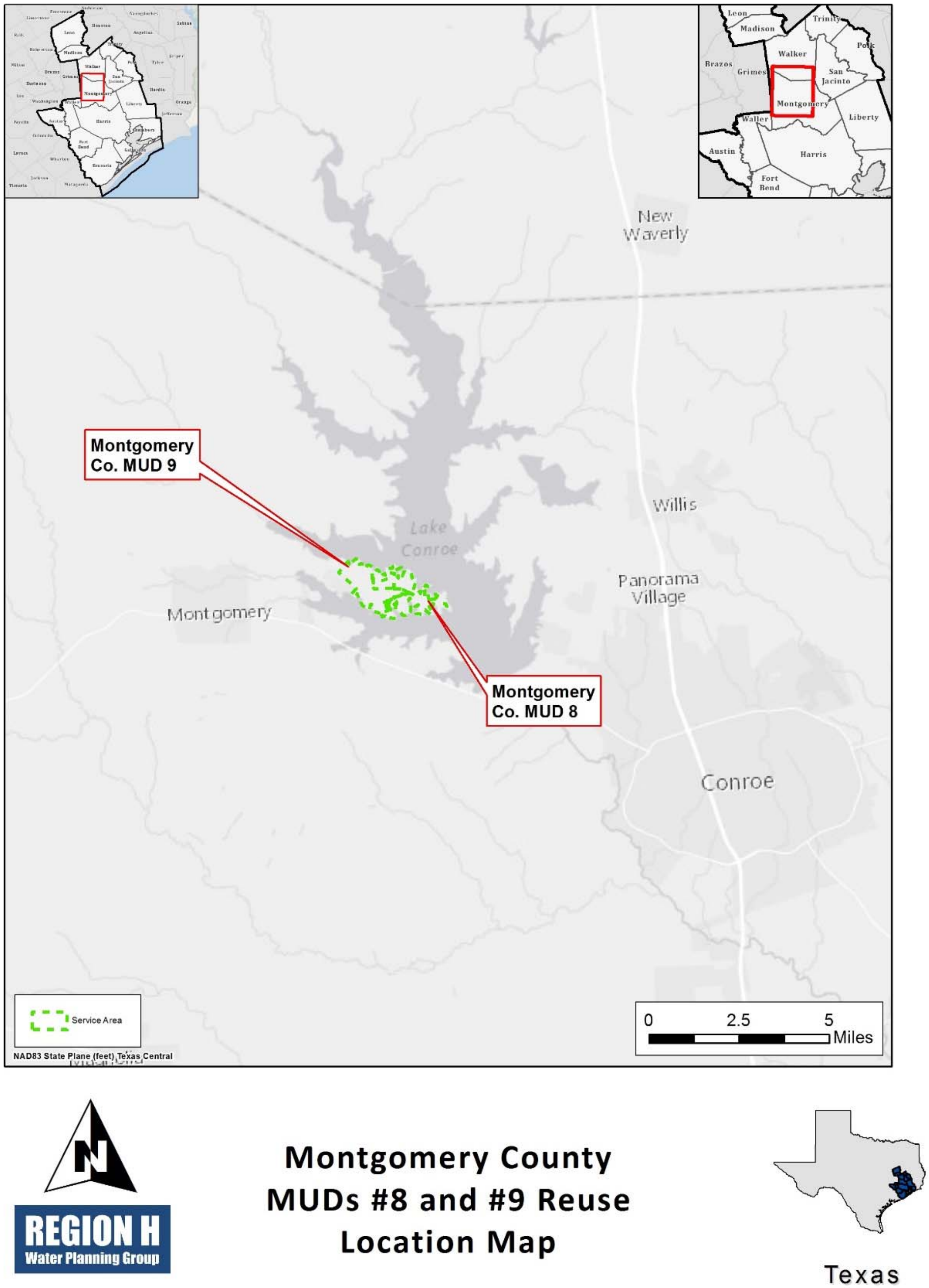
CRITERIA	WUG SUITABILITY
Proximity	Project diversion point located in close proximity to intended points of use.
Size	Overall project supply volume is appropriate to the conversion target demands identified by contract recipients.
Water Quality	This project provides a treated water supply to meet municipal demands.
Unit Cost	This project provides water at a high cost, particularly during debt service, but generates treated rather than raw supply.
Other Factors	Implementation of supply from this project requires a bed-and-banks permit for downstream use, which is currently under review.

REFERENCES

NRS Consulting Engineers, Inc., *Joint Groundwater Reduction Plan, Montgomery County Municipal Utility District No. 8 and Montgomery County Municipal Utility District No. 9,* prepared for Montgomery County MUD Nos. 8 and 9, April 2011.

Jones and Carter, Inc, *Amendment to the Joint Groundwater Reduction Plan for Montgomery County MUD Nos. 8 & 9*, Montgomery County MUD Nos. 8 and 9,April 2014.

LOCATION MAP



REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	San Jacinto Basin Regional Return Flows
Project ID:	REUS-007
Project Type:	Reuse
Potential Supply Quantity (Rounded):	59,525 – 150,994 ac-ft/yr (53.1 – 134.8 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$0 (Sept. 2013)
Unit Water Cost (Rounded):	$0 per ac-ft (during loan period) $0 per ac-ft (after loan period)

PROJECT DESCRIPTION

Lake Houston is located at the confluence of the East and West Forks of the San Jacinto River and receives flow from the Spring Creek Watershed. This entire area is anticipated to undergo considerable growth over the upcoming decades which will inevitably contribute to increased return flows to Lake Houston which serves as an ideal location for capturing available flows for use in meeting a number of water demands.

In the 2011 RWP, the existing City of Houston (COH) reuse permit took advantage of wastewater return flows from wastewater discharges in the Kingwood area to capture additional flow from the Lake Houston take point. In addition, the RWP also recommended the development of a reuse permit for the North Harris County Regional Water Authority (NHCRWA) service area to capture the portion of return flows in the Spring Creek Watershed. Together, these two projects represent a portion of a greater opportunity to capture reclaimed water supplies at Lake Houston for use. While the COH permit is already an existing supply, the expansion of Montgomery County allows for the potential development of a substantial reclaimed water supply in the basin.

Several existing water right permits dictate the use of water diverted from Lake Houston. These rights are owned by COH and the San Jacinto River Authority (SJRA) and some benefit from storage in Lake Houston while others are run-of-the-river diversions that share a diversion point with the reservoir. These rights are summarized in *Table 1*, below. Water Right 4964 serves SJRA's Highlands System and is diverted from Lake Houston although it does not benefit from storage in the reservoir. Water Right 4965 is the original right associated with Lake Houston and both permits and benefits from the reservoir's 160,000 ac-ft of storage. In 2003, COH and SJRA jointly permitted excess yield identified in Lake Houston totaling 32,500 ac-ft/yr. In addition, 80,000 ac-ft/yr of excess flows were also permitted for diversion when available. Conceptually, this permit allows for the diversion of return flows form the upper portion of the basin. However, since these return flows are not specifically called out in the permit, they are not considered in the firm yield analysis for Region H. Finally, COH's permit 5827 includes diversion of as much as 12,770 ac-ft/yr (11.4 mgd) of return flows from the

Kingwood Central and Kingwood West Wastewater Treatment Plants (WWTPs), which would have to be deducted from a Regional Return Flows permit.

Table 1 – Existing Water Rights at Lake Houston

Permit	Priority Year	Diversion (Ac-Ft/Yr)	Owner(s)	Lake Houston Storage?
4964	1942/44	55,000	SJRA	No
4965	1940/44	168,000	COH	Yes
5807	2003	32,500	COH/SJRA	Yes
5808	2003	80,000	COH/SJRA	No
5827	2004	12,770*	COH	No

*Includes only the permitted discharge of the City of Houston's Kingwood West and Kingwood Central WWTPs as referenced in WR 5827.

Montgomery County grows, provisions have been made for the future development of return flows. In developing their Groundwater Reduction Plan (GRP), SJRA contractually retained right to return flows related to surface water provided to its customers. The City of Conroe has also pursued indirect reuse opportunities and has submitted a permit application for the groundwater-sourced portion of their effluent.

This project aims to capture, on a firm yield basis, return flows associated with current unpermitted wastewater discharges and future growth in the San Jacinto River basin above Lake Houston and below Lake Conroe. This will consist primarily of flow generated by NHCRWA and SJRA's GRP participants.

PROJECT ANALYSES

The project analyses for San Jacinto Basin Regional Return Flows include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Identification of potential return flows was aided by the existence of a Geographic Information System (GIS) layer of spatial location of projected population and growth throughout Harris and Montgomery Counties used for the development of population projections. This is a similar layer to the one used for the development of population and demand projections for the 2016 Region H RWP and the Regional Groundwater Update performed for Harris-Galveston Subsidence District (HGSD), Fort Bend Subsidence District (FBSD), and Lone Star Groundwater Conservation District (LSGCD). Population projections at the census block level were overlaid with the Region H WUG spatial dataset and the project contributing area to determine estimated population in the San Jacinto River Basin between the Lake Conroe and Lake Houston outlets. Resultant populations were then multiplied by Regional Planning per-capita demand values to estimate projected water demand associated with the project area. The project contributing area also includes portions of Grimes, San Jacinto, Liberty, Walker, and Waller Counties, for which block level data were not available. For WUGs in these counties, a ratio of project contributing area coverage to total WUG area was applied to Regional Planning population projections. As with Harris and Montgomery Counties, Regional Planning per-capita values were used to calculate associated water demands.

Because Regional Planning estimates of WUG per-capita demand are based on dry-year conditions and may somewhat overestimate demands for a typical year, a conservative return flow factor of 45 percent was applied to estimate effluent generated. While lower than return flow rates in many parts of the greater Houston area, the selected factor is similar to observed return flows from suburban growth north of Houston.

As noted previously, not all return flows generated within the project contributing area will be available to the project due to pre-existing reuse authorizations. Flows for existing reuse authorizations held by the City of Houston, SJRA, and The Woodlands as well as a pending authorization from the City of Conroe and SJRA were deducted from the project availability estimate. An additional five percent loss factor was applied to account for channel losses. Return flow availability considerations are summarized in *Table 2* below. The project supply volume includes projected effluent originating from both surface water and groundwater-based supplies, the proportions of which will change over time.

Table 2 – Summary of Reuse Authorizations and Availability

Reuse Availability	Flow Volume (ac-ft)						
	Current	2020	2030	2040	2050	2060	2070
Water Demand	185,046	238,345	267,952	299,558	335,364	378,286	426,630
Total Return Flow	83,271	107,256	120,578	134,801	150,913	170,229	191,984
Availability Reductions	20,613	24,168	26,090	28,004	29,968	31,819	33,043
COH #5827[a]	5,538	5,630	5,846	6,085	6,334	6,600	6,735
SJRA #5809[b]	10,198	12,227	12,867	13,571	14,369	14,944	14,944
Woodlands #3960	310	310	310	310	310	310	310
Conroe Applications[c]	4,567	6,001	7,067	8,038	8,955	9,965	11,054
Channel Losses[d]	3,133	4,155	4,725	5,340	6,047	6,921	7,947
Max Project Supply	**59,525**	**78,933**	**89,763**	**101,457**	**114,898**	**131,489**	**150,994**

a. Includes only the portion of WR 5827 that may be diverted at Lake Houston. Per Permit 5827, the allowable diversion at Lake Houston is 5,506 gpm (8,881 ac-ft/yr) maximum rate at the Lake Houston Pump Station, with an identical rate at the Northeast Water Purification Plant. The values shown in the table are lower than this as the available effluent generated within the study area does not reach the permit amount.

b. Permit 5809 allows SJRA to reuse up to 14,944 ac-ft/yr of groundwater-based effluent from the Woodlands WWTPs. The values shown in the table reflect anticipated effluent from the source plants not reaching the permitted level for several decades.

c. Reductions for the pending reuse permits for City of Conroe effluent are assumed to be equal to estimated return flows up to 11,200 ac-ft/yr (10 MGD).

d. Estimated as five percent of effluent remaining after deducting existing authorizations.

The project supply listed in *Table 2* reflects the highest level of supply available to the project; any additional constraints applied to an associated reuse permit could impact project yield.

Environmental Considerations

Environmental impacts of the project would be examined in detail during the TCEQ permitting process. The San Jacinto Basin is subject to environmental flow requirements, including those established in accordance with 30 TAC §298 which establish seasonal requirements for flows. As the measurement points associated with 30 TAC §298 pulse flow requirements are located between the discharge and locations and the diversion point, return flows associated with this project would be conveyed through the associated channels regardless of the project diversion and should therefore not reduce frequency of pulse flow target achievement. Further, these flows should increase with population growth over time.

Diversions from the current level of return flows could potentially show some impacts below Lake Houston. Detailed environmental analysis would be performed during the permitting phase, with impacts dependent on permit terms. For this study, potential impacts to bay and estuary inflow were examined for implementation of the project at current (59,525 ac-ft) project supply levels. This examination approximated bay and estuary flows from the San Jacinto River Basin using the TCEQ Water Availability Models (WAMs). The TCEQ Run 3 (full authorized diversion with no return flows) and Run 8 (current conditions) WAMs were modified to include the environmental flow standards adopted by the Trinity and San Jacinto Rivers and Galveston Basin and Bay Area Stakeholder Committee (BBASC) in the absence of a model developed by TCEQ. The Run 3 WAM was additionally modified to include the return flows associated with the project. Bay and estuary flows were output from the model and target project diversions were subtracted. As this assumes that the project would be fully consumptive and not limited by water right priority, it should represent a worst-case scenario for environmental flow impacts. The results of this analysis are presented in **Table 3**. These results indicate that for most moisture conditions and seasons, impacts of the project would be limited; based on these values, frequencies of attainment of flow requirements under 30 TAC §298 would be met.

Table 3 – Galveston Bay Inflow Criteria

Flow Level	Season	Flow Target (ac-ft)	Attainment Frequency Criteria	Attainment Frequency			
				Run 8	Run 8 w/ Strategy Diversion	Run 3	Run 3 w/ Strategy Diversion
Dry	Winter	123,000	60%	100%	96%	84%	84%
Dry	Spring	155,000	60%	98%	88%	70%	70%
Dry	Summer	75,000	60%	100%	100%	74%	63%
Dry	Fall	90,000	60%	100%	100%	72%	60%
Dry	Annual	703,699	75%	95%	93%	75%	75%
Avg	Winter	278,000	50%	75%	74%	61%	60%
Avg	Spring	290,000	50%	70%	70%	58%	58%
Avg	Summer	100,000	50%	100%	100%	60%	56%
Avg	Fall	150,000	50%	82%	79%	58%	56%
Avg	Annual	1,164,408	60%	75%	75%	67%	63%
Wet	Winter	450,000	40%	58%	54%	47%	46%
Wet	Spring	500,000	40%	53%	53%	44%	42%
Wet	Summer	220,000	40%	61%	58%	42%	42%
Wet	Fall	200,000	40%	70%	61%	47%	42%
Wet	Annual	1,460,424	50%	74%	72%	54%	51%

Since no construction or soil disturbance would occur, permitting and/or coordination with the U.S. Army Corps of Engineers and Texas Historical Commission would not be required. Also, no impacts to threatened or endangered species due to construction or soils disturbance are anticipated.

Permitting and Development

This project would require a water right permit from TCEQ to establish legal authorization over the source return flows. Due to the location-specific nature of reuse authorizations, exact permit requirements would be determined by TCEQ during the application review process. At a minimum the permit would, by the nature of its water right priority date, be subject to existing environmental flow requirements including those established in accordance with 30 TAC §298. However, a diversion point at Lake Houston would be downstream of environmental flow monitoring locations and thus unlikely to be impacted by these instream flow requirements. A permit would also be expected to include water conservation plan requirements as well as specified monitoring and reporting requirements.

It is also likely that any permit granted would be limited in volume to the authorized discharge of source wastewater treatment plants (WWTPs). Based on a query of the Environmental Protection Agency (EPA) Integrated Compliance Information System (ICIS), there is at least 98,963 ac-ft/yr of existing permitted wastewater discharge capacity in the project contributing area excluding facilities associated with existing reuse authorizations as discussed previously. As such, the project could be initiated with this value as the target permit volume. Prior to Year 2040, when anticipated available project supply exceeds this amount, a permit amendment would be required.

Cost Analysis

The costs associated with developing this project are included under other infrastructure projects.

PROJECT EVALUATION

Based on the analysis provided above, the San Jacinto Basin Regional Return Flows project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	This project provides a raw water supply though permit that would rely upon other infrastructure to perfect it as a source of supply
Location	4	Conveyance may be performed through existing and potential future conveyances consider under separate project.
Water Quality	3	Project takes advantage of existing and planned discharges in the San Jacinto basin.
Environmental Land and Habitat	5	No impacts from permit project.

CRITERIA	RATING	EXPLANATION
Environmental Flows	2	Project will reduce the level of flows returned to streams to a level to be determined through the permitting process.
Local Preference	3	No known opposition to the proposed project.
Institutional Constraints	3	Permit process must be initiated.
Development Timeline	5	Permit could be developed in a relatively short period of time.
Sponsorship	3	No stakeholders have yet come forward to support this project although potential stakeholders have implemented similar projects within the basin and region.
Vulnerability	5	Minimal risk to availability of supply.
Impacts on Other Projects	3	The project would be developed in such a way to prevent detrimental impacts to other projects under development.

WATER USER GROUP APPLICATION

The San Jacinto Basin Return Flows project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	This project potentially provides water to the immediate vicinity of Lake Houston but also to COH customers served by the NEWPP and EWPP and SJRA customers served by the Highlands System. Conveyance to other customers will be considered under separate infrastructure projects.
Size	This project is easily scaled to meet needs of various sizes.
Water Quality	This project provides a raw water source that may be used to meet a number of demands in the basin including potable demands through existing and future treatment projects.
Unit Cost	The project is a low cost project although other infrastructure projects would be required to fully utilize its potential.
Other Factors	There is potential for the availability of this source to increase over time.

REFERENCES

Texas Commission on Environmental Quality Water Right Permit Number 3960, March 1986.

Texas Commission on Environmental Quality Water Right Permit Number 4964, February 1987.

Texas Commission on Environmental Quality Water Right Permit Number 4965, February 1987.

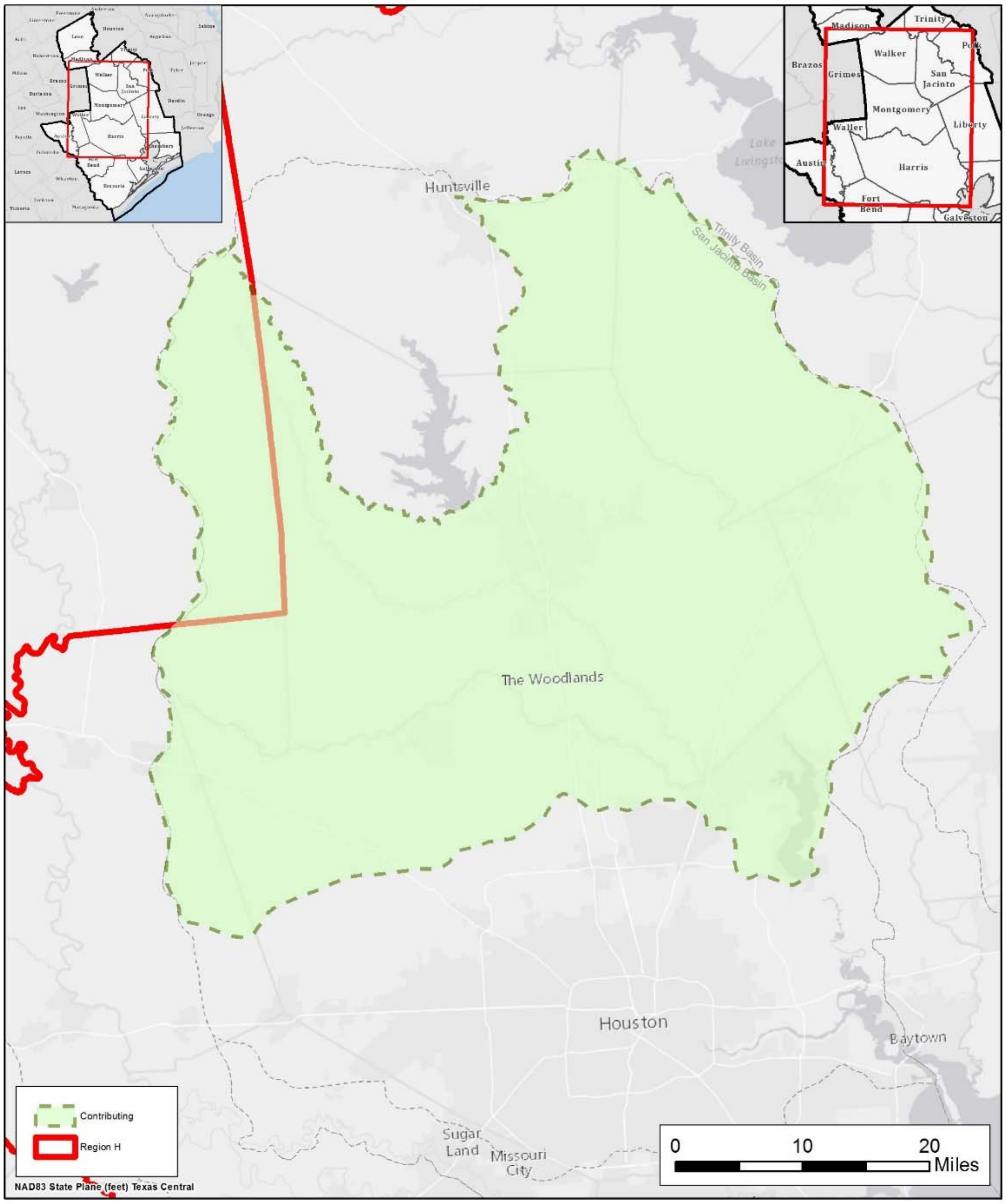
Texas Commission on Environmental Quality Water Right Permit Number 5807, December 2008.

Texas Commission on Environmental Quality Water Right Permit Number 5808, September 2009.

Texas Commission on Environmental Quality Water Right Permit Number 5809, May 2004.

Texas Commission on Environmental Quality Water Right Permit Number 5827, May 2011.

LOCATION MAP



Regional Return Flows Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	SJRA Conroe Reuse Project
Project ID:	REUS-008
Project Type:	Reuse
Potential Supply Quantity (Rounded):	3,205 – 6,807 ac-ft/yr (2.9 – 6.1 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$0 (Sept. 2013)
Unit Water Cost (Rounded):	$0

PROJECT DESCRIPTION

The San Jacinto River Authority (SJRA) provides a large volume of surface water supply to a number of entities in Region H. In Montgomery County, SJRA has partnered with a number of other entities through its Groundwater Reduction Plan (GRP) for purposes of meeting required reductions in groundwater use from the Gulf Coast Aquifer and has developed extensive treatment and distribution infrastructure to supply select entities with treated surface water. The terms of the GRP agreements also assign return flows originating from SJRA supplies to SJRA. The City of Conroe, which is located adjacent to Lake Conroe along the West Fork of the San Jacinto River, is one of the entities receiving surface water from SJRA and currently produces significant volumes of wastewater discharge. SJRA, recognizing the potential for these discharges to serve as a potential source of new supply within the region, has filed an application with the Texas Commission on Environmental Quality (TCEQ) to use the bed and banks of the West Fork to convey a portion of City of Conroe return flows for downstream use.

PROJECT ANALYSES

The project analyses for the SJRA Conroe Reuse Project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The SJRA permit application seeks up to 10 mgd (11,200 ac-ft/yr) in reuse supply from City of Conroe discharges, less any amount derived from the City of Conroe's self-supplied groundwater; the City of Conroe has filed a permit application with TCEQ for bed and banks conveyance of their groundwater-based effluent. The City is a participant in the SJRA GRP and is anticipated to convert from use of Gulf Coast Aquifer supplies to use of 60 percent alternate water supply by year 2016, with subsequent additional conversion to alternate supplies. The terms of the GRP contract specify that ownership of return flows generated from supplies provided by SJRA are held by SJRA rather than the surface water recipient. In addition to the City's self-supplied groundwater from the Gulf Coast Aquifer and alternate supply provided by SJRA, the City anticipates development of 5 mgd (5,600 ac-ft/yr) in alternate water supply from the Catahoula aquifer. Total potential return flows from the City of Conroe were determined using projected water demands and applying a return flow rate of 45 percent based on observations of return flows in Region H and a 5 percent channel loss factor for delivery to end users. The portion of this supply available to SJRA was then estimated by applying a ratio of projected SJRA-provided supply to total water supply. Results of this analysis are summarized in *Table 1*.

Table 1 – SJRA Conroe Potential Reuse Summary

Reuse Availability	Flow Volume (ac-ft)					
	2020	2030	2040	2050	2060	2070
Water Demand	13,336	15,705	17,863	19,899	22,144	24,564
Total Return Flow	5,701	6,714	7,636	8,507	9,467	10,501
Projected Supply	18,979	21,348	23,506	25,542	27,787	30,008
Lake Conroe	10,669	12,564	14,290	15,919	17,715	19,452
Gulf Coast Aquifer	2,710	3,184	3,616	4,023	4,472	4,956
Catahoula Aquifer	5,600	5,600	5,600	5,600	5,600	5,600
Surface Water %	56.2%	58.9%	60.8%	62.3%	63.8%	64.8%
Potential SJRA Reuse	3,205	3,951	4,642	5,302	6,035	6,807

Environmental Considerations

The diversion of the surface water-based effluent source supply would be expected to have some degree of impact in terms of reduction of instream flows downstream of the diversion point for any portion of the source supply originating from current levels of return flow. A more detailed analysis of environmental impacts and legal constrains would be considered during the permit application and review process, which has been initiated.

Permitting and Development

Permitting efforts associated with development of the SJRA Conroe Reuse project are in progress. SJRA has applied for authorization to use the bed and banks of the West Fork of the Trinity River to convey reuse supplies for subsequent diversion downstream.

Cost Analysis

The costs associated with developing this project are included under the infrastructure development project or projects for points of use.

PROJECT EVALUATION

Based on the analysis provided above, the SJRA Conroe Reuse project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	This project provides a raw water supply though permit that would rely upon other existing or future infrastructure to perfect it as a source of supply.
Location	4	Bed and banks conveyance to point(s) of use required
Water Quality	3	The project takes advantage of existing and future discharges in the San Jacinto basin.
Environmental Land and Habitat	5	No impacts from permit project.
Environmental Flows	2	Diversion of discharges would create reduction in environmental flows.
Local Preference	3	No known opposition to the proposed project.
Institutional Constraints	4	Permit application in progress.
Development Timeline	5	Permit could be developed in a relatively short period of time.
Sponsorship	5	Sponsor identified and committed to project.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

Determination of the Water User Groups (WUGs) to which the project may be applied was evaluated based on the factors below. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project would use the bed and banks of the San Jacinto River to convey supplies to point(s) of use.
Size	Overall project supply volume increases with time.

CRITERIA	WUG SUITABILITY
Water Quality	This project provides a raw water source that may be used to meet demands in the SJRA service area.
Unit Cost	The project is a low cost project although other existing or future infrastructure would be required to fully utilize its potential.
Other Factors	Implementation of supply from this project requires a bed-and-banks permit for downstream use, which is currently under review.

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Wastewater Reclamation for Industry
Project ID:	REUS-009
Project Type:	Reuse
Potential Supply Quantity (Rounded):	67,200 ac-ft/yr (60 mgd)
Implementation Decade:	2060
Development Timeline:	10 years
Project Capital Cost:	$356,340,557 (Sept. 2013)
Unit Water Cost (Rounded):	$856 per ac-ft (during loan period) $412 per ac-ft (after loan period)

PROJECT DESCRIPTION

The City of Houston (COH) holds Water Right Permit 5827 that allows the diversion and reuse of up to 580,923 ac-ft/yr in the San Jacinto River Basin or in the Trinity, Trinity-San Jacinto, and San Jacinto Brazos basins through interbasin transfer. This permit relates to 35 individual wastewater treatment plant (WWTP) discharges located on the Houston Ship Channel, Greens Bayou, Buffalo Bayou, Cole Creek, Berry Bayou, Keegans Bayou, Brickhouse Gully, Whiteoak Bayou, Evans Gull., and Lake Houston. In an effort to protect and maintain freshwater inflows to Galveston Bay, the permit limits diversion to 50% of the volume discharged on a daily basis form each wastewater treatment plant.

In addition to other alternatives for reclaimed water use, this permit may also be used for service to industrial customers. One concept for service to industry has existed in the Region H RWP since the first plan in 2001. This approach considers using reclaimed wastewater effluent to replace existing surface water supplies that serve industrial demands for process and boiler feed waters. Under this project, municipal wastewater currently discharged to Buffalo Bayou will receive further treatment and will be offered as a high quality water supply to industries. Reclaimed wastewater will be superior in quality to the raw water currently supplied, thus allowing industrial consumers to significantly reduce or eliminate their onsite water treatment costs. This project is applied within the industrial corridor of State Highway 225 and the Houston Ship Channel (San Jacinto Basin).

PROJECT ANALYSES

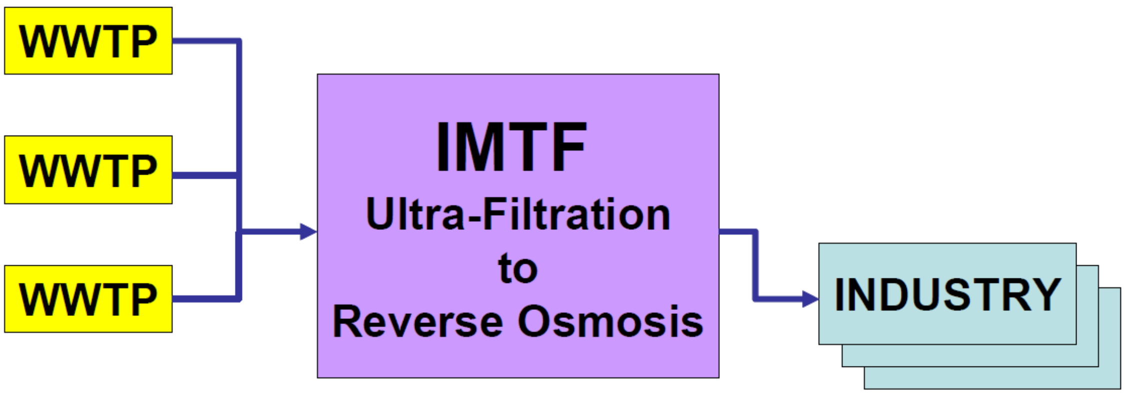
The project analyses for Wastewater Reclamation for Industry include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Effluent from three of the City's wastewater treatment plant (Sims North, Sims South and 69th Street) would be utilized. Secondary effluent would be pumped to an Integrated Membrane Treatment

Facility (IMTF) as shown in *Figure 1*. After treatment, the reclaimed water will be piped to the industrial users along the south side of the Houston Ship Channel corridor.

Figure 1 – Proposed Reuse Project



Environmental Considerations

Effluent currently being discharged to Buffalo Bayou, Sims Bayou, and the Houston Ship Channel would be diverted to the new IMTF. A discharge of brine concentrate from the IMTF into the Houston Ship Channel could affect water quality, although the proposed discharge would be into the dredged channel below the saline elevation. Reclaiming effluent will reduce the impacts of the current WWTP discharges. Less effluent will be discharged into the receiving stream. However, these issues were addressed during the permitting of WR 5827. Minimal impact to the terrestrial habitats and terrestrial organisms adjacent to these bayous is expected as a result of the reduction of wastewater treatment plant discharges.

Current levels of wastewater discharge by industries into the Houston Ship Channel would remain unchanged. There are no water rights on the Houston Ship Channel that would be negatively impacted by this project. This project will treat 83 mgd of effluent to produce 60 mgd of delivered high-quality water (the other 23 mgd being brine discharge). This will offset an existing raw water demand which is currently met from other City of Houston surface sources in the Trinity and San Jacinto basins.

Permitting and Development

Water rights permitting for this project has already been accomplished under Water Right Permit 5827. The terms of this permit specify the diversion rates and other terms for utilization of this supply. It should be noted that, since the identified supply would be taken directly from the plants without entry into waters of the state, the instream flow targets for diversion are not applicable. However, the 50 percent provision for bay and estuary inflows would be applied and would serve to protect baseflows from wastewater plants contributing to Galveston Bay.

Cost Analysis

Estimated costs for the project are shown below in *Table 1*. The costs presented in this memorandum do not include the purchase cost of water.

Table 1 – Wastewater Reclamation for Industry Project Cost

OPINION OF PROBABLE CONSTRUCTION COST					January 1, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$240,595,000	$240,595,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$81,736,200	$81,736,200
3	LAND AND EASEMENTS	1	LS	$7,000,000	$7,000,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$600,000	$600,000
5	INTEREST DURING CONSTRUCTION	1	LS	$26,409,357	$26,409,357
	PROJECT CAPITAL COST				$356,340,557

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$0	$0	$29,818,339	$29,818,339
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$0	$0	$26,028,385	$26,028,385
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$1,671,887	$1,671,887
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$0	$0	$57,518,611	$57,518,611

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$0	$0	$57,518,611	$57,518,611
2	YIELD	-	-	-	-	67,200	67,200
3	UNIT COST	$0	$0	$0	$0	$856	$856
	TOTAL UNIT COST						$856

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$21,359,000	$21,359,000
2	PIPELINES	1	LS	$32,061,000	$32,061,000
3	PIPELINE CROSSINGS	1	LS	$17,380,000	$17,380,000
4	WASTEWATER RECLAMATION PLANTS	1	LS	$169,795,000	$169,795,000
	PROJECT COST				$240,595,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$21,359,000	$533,975
2	PIPELINES	1.0	%	$32,061,000	$320,610
3	PIPELINE CROSSINGS	1.0	%	$17,380,000	$173,800
4	WASTEWATER RECLAMATION PLANTS	1.0	LS	$25,000,000	$25,000,000
	ANNUAL OPERATION AND MAINTENANCE COST				$26,028,385

This project has a unique cost dynamic. The industries will participate in this project only if it can be proven that their specific total water cost can be reduced. Reclamation saves an equivalent quantity of existing City of Houston Trinity River water supplies. The exact cost benefit of this project can only be determined through negotiation of firm supply contracts with the industry customers.

Substitution of reclaimed wastewater would potentially increase the industries' cost of water. However, the reclaimed water could save the industries money since reclaimed water will require less treatment (and in many cases no additional treatment) after it is delivered to the industrial consumers. The use of reclaimed municipal wastewater may be an economical alternative to current supplies.

PROJECT EVALUATION

Based on the analysis provided above, the Wastewater Reclamation for Industry project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

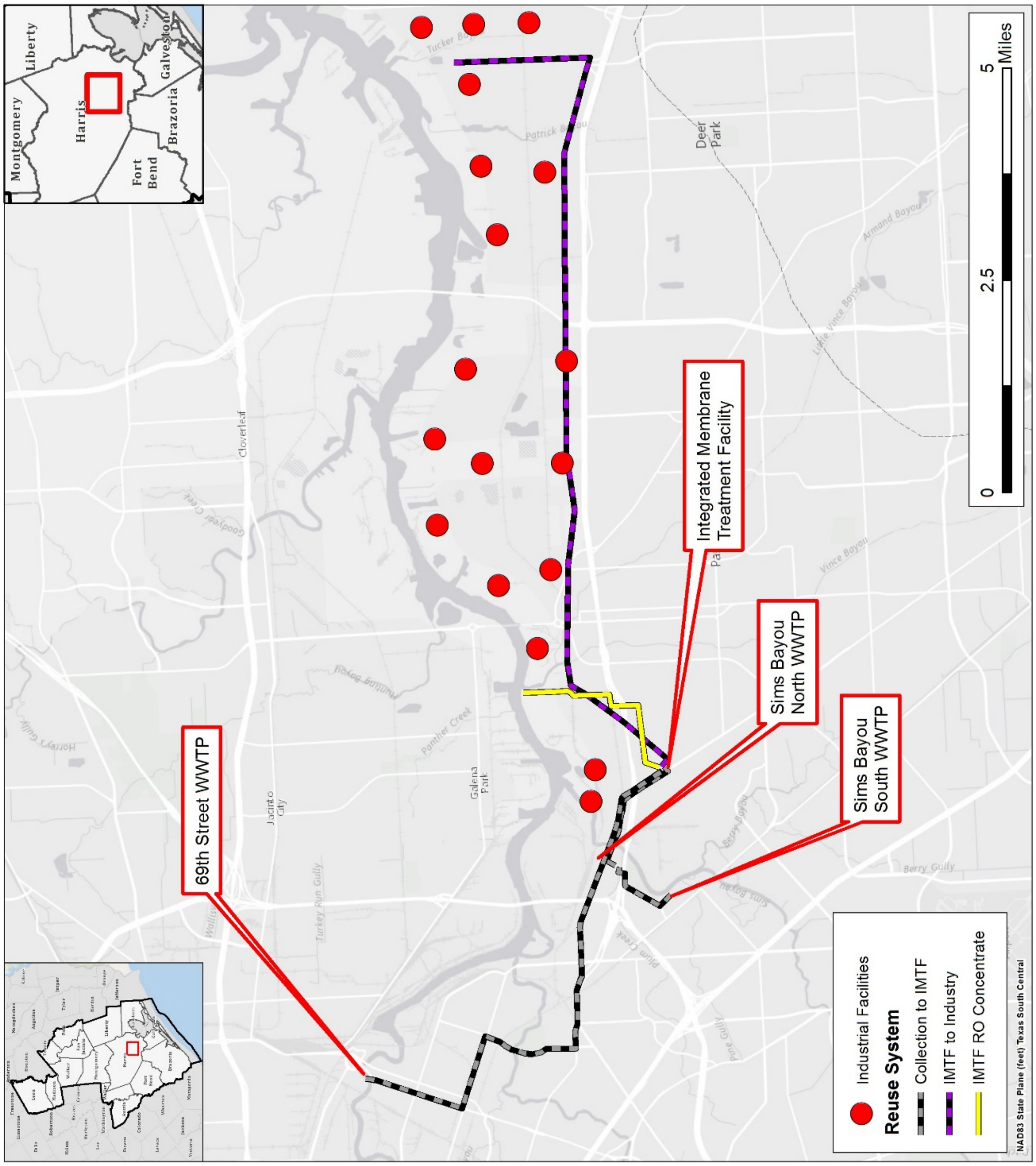
CRITERIA	RATING	EXPLANATION
Cost	2	High costs related to treatment of water prior to delivery. However, this may be offset through water rate for providing higher quality water to industry.
Location	4	Conveyance required for project implementation.
Water Quality	4	Proposed project would provide a higher quality water to industrial customers.
Environmental Land and Habitat	4	Majority of projects are to be constructed in already-developed areas or existing rights-of-way.
Environmental Flows	2	Project will reduce the level of flows returned to streams to a level planned for during permitting process.
Local Preference	3	Mixed support between COH and industrial stakeholders.
Institutional Constraints	3	Property acquisition required for project development.
Development Timeline	4	Project will require lead time to get stakeholders on board, develop final project concept, and design and construct the project.
Sponsorship	3	COH requires support from industrial stakeholders in order to push the project forward.
Vulnerability	4	Potential impacts related to damage to critical infrastructure.
Impacts on Other Projects	2	This project competes with water that may be utilized by the COH Reuse project.

WATER USER GROUP APPLICATION

The Wastewater Reclamation for Industry project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project is intended to serve customers along the Houston Ship Channel.
Size	The capacity of this project is intended to serve a portion of water demands by industry and may allow for reapplication of their current raw water supplies to other users.
Water Quality	This project provides treated but non-potable water for industrial use. This represents an improvement over the raw water currently sold to the target industries and may reduce their treatment burden.
Unit Cost	This high unit cost may be offset by reduced needs for treatment. However, the cost makes this water suitable only for industrial purposes.
Other Factors	The reliability of this supply is potentially higher than the current raw water supplies that may be curtailed by drought conditions, making it more attractive to industry.

LOCATION MAP



REGION H
Water Planning Group

Watewater Reclamation for Industry
Location Map

REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Wastewater Reclamation for Municipal Irrigation
Project ID:	REUS-010
Project Type:	Reuse
Potential Supply Quantity (Rounded):	7,472 – 38,940 ac-ft/yr (6.7 – 34.8 mgd)
Implementation Decade:	2030
Development Timeline:	1 - 3 years
Project Capital Cost:	$103,454,114 (Sept. 2013)
Unit Water Cost (Rounded):	$161 - 290 per ac-ft (during loan period) $62 per ac-ft (after loan period)

PROJECT DESCRIPTION

Population growth in Region H over recent decades has included the development of a large number of master-planned communities (MPCs) near the urbanized areas in the region. A number of these communities have adopted direct wastewater reuse technology to assist in meeting water demands from golf courses and greenspace. Wastewater reuse for municipal irrigation of golf courses and maintenance of green spaces in new MPCs is a potential source of future supply. With growth expected to increase by several million people in the Houston metropolitan area over the next 50 years, it can be expected that new master-planned communities will be developed in many areas within Brazoria, Fort Bend, Harris, and Montgomery Counties, and this growth would also provide possible candidates for using reclaimed wastewater.

PROJECT ANALYSES

The project analyses for Wastewater Reclamation for Municipal Irrigation include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

This study examined the potential for development of direct wastewater reuse supplies to meet municipal irrigation water demands in Brazoria, Fort Bend, Harris, and Montgomery Counties. Population growth in future MPCs was identified as the most likely candidate for using this project. Future MPCs are assumed to represent a portion of the growth within County-Other water user groups (WUGs) in the region. There is additional potential for MPC development within the boundaries of the regional water authorities in Region H, including the North Harris County Regional Water Authority (NHCRWA), West Harris County Regional Water Authority (WHCRWA), Central Harris County Regional Water Authority (CHCRWA), and North Fort Bend Water Authority (NFBWA) WUGs.

Analysis of the project in prior Region H RWPs estimated 25 percent of recent growth in the study area to be reflected by MPCs, based on data from the Fort Bend Economic Development Council. This estimate was retained for the 2016 RWP analysis. Because Fort Bend County leads the state in the number of MPCs, it was assumed that this percentage would be representative of the growing trend toward master-planned development within Region H. This percentage was then applied to the total population growth in County-Other and regional water authority WUGs within the growing suburban areas of Region H to determine the population that would be expected to occur in MPCs. Accordingly, this population growth is also assumed to have a similar amount of green spaces, golf courses, and amenity lakes associated with its growth.

The number of golf courses predicted for future development within Region H was determined for the 2006 RWP using data from a variety of sources. A list of courses and the number of golf holes at each location were obtained from the Houston Golf Association and compared to existing population to obtain the ratio of golf "holes" to population. The ratio was retained for this analysis and used to project the future anticipated golf course development in the four counties under evaluation. Water demands for these existing golf courses were estimated from well pumpage records and permitted withdrawals from wells in Fort Bend and Montgomery Counties that were known to be associated with golf courses. These demands, on a per-hole basis, were applied to the predicted new golf holes to find the potential golf course water demands through 2070.

The acreage of green space areas projected to accompany future development was estimated from GIS data for Cinco Ranch and Greatwood MPCs in Fort Bend County as part of the 2006 RWP. The area of irrigated esplanades and parks was compared to the total population of each development at ultimate development to find the average per capita acreage of green space for the two communities. This per capita rate was applied to the percentage of County-Other growth expected within MPCs to determine the projected green space acreage for each county through 2070.

Irrigation demands for the expected green space acreage were determined from evapotranspiration and precipitation data obtained from Texas Water Development Board (TWDB) using a method adapted from Richard Duble of Texas Cooperative Extension. This methodology yielded the ideal average annual application rate for turfgrass irrigation and was used with the projected acreage found above to determine the projected irrigation water demands for green spaces throughout the planning period. This value was determined for the 2006 RWP and is retained for this planning round.

Water demands from amenity lakes associated with population growth in MPCs were estimated from well data information from Fort Bend Subsidence District. Wells that were associated with amenity lakes and were located within named WUGs were identified. The population associated with these WUGs, as reported by TWDB, was compared to the annual pumpage for the wells to determine a per capita amenity lake demand. This per capita demand was then applied to the portion of population growth within County-Other that was expected to occur within MPCs. This value was determined for the 2006 RWP and is retained for this planning round.

The projected wastewater demands for each county are shown below in *Table 1*.

Table 1 - Projected Potential Demands for Reclaimed Wastewater

County	Potential Reuse Application	Wastewater Reuse Demands (ac-ft/yr)				
		2030	2040	2050	2060	2070
Brazoria	Golf Courses	185	382	579	788	1,022
	Green Spaces	77	151	227	310	399
	Amenity Lakes	87	171	257	351	452
	Total	**348**	**703**	**1,064**	**1,449**	**1,874**
Fort Bend	Golf Courses	2,240	3,520	5,047	6,659	8,456
	Green Spaces	418	656	937	1,233	1,567
	Amenity Lakes	474	743	1,061	1,397	1,775
	Total	**3,132**	**4,919**	**7,044**	**9,289**	**11,798**
Harris	Golf Courses	666	1,183	1,687	2,092	2,475
	Green Spaces	300	547	761	951	1,128
	Amenity Lakes	340	620	862	1,078	1,278
	Total	**1,307**	**2,350**	**3,310**	**4,121**	**4,881**
Montgomery	Golf Courses	2,536	5,503	9,134	13,676	19,241
	Green Spaces	413	897	1,489	2,230	3,136
	Amenity Lakes	359	779	1,294	1,937	2,725
	Total	3,308	7,179	11,917	17,842	25,102
Total Potential Reuse Demands		**8,095**	**15,151**	**23,334**	**32,702**	**43,655**

The amount of wastewater that could potentially be reclaimed for nonpotable uses is subject to both the potential demands for and the supply of treated wastewater. It is important to determine the minimum average flow available since wastewater treatment plants (WWTPs) typically experience their lowest discharge flows during the summer when irrigation demands are at their highest. Analysis of the project in prior Region H RWPs estimated an estimated low-flow wastewater discharge of approximately 69.6 gallons per capita per day, based on records from the Greatwood MPC discharge from a five-week period with no rainfall. This production rate was retained for the current study and applied to County-Other and regional water authority population projections to generate a decadal estimate of available effluent for direct non-potable reuse. Estimated available effluent from this analysis is intended to be exclusive of return flows utilized in other potential reuse project in the 2016 RWP. Based on the above methodology, the projected availability of reclaimed wastewater throughout the planning period within each county is shown in *Table 2*.

Table 2 - Projected Potential Supplies for Reclaimed Wastewater

County	Wastewater Reuse Supply (ac-ft/yr)				
	2030	2040	2050	2060	2070
Brazoria	649	1,277	1,926	2,629	3,385
Fort Bend	3,546	5,561	7,938	10,451	13,281
Harris	2,546	4,636	6,449	8,066	9,564
Montgomery	2,685	5,829	9,679	14,493	20,387
Total Potential Reuse Supplies	**9,426**	**17,303**	**25,992**	**35,639**	**46,617**

As noted previously, application of this project is limited not only by the available supply but by the potential demands. Therefore, the potential demand reduction in a given county and decade would be the lesser of the available effluent supply (*Table 2*) and the demand for that effluent (*Table 1*). The resultant usable project supply volume is shown in *Table 3*.

Table 3 - Projected Usable Reclaimed Wastewater Supply

County	Wastewater Reuse Supply (ac-ft/yr)				
	2030	2040	2050	2060	2070
Brazoria	348	703	1,064	1,449	1,874
Fort Bend	3,132	4,919	7,044	9,289	11,798
Harris	1,307	2,350	3,310	4,121	4,881
Montgomery	2,685	5,829	9,679	14,493	20,387
Total Potential Reuse Supplies	**7,472**	**13,801**	**21,097**	**29,352**	**38,940**

Environmental Considerations

Environmental impacts of the project would be examined in detail during the Texas Commission on Environmental Quality (TCEQ) permitting process. The study includes areas within the San Jacinto and Brazos River Basins and the San Jacinto-Brazos Coastal Basin. These basins are subject to environmental flow requirements, including those established in accordance with 30 TAC §298 which establish seasonal requirements for flows. However, because the supply source for this project is based on return flow from a subset of future growth rather than existing development, this project would not be expected to reduce instream flows below current levels.

Infrastructure required for implementation of this project would consist primarily of reclamation facilities located at MPC wastewater treatment plants and conveyance infrastructure to connect to points of use. Because wastewater reclamation infrastructure would presumable be constructed concurrently with other community water and wastewater facilities, proper planning would minimize habitat impacts beyond those inherently associated with MPC development.

Permitting and Development

Construction of direct wastewater reuse facilities as part of overall MPC development would likely allow for a simplified construction permitting process relative to retrofitting direct reuse components into a preexisting system. At a minimum, MPC construction would require a Stormwater Pollution Prevention Plan (SWPPP) and a TCEQ Construction General Permit (TXR 150000).

Use of reclaimed wastewater effluent requires approval and permitting by the TCEQ under the requirements of 30 TAC §210. TCEQ classifies reclaimed water as Type 1 (higher quality for use where public contact is likely) or Type 2 (for uses with limited risk of human contact). Due to the potential for human contact, supplies for this project would have to be treated to Type 1 quality standards. If approved for use, the reclaimed water would have to be sampled and analyzed a minimum of twice per week.

Cost Analysis

A preliminary planning level cost estimate was prepared for the Wastewater Reclamation for Municipal Irrigation project. Capital costs for wastewater treatment plant (WWTP) upgrades were estimated as $630 per acre-foot of direct reuse capacity. This value was based on the per acre-foot value from the 2011 Region H Water Plan scaled based on the Engineering News Record (ENR) indices.

Costs were also developed for pump station and pipeline infrastructure required to convey reclaimed supplies from WWTPs to points of use. For purposes of this assessment it was assumed that each WWTP within the participating MPCs would have an average production of approximately 1 MGD and would require one mile of pipeline to reach points of use. Because the project is not implemented completely within one decade but rather increases in volume over time as more MPCs implement direct reuse, cost estimates developed for the project reflect incremental development of infrastructure and supply capacity. For this reason, annualized costs vary across the planning period as some users retire debt service and others begin project development. While overall annual costs increase across the planning period, unit costs decrease as more project supply volume is added with development of new MPCs.

Table 4 summarizes the component costs of key facilities. Costs are presented in September 2013 dollars and include a contingency of 35% including professional services.

Based on these costs as presented and assuming full utilization of supplies from the project, the unit cost for water from the project is varies from $291 per acre-foot in 2030 to $161 per acre-foot in 2070. Costs decline to $62 per acre-foot following the retirement of the debt on the project (by 2090 for MPCs developed in 2070).

Table 4 – Wastewater Reclamation for Municipal Irrigation Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					May 14, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$72,414,239	$72,414,239
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$24,797,990	$24,797,990
3	LAND AND EASEMENTS	1	LS	$604,892	$604,892
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$2,430,144	$2,430,144
5	INTEREST DURING CONSTRUCTION	1	LS	$3,206,849	$3,206,849
	PROJECT CAPITAL COST				$103,454,114

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$1,687,762	$3,128,864	$3,115,937	$3,420,105	$3,853,272
2	OPERATION AND MAINTENANCE (O&M)	$0	$393,229	$728,377	$1,117,171	$1,530,131	$2,001,644
3	PUMPING ENERGY COSTS	$0	$83,717	$155,474	$239,191	$322,907	$430,543
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$2,164,707	$4,012,715	$4,472,299	$5,273,144	$6,285,459

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$2,164,707	$4,012,715	$4,472,299	$5,273,144	$6,285,459
2	YIELD	-	7,472	13,801	21,097	29,352	38,940
3	UNIT COST	$0	$290	$291	$212	$180	$161
	TOTAL UNIT COST						$201

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$37,781,965	$37,781,965
2	PIPELINES	1	LS	$10,939,863	$10,939,863
3	DIRECT REUSE TREATMENT FACILITIES	1	LS	$23,692,410	$23,692,410
	PROJECT COST				$72,414,239

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$37,781,965	$944,549
2	PIPELINES	1.0	%	$10,939,863	$109,399
3	DIRECT REUSE TREATMENT FACILITIES	4.0	%	$23,692,410	$947,696
	ANNUAL OPERATION AND MAINTENANCE COST				$2,001,644

PROJECT EVALUATION

Based on the analysis provided above, the Wastewater Reclamation for Municipal Irrigation project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	The project is somewhat economical compared to alternative raw water supply projects.
Location	5	Direct reuse infrastructure would be located in close proximity to points of water use.
Water Quality	3	No known impacts to water quality.
Environmental Land and Habitat	5	Impacts from project are unlikely to exceed regular land development impacts for master planned communities.
Environmental Flows	2	Project will reduce the level of flows returned to streams to a level to be determined through the permitting process
Local Preference	3	No known opposition to the proposed project.
Institutional Constraints	3	Permit process must be initiated.
Development Timeline	5	Permit could be developed in a relatively short period of time.
Sponsorship	3	No stakeholders have yet come forward to support this project although potential stakeholders have implemented similar projects within the basin and region.
Vulnerability	5	Minimal risk to availability of supply.
Impacts on Other Projects	3	The project would be developed in such a way to prevent detrimental impacts to other projects under development.

WATER USER GROUP APPLICATION

The Wastewater Reclamation for Municipal Irrigation project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	This project provides water to new MPC developments (County-Other and regional water authority WUGs) in Brazoria, Fort Bend, Harris, and Montgomery Counties.
Size	This project is easily scaled with the size of the implementing MPCs.
Water Quality	This project provides a high-quality raw water source that may be used to meet greenspace, golf course, and amenity pond water demands.

CRITERIA	WUG SUITABILITY
Unit Cost	This project is of moderate cost compared to alternative raw water sources to meet MPC non-potable municipal demands. Unit costs for individual MPCs will decrease substantially after closure of debt service.
Other Factors	This project is limited to non-potable demands.

REFERENCES

Texas Commission on Environmental Quality, http://www.tceq.texas.gov/assistance/water/reclaimed_water.html, Accessed May 13, 2014.

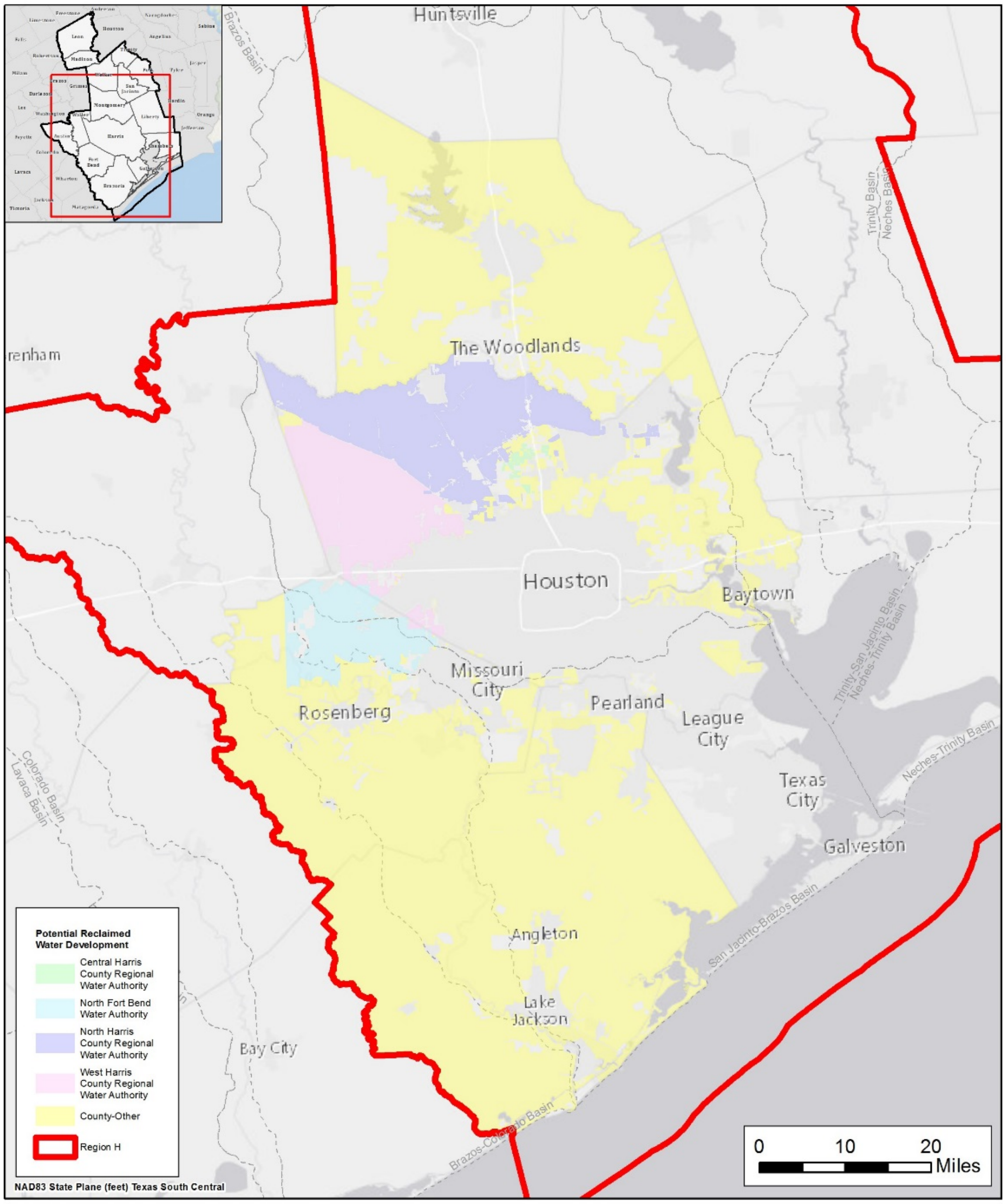
Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Brazoria, Accessed January 9, 2014.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Fort Bend, Accessed January 9, 2014.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Harris, Accessed January 9, 2014.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Montgomery, Accessed January 9, 2014.

LOCATION MAP



Wastewater Reclamation for Municipal Irrigation Location Map

Texas

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Allens Creek Reservoir
Project ID:	SWDV-001
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	99,650 ac-ft/yr (89 mgd)
Implementation Decade:	2020 (2028)
Development Timeline:	15 years
Project Capital Cost:	$316,226,894 (Sept. 2013)
Unit Water Cost (Rounded):	$231 per ac-ft (during loan period) $33 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Allens Creek Reservoir site is located on Allens Creek, a tributary to the Brazos River in Austin County, one mile north of the City of Wallis. The site was originally permitted by Houston Lighting and Power as a cooling water reservoir for a proposed nuclear power plant. The site was later jointly purchased by the Brazos River Authority (BRA) and the City of Houston (COH).

A water right is granted to the development of Allens Creek Reservoir through permit 2925A granted January 16, 2002 which was amended from the original right of 2925 granted February 2, 2000. This amendment provided for the ownership of the reservoir among COH, BRA, and the Texas Water Development Board (TWDB) that provided funding for the original purchase of the site. The amended permit is a mixed use permit for municipal, industrial, irrigation, and recreational purposes. The water is permitted for inter-basin transfer to the San Jacinto and San Jacinto-Brazos basins.

The yield of Allens Creek Reservoir was developed through an analysis of flow conditions in the Brazos River Basin along with storage characteristics for the reservoir site. The impoundment is described by permit as being of a capacity not to exceed 145,533 acre-feet at a maximum water surface elevation of 121.0 feet above mean sea level. This reservoir may be filled annually by a volume not to exceed 202,000 acre-feet from the Brazos River resulting in a yield of 99,650 acre-feet per year (approximately 89 MGD) for municipal, industrial, and irrigation purposes. This value was developed in prior studies and does not incorporate impacts from other potential projects or subsequent environmental flow standards due to the lack of an updated base availability model. The priority for impoundment and use of water under permit 2925A is September 1, 1999. Seventy percent of the permit (69,750 acre-feet per year) is owned by COH and 30 percent of the permit (29,900 acre-feet per year) is owned by the BRA. The maximum dam height is 53-feet, and the conservation storage is approximately 145,500 acre-feet at an elevation of 121.0 feet msl.

Despite a preliminary ruling of yield for the permit, it was also decided that, once instream flow standards were developed to be applied to the project, these would be retroactively applied to the permit and may result in the revision of the permit yield by up to a 6.4% (approximately 6,378 acre-feet per year) increase or decrease. In effect, the actual yield of the project may vary between approximately 93,272 and 106,028 acre-feet per year. On August 31, 2012, the Brazos River Basin and Bay Stakeholder Committee (BBASC) submitted an environmental flow regime recommendations report for the basin which would serve as a factor in determining the final yield to be applied to the Allens Creek project. Currently, this regime has not been applied to the project for the purpose of reevaluating permit yield.

The yield of Allens Creek Reservoir is primarily produced by the storage of flows diverted from the main stem of the Brazos River. Permit 2925A allows for the construction of one or both of two pump stations to be built on the river. The maximum combined diversion rate permitted from both of these diversion points is 2,200 cubic feet per second (cfs) or approximately 1,400 million gallons per day (MGD). However, the likely scenario is for the construction of only one pump station to provide for filling of the reservoir. Diversions around the perimeter of the reservoir may be made at a rate of 300 cfs (approximately 190 MGD) while the reservoir outlet works may be used to pass water downstream at a maximum rate of 700 cfs (approximately 450 MGD).

The original issue of water right permit 2925A included a mandatory date of September 1, 2018 by which construction shall commence with completion of the reservoir within three years following that date. In 2011, the 82nd Legislature adopted Senate Bill 1132 (SB1132) to amend the deadline to September 1, 2025 and this has since been incorporated into a reissued permit for 2925A.

PROJECT ANALYSES

The project analyses for Allens Creek Reservoir include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The supply from Allens Creek Reservoir is specified in its permit issued by the Texas Commission on Environmental Quality (TCEQ). Additional yield capacity may be available through combined operation with other system reservoirs. This additional yield will be considered in the context of the BRA System Operation Permit.

Environmental Considerations

Investigation has been performed into the nature of the permitting required for the development of the project. The general nature and size/scope of the Allens Creek Reservoir project necessitates several environmental permitting considerations. *Table 1* lists the threatened and endangered species of Austin County as well as other species of concern.

Table 1 – Threatened and Endangered Species of Austin County

AMPHIBIANS		FEDERAL STATUS	STATE STATUS
Houston toad	*Anaxyrus houstonensis*	LE	E

BIRDS		FEDERAL STATUS	STATE STATUS
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

BIRDS		FEDERAL STATUS	STATE STATUS
Attwater's Greater Prairie-Chicken	*Tympanuchus cupido attwateri*	LE	E
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Henslow's Sparrow	*Ammodramus henslowii*		
Interior Least Tern	*Sterna antillarum athalassos*	LE	E
Mountain Plover	*Charadrius montanus*		
Peregrine Falcon	*Falco peregrinus*	DL	T
Sprague's Pipit	*Anthus spragueii*	C	
Western Burrowing Owl	*Athene cunicularia hypugaea*		
White-faced Ibis	*Plegadis chihi*		T
White-tailed Hawk	*Buteo albicaudatus*		T
Whooping Crane	*Grus americana*	LE	E
Wood Stork	*Mycteria americana*		T

FISHES		FEDERAL STATUS	STATE STATUS
Sharpnose shiner	*Notropis oxyrhynchus*	C	

INSECTS		FEDERAL STATUS	STATE STATUS
A mayfly	*Pseudocentroptiloides morihari*		

MAMMALS		FEDERAL STATUS	STATE STATUS
Louisiana black bear	*Ursus americanus luteolus*	LT	T
Plains spotted skunk	*Spilogale putorius interrupta*		
Red wolf	*Canis rufus*	LE	E

MOLLUSKS		FEDERAL STATUS	STATE STATUS
False spike mussel	*Quadrula mitchelli*		T
Smooth pimpleback	*Quadrula houstonensis*	C	T
Texas fawnsfoot	*Truncilla macrodon*	C	T

REPTILES		FEDERAL STATUS	STATE STATUS
Alligator snapping turtle	*Macrochelys temminckii*		T
Smooth green snake	*Liochlorophis vernalis*		T
Texas horned lizard	*Phrynosoma cornutum*		T
Timber/Canebrake rattlesnake	*Crotalus horridus*		T

PLANTS		FEDERAL STATUS	STATE STATUS
Panicled indigobush	*Amorpha paniculata*		
Shinner's sunflower	*Helianthus occidentalis ssp plantagineus*		
Texas meadow-rue	*Thalictrum texanum*		

LE, LT - Federally Listed Endangered/Threatened; SAE, SAT - Federally Listed Endangered/Threatened by Similarity of Appearance; C - Federal Candidate for Listing; DL, PDL - Federally Delisted/Proposed for Delisting; NL - Not Federally Listed; E, T - State Listed Endangered/Threatened; "blank" - Rare, but with no regulatory listing status.

Permitting and Development

A 10-year schedule is estimated for environmental activities associated with the project. However, the schedule may be accelerated depending on coordination with regulating entities and the proposed project approach. Any approaches that result in favorable impacts to the overall permitting timeline could significantly influence the overall schedule for development of the project.

Based on preliminary desktop investigation, the following environmental permits and permitting activities are likely to apply:

- U.S. Army Corps of Engineers (USACE) Section 404 Permit – Reservoir development will involve modifications to water of the U.S. As such, the project must be federally permitted using a Section 404 Permit of the Clean Water Act. Due to the magnitude of impacts, construction of this reservoir would require a Section 404 Individual Permit.

- National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) – An EIS will likely be required as part of the Section 404 Permitting process.

- Cultural Resources Survey and National Register of Historic Places (NRHP) Testing – As part of the Section 404 Permit processing and EIS development, cultural resources surveys and NRHP testing will likely need to be completed.

- Mitigation Plan – A mitigation plan will be required as part of the Section 404 Permit. Mitigation will most likely involve purchase of mitigation bank credits or construction of mitigation sites to offset impacts to waters of the U.S. Due to the large amount of impacts to wetlands and other waters of the U.S., mitigation credits may be limited and mitigation may require permittee-responsible mitigation.

- U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD) Ancillary Studies – USFWS and TPWD are stakeholders in the Section 404 Permitting process, and, as such, they will require ancillary studies to be completed. These studies will include surveys for federal threatened and endangered species and habitat modeling to assess impacts of the proposed project.

- Constructing the dam to form the Allens Creek Reservoir will remove a large portion of the Brazos River floodplain from flood storage. This will, in turn, have an effect on flood elevations upstream and downstream from the facility. The reduction of floodplain storage will likely require the establishment of flood storage capacity in the project vicinity to offset this loss.

Commencing near the end of the permitting phase, design and construction periods of 2.5 to 3.5 years are anticipated to bring the project to completion at the end of an overall 15-year development.

Cost Analysis

A detailed update to the reservoir cost estimate was prepared in preparation of the 2016 RWP. New costs were developed for the impoundment as well as pump station and conveyance facilities. Costs for the reservoir were developed based on updated information based on a combination of recent

FNI projects and other cost scaling based on the Engineering News Record (ENR) indices. Quantities of embankment fill, slurry trench, and soil cement were updated form the original estimates. Estimates for erosion protection along the Brazos River were also updated. Costs for the pump station and conveyance conceptual design were based on current and previous design studies as well as rations originating from ENR.

Table 2 summarizes the component costs of key facilities. Costs are presented in September 2013 dollars and include a contingency of 30% including professional services.

Based on these costs as presented and assuming full utilization of the reservoir yield of 99,650 acre-feet per year, the unit cost for water from the project is approximately $231 per acre-foot during the debt term and $33 per acre-foot following the retirement of the debt on the project (40 years).

Table 1 – Allens Creek Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					December 30, 2013
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$174,711,410	$174,711,410
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$61,148,994	$61,148,994
3	LAND AND EASEMENTS	1	LS	$952,794	$952,794
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$60,458,394	$60,458,394
5	INTEREST DURING CONSTRUCTION	1	LS	$18,955,303	$18,955,303
	PROJECT CAPITAL COST				$316,226,894

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$19,707,369	$19,707,369	$19,707,369	$19,707,369	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$2,691,577	$2,691,577	$2,691,577	$2,691,577	$2,691,577	$2,691,577
3	PUMPING ENERGY COSTS	$623,839	$623,839	$623,839	$623,839	$623,839	$623,839
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$23,022,784	$23,022,784	$23,022,784	$23,022,784	$3,315,415	$3,315,415

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$23,022,784	$23,022,784	$23,022,784	$23,022,784	$3,315,415	$3,315,415
2	YIELD	99,650	99,650	99,650	99,650	99,650	99,650
3	UNIT COST	$231	$231	$231	$231	$33	$33
	TOTAL UNIT COST						$165

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$54,532,000	$54,532,000
2	APPROACH CHANNEL	1	LS	$5,703,900	$5,703,900
3	DISCHARGE CONVEYANCE	1	LS	$5,395,000	$5,395,000
4	OFF-CHANNEL RESERVOIRS	1	LS	$62,331,900	$62,331,900
5	EROSION PROTECTION	1	LS	$28,230,900	$28,230,900
6	RELOCATIONS	1	LS	$18,517,710	$18,517,710
	PROJECT COST				$174,711,410

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$54,532,000	$1,363,300
2	APPROACH CHANNEL	1.0	%	$5,703,900	$57,039
3	DISCHARGE CONVEYANCE	1.0	%	$5,395,000	$53,950
4	OFF-CHANNEL RESERVOIRS	1.5	%	$62,331,900	$934,979
5	EROSION PROTECTION	1.0	%	$28,230,900	$282,309
6	RELOCATIONS	0.0	%	$18,517,710	$0
	ANNUAL OPERATION AND MAINTENANCE COST				$2,691,577

PROJECT EVALUATION

Based on the analysis provided above, the Allens Creek Reservoir project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	The project provides raw water at a highly competitive cost for future water supplies in the Brazos River Basin.
Location	5	The project is located upstream of significant future needs identified in the lower Brazos.
Water Quality	3	No known water quality issues impacted by the project.
Environmental Land and Habitat	4	Project has been configured in such a way to minimize impacts. Off-channel location is preferable to on-channel reservoir development.
Environmental Flows	3	The project will reduce peak flows in the Brazos Basin but releases will improve dry-weather baseflows downstream.
Local Preference	4	The project is recognized as a priority in the lower Brazos River Basin for meeting future needs.
Institutional Constraints	4	Project has received a water right permit and land for reservoir site is already purchased.
Development Timeline	4	The project may be developed within 15 years due to steps that have already been undertaken to further the project.
Sponsorship	4	Project sponsors have been identified and willing to commit to project pending support from potential customers.
Vulnerability	2	Some risk from natural and man-made disasters due to impoundment of water.
Impacts on Other Projects	5	Project has the potential to benefit the overall yield of the BRA System Operation Permit by maximizing the utility of storage in the lower basin.

WATER USER GROUP APPLICATION

The Allens Creek Reservoir project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	The location of the project provides for service to needs in the lower Brazos Basin through bed and banks transfer. Also, the reservoir may serve customers in western Harris County or northern Fort Bend County through the development of pipeline infrastructure.

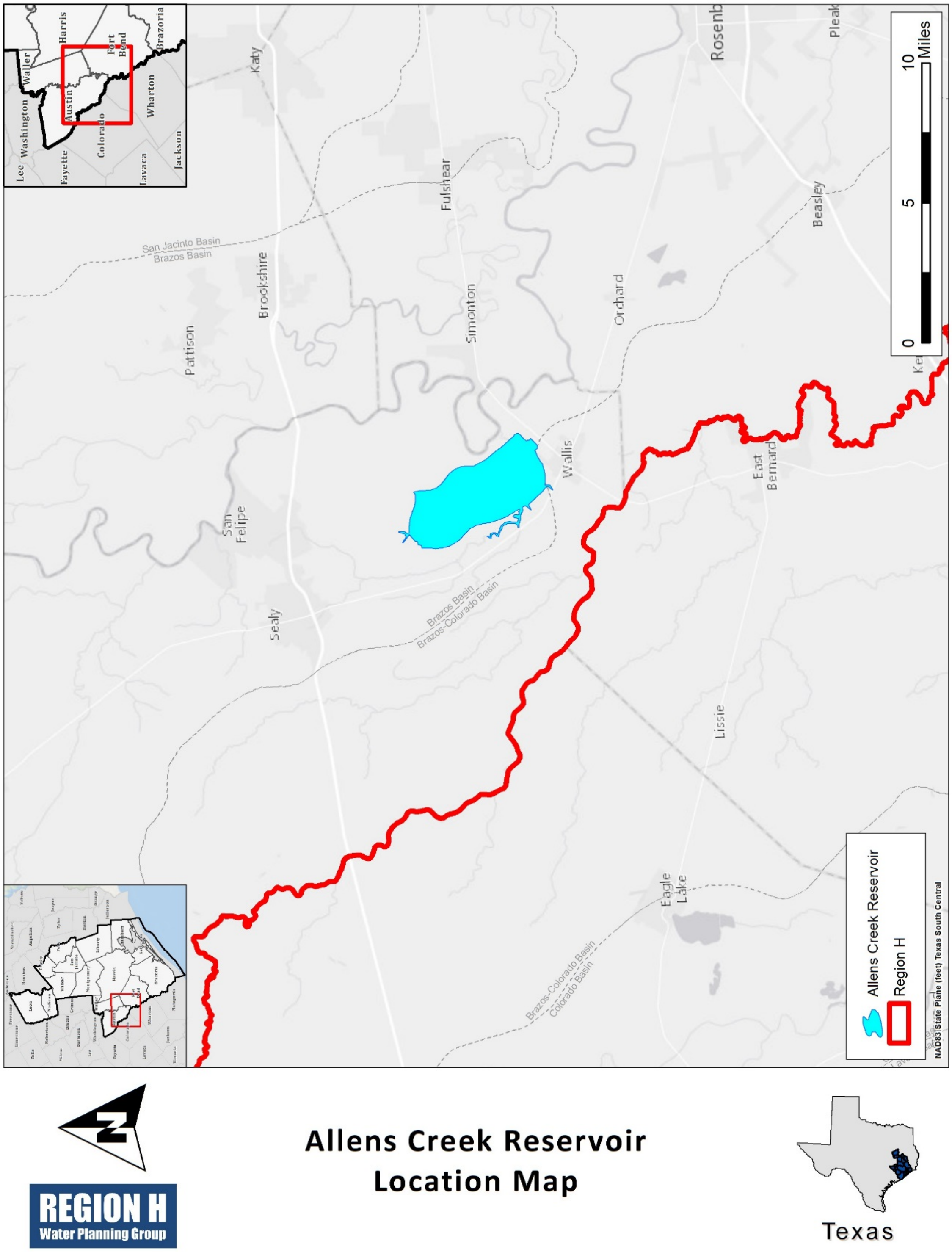
CRITERIA	WUG SUITABILITY
Size	The magnitude of the project makes is adequate for serving large demands through the sale of water to WWPs that serve a large geographic area.
Water Quality	The project will produce raw water that may be treated through additional projects to provide for treated, potable water.
Unit Cost	The unit cost for the project is relatively low for a reservoir project and highly competitive with other projects in the lower Brazos River basin.
Other Factors	

REFERENCES

Texas Commission on Environmental Quality Water Right Permit Number 2925A, January 2002.

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Austin, Accessed January 9, 2014.

LOCATION MAP



Allens Creek Reservoir
Location Map

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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	BRA System Operation Permit
Project ID:	SWDV-002
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	25,350 ac-ft/yr (22.6 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$0 (Sept. 2013)
Unit Water Cost (Rounded):	$0 per ac-ft (during loan period) $0 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Brazos River Authority (BRA) has submitted a permit application to the Texas Commission on Environmental Quality (TCEQ) requesting additional appropriation of water that could be made available through system operation of the BRA's existing water rights and reservoirs.

PROJECT ANALYSES

The project analyses for the BRA System Operation Permit include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The BRA has submitted a permit application to the TCEQ requesting additional appropriation of water from existing reservoirs and BRA water rights, with the yield generated through operation of reservoir facilities as a coordinated system. The Region G Water Planning Group (Brazos G) evaluated the BRA System Operations Permit as a potential water management strategy for the 2011 RWP. The Brazos G Water Availability Model (WAM) was utilized to determine the availability of water from the BRA System. Total project yield was estimated as approximately 200,000 ac-ft/yr; through interregional coordination and discussions with BRA, it was determined that 25,350 ac-ft/yr was an appropriate conservative estimate of the portion of this yield available to Region H; this matches the amount of the System Operation project that was assigned to Region H for the 2011 RWP.

Environmental Considerations

The primary impact associated with the implementation of this project is an increase in diversions from the Brazos River. Increased diversion of water from the Brazos River will result in some decreases in instream flow downstream of diversion points. However, the proposed permit would be subject to environmental flow restrictions in the basin senior to the permit and would likely be subject to a number of permit-specific requirements. This project would create increased yield from more efficient use of existing infrastructure, which would cause less surface disturbance impacts relative to yield increase through reservoir construction.

Permitting and Development

The BRA System Operation Permit has been referred to the State Office of Administrative Hearings (SOAH) for consideration.

Cost Analysis

The costs associated with developing this project are included under other infrastructure projects.

PROJECT EVALUATION

Based on the analysis provided above, the BRA System Operation Permit project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Cost reflected under other strategies for use of additional supply.
Location	4	Transmission infrastructure required for some potential users.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	3	Limited impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below diversion points.
Local Preference	2	Some opposition.
Institutional Constraints	2	Some permit opposition.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	5	Sponsor has identified project and is in development.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

The BRA System Operation Permit project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project requires conveyance infrastructure for some potential users.
Size	Project provides a large volume of water that may be applied through contract to demands of various magnitudes.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	Cost reflected under other strategies for use of additional supply.
Other Factors	This project can be implemented primarily through optimized use of existing infrastructure.

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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Dow Off-Channel Reservoir and Pump Station Expansion
Project ID:	SWDV-003
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	80,000 ac-ft/yr (71.4 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$255,865,694 (Sept. 2013)
Unit Water Cost (Rounded):	$303 per ac-ft (during loan period) $36 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Dow Chemical Company – Texas Operations plans to increase the total raw water pumping and storage capacity available for use at their industrial site in Freeport, Texas. Increasing the site's reservoir storage capacity and building a new river intake and pump station would give Dow more flexibility in managing their raw water resources and provide protection during drought conditions when pumping from the Brazos River is limited or curtailed. This project does not require a new water right appropriation because it is intended to firm up existing water rights held by Dow and the Brazosport Water Authority to meet manufacturing and municipal shortages in Brazoria County. The proposed reservoir would provide an additional firm yield supply quantity of 80,000 acre-feet/year.

PROJECT ANALYSES

The project analyses for Dow Off-Channel Reservoir and Pump Station Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Dow pumps raw water supply from the Brazos River to meet the manufacturing demands of its industrial site, manufacturing demands of fence line partners, and municipal demands of the Brazosport Water Authority (BWA) and its customers. Water is diverted by Dow under Dow's water rights and on behalf of BWA under the authority's water rights. The current supply available from the water rights held by Dow and the BWA is 153,967 acre-feet per year, including 137,763 for manufacturing use (includes approximately 288 acre-feet per year provided to industry by BWA) and 16,204 acre-feet per year for municipal use. This was determined using the Brazos Basin WAM developed for use by the Brazos G and Region H Water Planning Groups during development of the 2011 Plans. During the drought in the summer of 2009, extremely low flows caused Dow to cease pumping from the Brazos River into their raw water storage reservoirs. The proposed project would increase the amount of off-channel reservoir storage capacity by 56,760 acre-feet and would provide a 4- to 8-month supply for Dow during the driest months of the critical drought, allowing Dow to meet more of its current raw water demand and the demands of the municipal customers of the BWA. A new raw water intake and pump station, with a pumping capacity of 200,000 gpm, will make efficient use of the additional storage capacity, and allow Dow to provide an additional 80,000 acre-feet per year of firm supply when used in conjunction with Dow's and the BWA's existing water rights and Dow's Two-Tier BRA contract.

The reservoir expansion would consist of an earthen embankment built to an elevation of 79 feet, MSL, with a conservation storage pool level of 73 feet, MSL. The reservoir expansion would have an average water depth of 33 feet with an average embankment height of approximately 39 feet. An exploratory geotechnical analysis indicates that sufficient on-site materials exist to construct the compacted clay embankment. The embankment would include a vertical chimney drain and horizontal sand blanket drain. The materials for both drains would need to be imported from off-site. An outlet works system would discharge into Oyster Creek for transport to Dow's pumping facility in Lake Jackson.

A new intake and pump station on the Brazos River having a capacity of 200,000 gpm would be constructed, consisting of a headwall and intake screens leading to four 50,000 gpm vertical end-suction pumps with 1,500 HP motors, which will discharge into a sedimentation basin adjacent to the reservoir expansion. Water pumped into the sediment basin will be allowed to flow into both the existing Harris Reservoir storage and the storage expansion.

Environmental Considerations

The project would impact approximately 2,000 acres of land, which is currently used for agricultural production and grazing. Although a number of federal and state endangered and threatened species are listed for Brazoria County, the existing disturbed condition of the proposed site suggests that impacts to listed species essentially have already occurred and any additional impacts will be moderate to low. Large changes in nearby property values are not anticipated due to the rural nature of the existing area. Recreational use of the reservoir will be closely managed by Dow and is anticipated to include fishing and bird watching.

Permitting and Development

The development of a project of this nature will require the study and consideration of many issues. These will include, but not necessarily limited to: Texas Commission on Environmental Quality (TCEQ) water rights permitting for additional off-channel storage capacity (application has been submitted to the TCEQ for the additional storage capacity), U.S. Army Corps of Engineers (USACE) Section 404 permitting, environmental assessments of the intake and pump station and reservoir sites, Sand, Gravel and Marl permit from the Texas Parks and Wildlife Department (TPWD), compliance with TCEQ dam safety regulations including reviews and construction approvals, revisions to Federal Emergency Management Agency (FEMA) floodplain mapping for the Oyster Creek and Brazos River floodplains, utility relocations, new electrical power supply to the pump station site, road relocations, sediment removal (permitting and facility design), Storm Water Pollution Prevention Plans for construction operations, and site security.

Cost Analysis

Costs were developed for the reservoir expansion project and are contained below in *Table 1*.

Table 1 – Dow Off-Channel Reservoir and Pump Station Expansion Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					January 1, 2015
ITEM	**DESCRIPTION**	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$173,928,000	$173,928,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$60,874,800	$60,874,800
3	LAND AND EASEMENTS	1	LS	$100,000	$100,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$2,000,000	$2,000,000
5	INTEREST DURING CONSTRUCTION	1	LS	$18,962,894	$18,962,894
	PROJECT CAPITAL COST				**$255,865,694**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
1	DEBT SERVICE	$21,410,670	$21,410,670	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$2,864,105	$2,864,105	$2,864,105	$2,864,105	$2,864,105	$2,864,105
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	**$24,274,775**	**$24,274,775**	**$2,864,105**	**$2,864,105**	**$2,864,105**	**$2,864,105**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
1	ANNUAL COST	$24,274,775	$24,274,775	$2,864,105	$2,864,105	$2,864,105	$2,864,105
2	YIELD	80,000	80,000	80,000	80,000	80,000	80,000
3	UNIT COST	$303	$303	$36	$36	$36	$36
	TOTAL UNIT COST						**$125**

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$34,951,000	$34,951,000
2	OFF-CHANNEL RESERVOIRS	1	LS	$120,112,000	$120,112,000
3	OTHER	1	LS	$18,865,000	$18,865,000
	PROJECT COST				**$173,928,000**

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$34,951,000	$873,775
2	OFF-CHANNEL RESERVOIRS	1.5	%	$120,112,000	$1,801,680
3	OTHER	1.0	%	$18,865,000	$188,650
	ANNUAL OPERATION AND MAINTENANCE COST				**$2,864,105**

PROJECT EVALUATION

Based on the analysis provided above, the Dow Off-Channel Reservoir and Pump Station Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

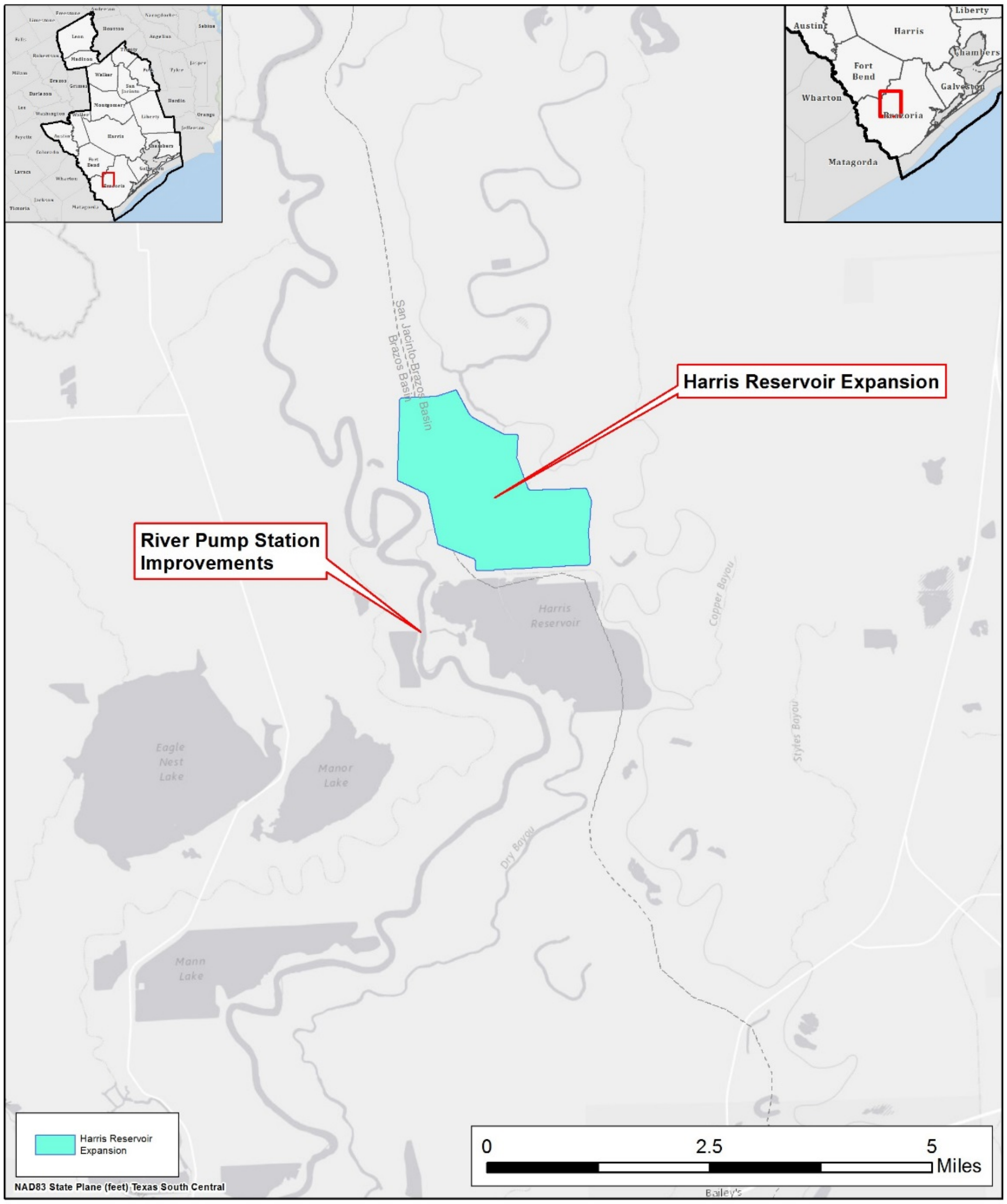
CRITERIA	RATING	EXPLANATION
Cost	4	Reservoir improvements result in a fairly low-cost project for enhancing yields from the Brazos River.
Location	5	Reservoir is already in proximity to demands through existing infrastructure.
Water Quality	4	Water supply quality is enhanced through the development of additional raw water that is less impacted by intrusion of saltwater in lower reaches of the Brazos River.
Environmental Land and Habitat	4	Limited environmental impacts associated with identified site.
Environmental Flows	2	Reduction in instream flows during periods when the reservoir is filled. These diversions are currently within the limits of the existing water right.
Local Preference	5	Widespread support and opportunity to enhance manufacturing and municipal water supplies.
Institutional Constraints	4	Property acquired and limited permitting in progress.
Development Timeline	5	Project development within 5 years.
Sponsorship	5	Dow is identified as project sponsor and the project is moving forward.
Vulnerability	3	Some risk from natural and man-made disasters due to impoundment of water.
Impacts on Other Projects	4	Project provides additional surface water availability Dow and BWA water rights.

WATER USER GROUP APPLICATION

The Dow Off-Channel Reservoir and Pump Station Expansion project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Location of the project suits it to serving existing customers of the Dow and BWA systems.
Size	Project supply capacity is a considerable benefit to large deficits traditionally associated with the lower Brazos River Basin.
Water Quality	Project produces raw water for use by customers who require raw water or are already prepared to treat raw water for other uses.
Unit Cost	Unit cost is reasonable for municipal and industrial needs.
Other Factors	Project is being sponsored by Dow Chemical and is intended to serve the needs of Dow and their current and future customers.

LOCATION MAP



Dow Off-Channel Reservoir Expansion Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Freeport Seawater Desalination
Project ID:	SWDV-004
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	11,200 ac-ft/yr (10 mgd)
Implementation Decade:	2040
Development Timeline:	5 years
Project Capital Cost:	$132,937,747 (Sept. 2013)
Unit Water Cost (Rounded):	$2,454 per ac-ft (during loan period) $1,461 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Brazos River Authority (BRA) and Poseidon Water (Poseidon) cooperated on a study of a potential desalination facility in the vicinity of the Dow Chemical facility in Freeport. This study was concluded in 2004 as part of the Texas Water Development Board (TWDB) initiative for desalination research. Since that time, the project has been included in the 2006 and 2011 Region H Regional Water Plans (RWPs). However, the status of the project has changed from an active pursuit to an inactive concept. Despite this status, the project remains a viable alternative for water supply and may be enhanced in the future through additional technological development in a way which may make the project more cost-effective.

This memorandum summarizes the project as conceptualized in the original study and presented in the TWDB 2004 Biennial Report on Seawater Desalination. Although no active sponsors exist for the project, the site originally identified in the study remains available for development. Therefore, this concept is still a viable option for water supply and provides a reference for costs associated with seawater desalination in Region H.

PROJECT ANALYSES

The strategy analyses for Freeport Seawater Desalination include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The concept for the project, as presented, is derived from the concept presented in the 2004 report. A desalination facility located in Freeport would allow desalinated water to be supplied to such wholesale water providers as the Brazosport Water Authority (BWA) and/or the Gulf Coast Water Authority (GCWA). These wholesale water providers (WWPs) would then be able to replace or augment their supplies with a reliable, high-quality water supply from an alternative source that would reduce water-quality issues that have been encountered in the past. Additionally, current BWA and GCWA surface water sources, diversion rights from the Brazos River, could be contracted to provide for industrial raw water demands rather than for use to meet municipal shortages.

The proposed strategy calls for a 10 MGD reverse osmosis (RO) treatment facility within the Dow Chemical Company complex in Freeport with capability to scale to as much as 100 MGD. Currently, Dow is not interested in sponsoring a desalination project in the near term. The proposed location of the project benefits the project in several ways that include, but are not limited to:

- Pre-existing infrastructure for supporting large-scale industrial processes to reduce costs and expedite project implementation.
- Access to saline and fresh water sources and discharge points.
- Pre-existing permits for withdrawal and discharge.
- Discharge directly into the Gulf of Mexico and fewer environmental concerns than a system discharging into a bay system.

The proposed facility location allows access to an existing seawater intake, A801, located across from the port of Freeport or raw water from the Brazos River. Brine created from the desalination process with a solids concentration nearly twice that of incoming seawater, would be discharged from the site at outfall No. 001 where it will be diluted and discharged into the Brazos River and, ultimately, the Gulf of Mexico.

Pretreatment will be performed by means of high-rate sedimentation, filtration, and chlorination and pH adjustment to reduce impacts on process equipment, incoming seawater will be fed to 8-inch diameter, high rejection seawater membrane elements. Post-processing of the water will include stabilization to make the treated water non-aggressive to the distribution system and provide residual chlorination for disinfection. Fresh water from the Brazos River could be blended with desalinated water to maximize the economic efficiency of the plant.

Environmental Considerations

Environmental impacts associated with this project are expected to be minimal due to the nature of the identified site. Access to an existing seawater intake and discharge point allows for minimal additional to water resources in the area. The site itself is adjacent to existing industrial facilities and is expected to have minimal impacts to habitat and wildlife.

Permitting and Development

Permit requirements for the implementation of the project are expected to be minimal, as the facility is located within the Dow industrial complex. This location will minimize further impacts on threatened and endangered species, wetlands, and other environmental factors. Existing Dow permits for seawater withdrawals may be amended to allow for the plant's operation. Also, pipe alignments are expected to follow existing pipelines whenever possible, minimizing environmental issues along these rights-of-way. Waste-stream discharge, though occurring through the existing Dow discharge canal system, will require a separate TPDES discharge permit.

Cost Analysis

Costs were originally developed for a number of scenarios presented in the initial study. For the sake of Region H, the costs from the TWDB report were adapted into the values in *Table 1*.

Table 1 – Freeport Seawater Desalination Project Costs

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$93,980,000	$93,980,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$24,170,000	$24,170,000
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$8,730,000	$8,730,000
5	INTEREST DURING CONSTRUCTION	1	LS	$6,057,747	$6,057,747
	PROJECT CAPITAL COST				$132,937,747

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$11,124,142	$11,124,142	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$12,298,450	$12,298,450	$12,298,450	$12,298,450
3	PUMPING ENERGY COSTS	$0	$0	$4,066,000	$4,066,000	$4,066,000	$4,066,000
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$27,488,592	$27,488,592	$16,364,450	$16,364,450

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$27,488,592	$27,488,592	$16,364,450	$16,364,450
2	YIELD	-	-	11,200	11,200	11,200	11,200
3	UNIT COST	$0	$0	$2,454	$2,454	$1,461	$1,461
	TOTAL UNIT COST						$1,958

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$7,250,000	$7,250,000
2	PIPELINES	1	LS	$27,520,000	$27,520,000
3	WATER TREATMENT PLANTS	1	LS	$59,210,000	$59,210,000
	PROJECT COST				$93,980,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$7,250,000	$181,250
2	PIPELINES	1.0	%	$27,520,000	$275,200
3	WATER TREATMENT PLANTS	1.0	LS	$11,842,000	$11,842,000
	ANNUAL OPERATION AND MAINTENANCE COST				$12,298,450

PROJECT EVALUATION

Based on the analysis provided above, the Freeport Seawater Desalination strategy was evaluated across eleven different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	Very high project but is associated with a drought proof, high quality water supply.
Location	3	Conveyance likely required to meet demands. This is dependent upon the location of future municipal and industrial development in the lower Brazos River Basin.
Water Quality	3	No known water quality issues due to location of intake and discharge points.
Environmental Land and Habitat	3	Limited environmental concerns associated with project development.
Environmental Flows	3	No impact on environmental flows due to location of intake and discharge.
Local Preference	3	Local support for desalination development.
Institutional Constraints	3	Limited permit requirements. Property available for potential project development.
Development Timeline	5	Reasonably short development process due to existing infrastructure for seawater intake and brine discharge.
Sponsorship	2	BRA remains interested in the project but is not yet committed due to other alternative projects in the basin.
Vulnerability	3	Risk to project related to natural disasters within proximity to the coast. However, this risk is mitigated through existing, developed infrastructure.
Impacts on Other Projects	3	No impacts on other projects.

WATER USER GROUP APPLICATION

The Freeport Seawater Desalination project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	The proposed project is ideally suited to serving needs in the Freeport area. However, the original project concept recommended delivery of desalinated water far from the location of the plant.

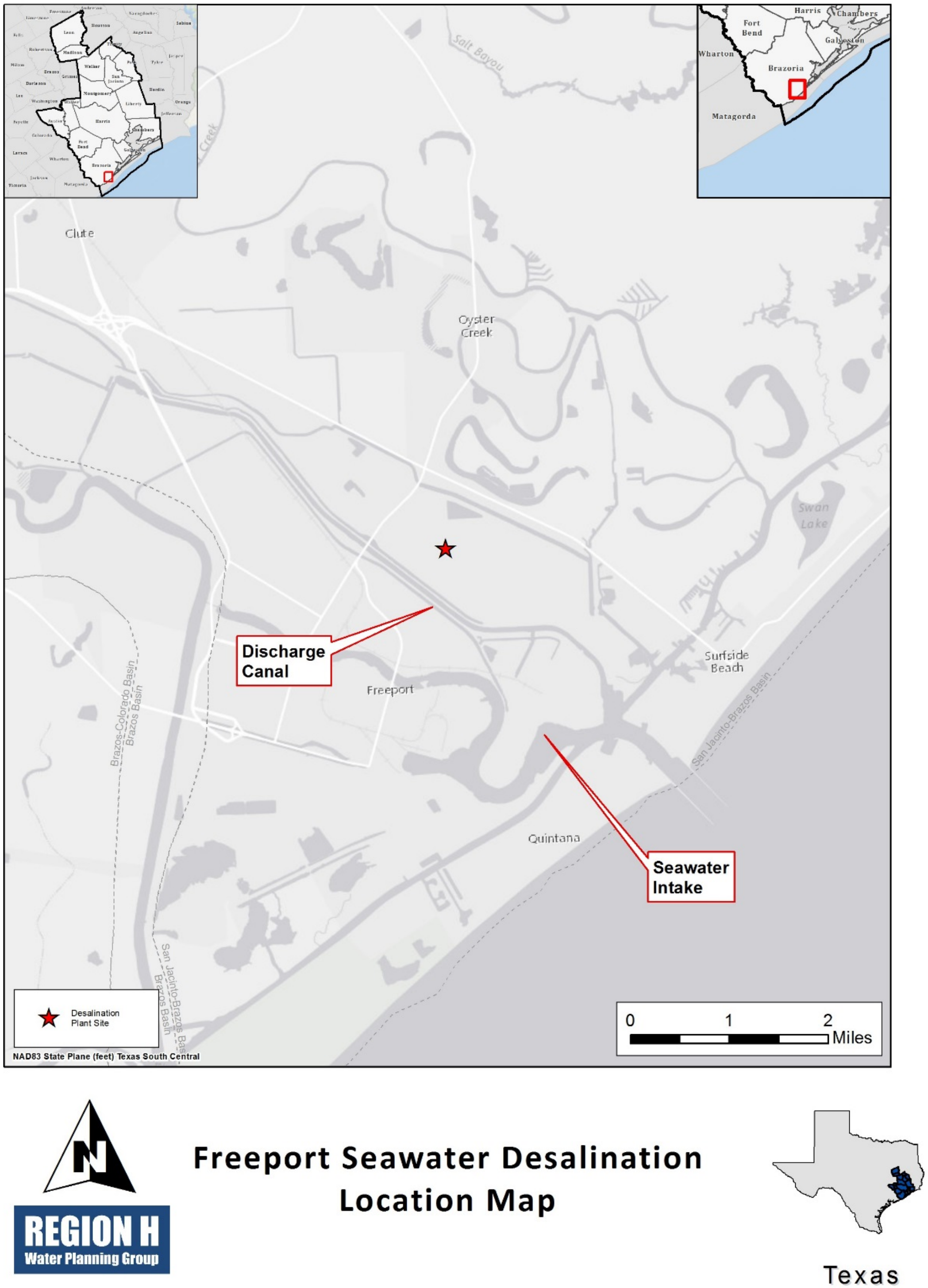
CRITERIA	WUG SUITABILITY
Size	The project may be scaled from as little as 10 MGD to as much as 100 MGD based on the concept outlined in the original study making it adaptable for a number of potential water needs.
Water Quality	The water from this project would be a high-quality, RO-treated supply that would be appropriate for municipal or extremely high-quality industrial use.
Unit Cost	The unit cost for this project prohibitive to most users with alternatives available. However may be reasonable for uses requiring a supply that is protected from effects of drought.
Other Factors	Many of the needs in the immediate vicinity of the project are currently planned to be met with alternative water supplies in the near-term.

REFERENCES

Texas Water Development Board. The Future of Desalination in Texas, Volume 1 – Biennial Report on Seawater Desalination. 2004.

CDM. Freeport Seawater Desalination Project Final Report. 2004.

LOCATION MAP



REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Lake Somerville Augmentation Project
Project ID:	SWDV-005
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	Up to 22,800 ac-ft/yr (20.4 mgd)
Implementation Decade:	2020 potential
Development Timeline:	5 years
Project Capital Cost:	Varies based on configuration
Unit Water Cost (Rounded):	Varies based on configuration

PROJECT DESCRIPTION

The Brazos River and its tributaries serve as a major source of water supply for entities in Regional Water Planning Areas (RWPAs) G and H. Due to the natural variability of flows in the basin, reservoirs have played an important role in capturing and storing high flows to generate more reliable water supplies. Through the Regional Planning process and other planning efforts, a number of supply concepts to increase Brazos River Basin supplies through increased use of storage have been considered. One potential option is the use of available storage capacity in Lake Somerville to store flows diverted from the main channel of the Brazos River and conveyed to the lake by pipeline.

PROJECT ANALYSES

The project analyses for Lake Somerville Augmentation project include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Lake Somerville, which is located on Yegua Creek, is operated by the US Army Corps of Engineers (USACE) and through contract serves as a water supply impoundment for the Brazos River Authority (BRA). One concept to increase firm water supplies in the Brazos Basin is the development of a pump station and pipeline to divert high flows from the Brazos River to utilize available storage in Lake Somerville and potentially increase the firm yield of the reservoir. The lake is currently permitted for diversions of up to 48,000 ac-ft per year for multiple uses under Certificate of Adjudication (COA) 12-5164.

TWDB's First Amended General Guidelines for Regional Water Plan Development requires the use of WAM Run 3, reflecting full authorized diversion of current water rights with no return flows, when determining the supply available to the region. Run 3 represents a conservative approach, since not all rightholders attempt to divert their full permit amount every year and diversions for municipal and manufacturing users typically return a portion of diverted water to streams as treated wastewater effluent. However, the majority of water rights do not address return flows to source streams, implying a right to full consumptive use. For this reason, and because the planning period extends 50 years into the future, use of a model reflecting full consumptive diversion by all rights is appropriate for long-term planning. The model simulates a set of monthly diversion targets attempted annually against a historical inflow dataset including the drought of record. Water diversions are modeled according to the parameters of each particular water right and are taken in priority order, such that the senior water rights are satisfied before junior rights are allowed to divert water.

A preliminary planning-level Yield analysis for the project was conducted by the Region H Regional Water Planning Group (RWPG) using the Brazos G Water Availability Model (WAM) as a base model. The Brazos G WAM is a modified version of the Texas Commission on Environmental Quality (TCEQ) Run 3 WAM developed by the Brazos G RWPG to for use in development of its Regional Plan. In addition to the adjustments made by the Brazos G RWPG, the model used for this analysis was modified to reflect projected Year 2025 sedimentation conditions for Lake Somerville. Four scenarios were executed to determine the potential firm yield benefit of an augmentation project for Lake Somerville. Scenario 1 acted as a baseline and did not include a pipeline transfer, while Scenarios 2 and 3 included a pipeline transfer with a 100 million gallon per day (mgd) and 200 mgd pump station, respectively. Scenario 4 modeled a pipeline transfer with no limit on pump station capacity. The new diversion was modeled as a new water right at Lake Somerville able to draw flows from a nearby point on the Brazos River and junior in priority to the existing water rights in the model. For each scenario, the total diversion target of the reservoir was iteratively adjusted until a firm diversion target which could be met without shortage was determined. The results of the modeling analysis are shown in *Table 1*.

Table 1 – Modeled Firm Yield

Scenario	Pump Station (mgd)	Yield (ac-ft/yr)	Yield Increase (ac-ft/yr)
1	0	41,900	0
2	100	55,200	13,300
3	200	64,700	22,800
4	∞	64,700	22,800

The results of this analysis suggest that a pipeline transfer project from the main stem of the Brazos River to Lake Somerville could have some benefit in terms of increased firm yield. Due to the highly variable nature of flows in the Brazos River, generating an appreciable volume of yield from this project concept would require a large pump station of sufficient capacity to capture intermittent high flows not appropriated by more senior water rights. Although the model results indicate that implementation of the project would require high-capacity infrastructure, the resultant yields were proportionally large compared to the baseline scenario, with a potential improvement in yield to approximately 150 percent of that exhibited by the Scenario 1.

Environmental Considerations

Due to the conceptual nature of this project, a detailed project-specific environmental assessment or field survey has not been performed. Any project of this magnitude will include environmental challenges to be resolved during planning, design, and construction. Specific environmental obstacles would be identified during routing studies of the proposed alignment and other infrastructure. Construction of pipeline and pump station facilities would create some degree of surface disturbance, although disturbance and associated impacts would likely be limited for the conceptual pipeline route, which largely follows existing roadway alignments. Overall habitat impacts for the project would be expected to be far less than those necessary for development of a new reservoir.

As with any new appropriation or transfer of surface water, there is the potential for impact to instream flows and habitat. However, several factors likely mitigate potential impacts for the Lake Somerville Augmentation project. The project would derive yield largely from diversions captured during periods of high flow in the river. Additionally, the proposed project does not involve an interbasin transfer of water but rather utilizes an impoundment on a tributary which flows into the river south of the diversion point. The concept as modeled would also be junior to the Senate Bill 3 environmental flow standards adopted for the Brazos River Basin.

Permitting and Development

A number of permitting steps are required for the development of this project. A new appropriation of surface water would require water right permitting through the TCEQ. Additionally, because Lake Somerville is operated by USACE, coordination and permitting through that agency would be required as well. Permitting and mitigation would also be required for physical development of infrastructure, potentially including permitting through Section 404 of the Clean Water Act administered by the USACE.

These permitting requirements may require various studies for application including environmental impact or assessment studies, a wildlife habitat mitigation plan, an assessment of impacts to species, and cultural resource studies.

Cost Analysis

Preliminary planning level cost estimates were prepared for the Lake Somerville Augmentation project for infrastructure capacities of 100 mgd and 200 mgd. Costs were developed for a pump station with an intake structure and an estimated 18.4 miles of pipeline using standard Regional Planning costing assumptions and adjusted to a cost reference of September 2013 dollars as required by TWDB. Due to the conceptual nature of the project, cost estimation for this analysis was limited to the major pump station and pipeline components and does not include other components including individual appurtenances, pipeline crossings, relocations or other infrastructure. Cost for the project with a 100 mgd pump station is provided below in *Table 2*, with cost for a 200 mgd pump station in *Table 3*.

Table 2 – Lake Somerville Augmentation Project Cost Estimate (100 mgd Pump Station)

OPINION OF PROBABLE CONSTRUCTION COST							January 31, 2015
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY							
1	CONSTRUCTION (CAPITAL) COST			1	LS	$60,979,135	$60,979,135
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES			1	LS	$18,954,054	$18,954,054
3	LAND AND EASEMENTS			1	LS	$990,472	$990,472
4	ENVIRONMENTAL - STUDIES AND MITIGATION			1	LS	$502,504	$502,504
5	INTEREST DURING CONSTRUCTION			1	LS	$2,604,774	$2,604,774
	PROJECT COST						$84,030,938
ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$7,031,653	$7,031,653	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$807,885	$807,885	$807,885	$807,885	$807,885	$807,885
3	PUMPING ENERGY COSTS	$490,462	$490,462	$490,462	$490,462	$490,462	$490,462
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$8,330,000	$8,330,000	$1,298,347	$1,298,347	$1,298,347	$1,298,347
ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$8,330,000	$8,330,000	$1,298,347	$1,298,347	$1,298,347	$1,298,347
2	YIELD	13,300	13,300	13,300	13,300	13,300	13,300
3	UNIT COST	$626	$626	$98	$98	$98	$98
	TOTAL UNIT COST						$274
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY							
1	PUMP STATIONS			1	LS	$13,206,265	$13,206,265
2	PIPELINES			1	LS	$47,772,870	$47,772,870
	PROJECT COST						$60,979,135
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY							
1	PUMP STATIONS			2.5	%	$13,206,265	$330,157
2	PIPELINES			1.0	%	$47,772,870	$477,729
	ANNUAL OPERATION AND MAINTENANCE COST						$807,885
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
PUMP STATION CONSTRUCTION COSTS							
1	5075 HP Pump Station with Intake			1.0	LS	$13,206,265	$13,206,265
	PUMP STATIONS TOTAL COST						$13,206,265
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
PIPELINE CONSTRUCTION COSTS							
1	78'' Diameter Pipeline (Rural Soil)			97,152.0	LF	$492	$47,772,870
	PIPELINES TOTAL COST						$47,772,870

Table 3 – Lake Somerville Augmentation Project Cost Estimate (200 mgd Pump Station)

OPINION OF PROBABLE CONSTRUCTION COST							January 31, 2015
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY							
1	CONSTRUCTION (CAPITAL) COST			1	LS	$110,728,761	$110,728,761
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES			1	LS	$34,120,019	$34,120,019
3	LAND AND EASEMENTS			1	LS	$990,472	$990,472
4	ENVIRONMENTAL - STUDIES AND MITIGATION			1	LS	$502,504	$502,504
5	INTEREST DURING CONSTRUCTION			1	LS	$4,681,384	$4,681,384
	PROJECT COST						$151,023,140
ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$12,637,515	$12,637,515	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,377,705	$1,377,705	$1,377,705	$1,377,705	$1,377,705	$1,377,705
3	PUMPING ENERGY COSTS	$885,151	$885,151	$885,151	$885,151	$885,151	$885,151
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
5	OTHER (HIDE IF INACTIVE)						
	TOTAL ANNUAL COST	$14,900,371	$14,900,371	$2,262,855	$2,262,855	$2,262,855	$2,262,855
ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$14,900,371	$14,900,371	$2,262,855	$2,262,855	$2,262,855	$2,262,855
2	YIELD	22,800	22,800	22,800	22,800	22,800	22,800
3	UNIT COST	$654	$654	$99	$99	$99	$99
	TOTAL UNIT COST						$284
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY							
1	PUMP STATIONS			1	LS	$18,027,812	$18,027,812
2	PIPELINES			1	LS	$92,700,949	$92,700,949
	PROJECT COST						$110,728,761
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY							
1	PUMP STATIONS			2.5	%	$18,027,812	$450,695
2	PIPELINES			1.0	%	$92,700,949	$927,009
	ANNUAL OPERATION AND MAINTENANCE COST						$1,377,705
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
PUMP STATION CONSTRUCTION COSTS							
1	9159 HP Pump Station with Intake			1.0	LS	$18,027,812	$18,027,812
	PUMP STATIONS TOTAL COST						$18,027,812
ITEM	DESCRIPTION			QUANTITY	UNIT	UNIT PRICE	TOTAL
PIPELINE CONSTRUCTION COSTS							
1	108'' Diameter Pipeline (Rural Soil)			97,152.0	LF	$954	$92,700,949
	PIPELINES TOTAL COST						$92,700,949

PROJECT EVALUATION

Based on the analysis provided above, the Lake Somerville Augmentation project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	3	Project is moderately expensive but annual costs decrease considerably after debt service.
Location	4	Project requires extensive pipeline conveyance.
Water Quality	3	No known issues related to water quality.
Environmental Land and Habitat	3	Environmental impacts associated with the project can be mitigated.
Environmental Flows	2	Reduction in instream flows limited by flow requirements for Brazos River Basin.
Local Preference	3	No known significant opposition to project.
Institutional Constraints	3	Permitting and property acquisition required for project development.
Development Timeline	4	Approximate 10-year development timeline.
Sponsorship	3	Concept identified by Brazos River Authority.
Vulnerability	4	Slight risk from natural and man-made disasters.
Impacts on Other Projects	4	Project has potential to be integrated into System Operation Permit though enhancing overall basin storage.

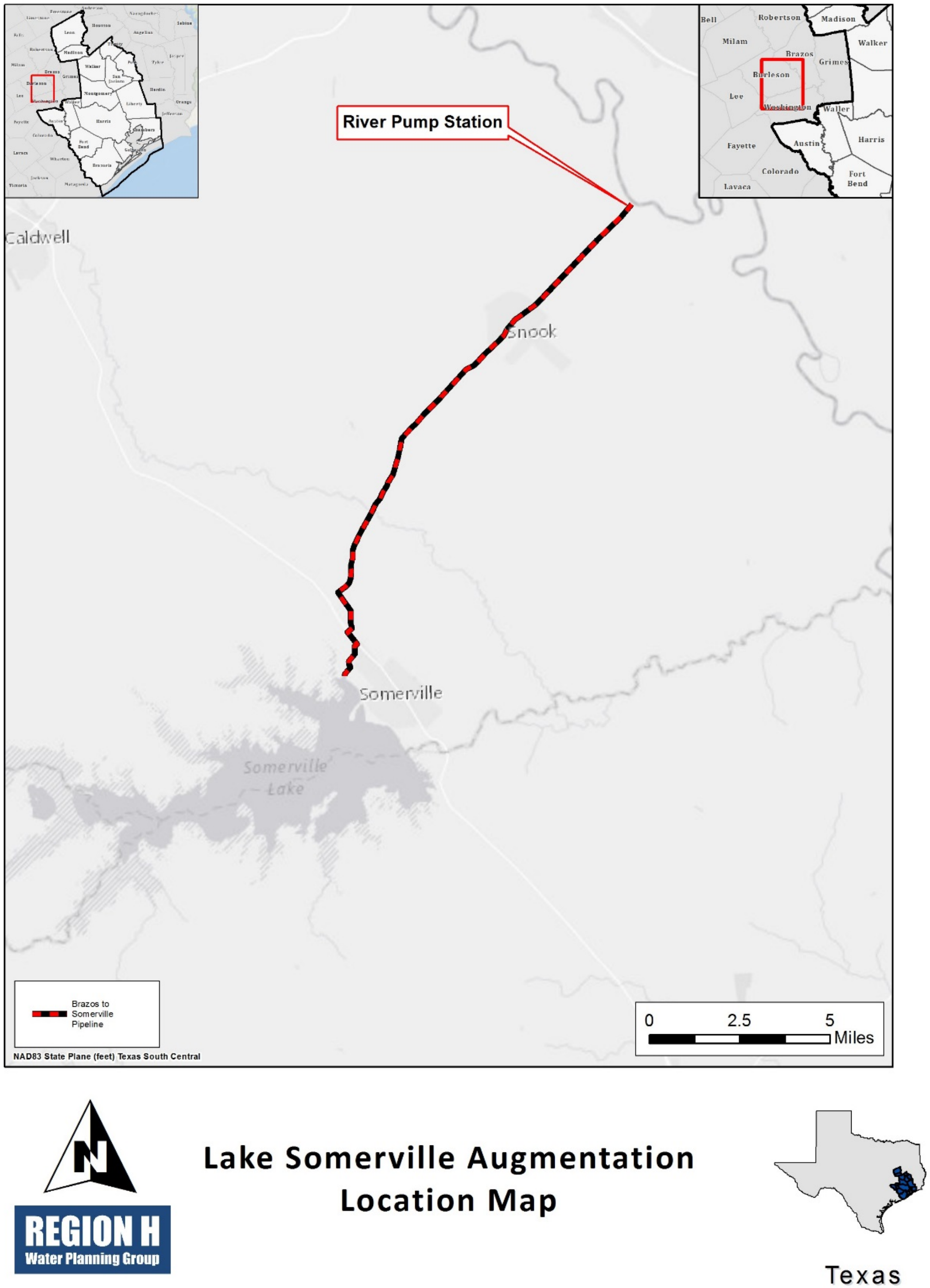
WATER USER GROUP APPLICATION

The Lake Somerville Augmentation project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project is intended to serve customers in the lower Brazos River Basin.

CRITERIA	WUG SUITABILITY
Size	The magnitude of the project makes is adequate for serving moderately large demands through the sale of water to WWPs that serve a large geographic area.
Water Quality	The project will produce raw water that may be treated through additional projects to provide for treated, potable water.
Unit Cost	The unit cost for the project is moderately high during debt service but unit cost declines substantially afterward.
Other Factors	

LOCATION MAP



REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Little River Off-Channel Reservoir
Project ID:	SWDV-006
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	27,225 ac-ft/yr (24.3 mgd)
Implementation Decade:	2040 potential
Development Timeline:	20 years
Project Capital Cost:	$139,664,800 (Sept. 2013)
Unit Water Cost (Rounded):	$365 per ac-ft (during loan period) $56 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Little River Off-Channel Reservoir is an off-channel reservoir located in Milam County near the City of Cameron. The Brazos G Water Planning Group analysis of this water management project was used in the Region H project selection process. The yield and cost data in the summary above is provided by the Brazos G Water Planning Group based on updated analysis and modeling. The reservoir yield above reflects inclusion of this project in the BRA System Operation Permit.

PROJECT ANALYSES

The project analyses for Little River Off-Channel Reservoir include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Yield analysis for the project was conducted by the Brazos G Regional Water Planning Group.

Water potentially available for impoundment in the proposed Little River Off-Channel Reservoir was estimated using the Brazos G WAM. The model utilized a January 1940 through December 1997 hydrologic period of record. Estimates of water availability were derived subject to general assumptions for application of hydrologic models as adopted by the Brazos G Regional Water Planning Group and summarized previously. The model computed the streamflow available for diversion from the Little River into the Little River Off-Channel Reservoir without causing increased shortages to downstream rights. Firm yield was computed subject to the reservoir and Little River diversion having to pass inflows to meet environmental flow standards for the Brazos River basin.

Various maximum diversion capacities associated with potential pipeline sizes (64-inch, 72-inch, 90-inch, 108-inch, and 120-inch diameter pipelines) were considered. The greatest incremental benefit in yield occurs with the 90-inch and 108-inch pipeline sizes.

The calculated firm yield of the Little River Off-Channel Reservoir is 27,225 acre-feet/year. The yield is constrained by the capacity of a 108-inch diameter pipeline. The available firm yield is significant since there is a substantial watershed for the Little River (7,500 square miles) that is uncontrolled.

Environmental Considerations

The potential impacts of this project were evaluated in two locations, at the proposed reservoir site and in the Little River where water will be pumped and diverted to the project site. The potential impacts of this project are very different in the two locations. In the diversion site on the Little River, very little impact is predicted in terms of a reduction in flow variability or quantity of median monthly flows. But in the proposed project site, there would be dramatic reductions in both flow variability and the quantity of median monthly flows.

Although there would be biological impacts in the immediate vicinity of the project site and downstream, it is not likely that this project, alone, would have a substantial influence on total discharge in the Brazos River, in which case there would be minimal influence on freshwater inflows to the Brazos River estuary. However, the cumulative impact of multiple projects may reduce freshwater inflows into the estuary.

A total of 28 species could potentially occur within the vicinity of the site that are state or federally-listed as threatened or endangered, candidates for listing, or exhibit sufficient rarity to be listed as a species of concern. This group includes 1 amphibian, 4 reptiles, 8 birds, 3 mammals, 5 fish species, 5 mollusks, and 2 plant species. One amphibian, two bird species, and one plant species federally-listed as threatened or endangered could occur in the project area. These include the Houston toad (*Bufo houstonensis*), interior least tern (*Sterna antillarum athalassos*), whooping crane (*Grus americana*), and Navasota ladies'-tresses (*Spiranthes parksii*). The interior least tern, and whooping crane are seasonal migrants that could pass through the project area but would not likely be directly affected by the proposed reservoir. The Navasota Ladies'-tresses occur on upland margins of intermittent, minor tributaries in association with post oak, blackjack oak, and yaupon.

A search of the Texas Natural Diversity Database revealed documented occurrences of Navasota ladies'-tresses an endangered species and Park's jointweed, a species of concern, within two miles of the proposed Little River Off-Channel Reservoir. These data are not a representative inventory of rare resources or sensitive sites. Although based on the best information available to TPWD, these data do not provide a definitive statement as to the presence, absence, or condition of special species, natural communities, or other significant features in the project area. On-site evaluations will be required by qualified biologists to confirm the occurrence of sensitive species or habitats.

Approximately 4,343 acres are estimated to be inundated by the reservoir. Projected wildlife habitat that will be impacted includes approximately 2,215 acres of Mixed Grassland, 1,839 acres of Post Oak Woods, and 289 acres of Mixed Riparian Woods/Forest.

A number of vertebrate species could occur within the Little River Off-Channel Reservoir site as indicated by county occurrence records. These include four species of salamanders and newts, 16 species of frogs and toads, nine species of turtles, the American alligator, 10 species of lizards and skinks, and 21 species of snakes. Additionally, 54 species of mammals could occur within the site or surrounding region in addition to an undetermined number of bird species. A variety of fish species would be expected to inhabit streams and ponds within the site, but with distributions and population densities limited by the types and quality of habitats available.

A search of the Texas Archeological Sites Atlas database indicates that 31 archeological sites have been documented within the general vicinity of the proposed reservoir. Nineteen of these sites were recorded by private individuals or by university research programs for academic purposes. All of these sites lie outside the currently proposed reservoir location. These sites represent a variety of historic and prehistoric site types. In addition, Pin Oak Cemetery may lie within the reservoir site. Prior to reservoir inundation, the project must be coordinated with the Texas Historical Commission and a cultural resources survey must be conducted to determine if any cultural resources are present within the conservation pool. Any cultural resources identified during survey will need to be assessed for eligibility for inclusion in the National Register of Historic Places (NRHP) or as State Archeological Landmarks (SAL). Cultural resources that occur on public lands or within the Area of Potential Effect of publicly funded or permitted projects are governed by the Texas Antiquities Code (Title 9, Chapter 191, Texas Natural Resource Code of 1977), the National Historic Preservation Act (PL96-515), and the Archeological and Historic Preservation Act (PL93-291).

Permitting and Development

A number of permitting steps are required for the development of this project. The reservoir requires water right permitting through the Texas Commission on Environmental Quality (TCEQ). Development of the site will involve permitting through Section 404 of the Clean Water Act administered by the United States Army Corps of Engineers (USACE). Additional permitting for project development may include the acquisition of a General Land Office easement for use of State-owned land and a TPWD permit for use of state-owned streambed.

These permitting requirements may require various studies for application including environmental impact or assessment studies, a wildlife habitat mitigation plan, an assessment of impacts to species, and cultural resource studies.

Cost Analysis

Project costs were adapted from information developed by the Brazos G Water Planning Group. These costs have been adjusted accordingly to the requirements of regional plan development and are provided below in *Table 1*.

Table 1 - Little River Off-Channel Reservoir Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					January 10, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$67,620,000	$67,620,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$23,495,500	$23,495,500
3	LAND AND EASEMENTS	1	LS	$22,110,000	$22,110,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$22,110,000	$22,110,000
5	INTEREST DURING CONSTRUCTION	1	LS	$4,329,300	$4,329,300
	PROJECT CAPITAL COST				$139,664,800

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$8,703,958	$8,703,958	$8,703,958	$8,703,958
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$1,234,550	$1,234,550	$1,234,550	$1,234,550
	TOTAL ANNUAL COST	$0	$0	$9,938,508	$9,938,508	$9,938,508	$9,938,508

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$9,938,508	$9,938,508	$9,938,508	$9,938,508
2	YIELD	-	-	27,225	27,225	27,225	27,225
3	UNIT COST	$0	$0	$365	$365	$365	$365
	TOTAL UNIT COST						$365

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$23,820,000	$23,820,000
2	PIPELINES	1	LS	$3,430,000	$3,430,000
3	DAMS AND RESERVOIRS	1	LS	$40,210,000	$40,210,000
4	OTHER	1	LS	$160,000	$160,000
	PROJECT COST				$67,620,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$23,820,000	$595,500
2	PIPELINES	1.0	%	$3,430,000	$34,300
3	DAMS AND RESERVOIRS	1.5	%	$40,210,000	$603,150
4	OTHER	1.0	%	$160,000	$1,600
	ANNUAL OPERATION AND MAINTENANCE COST				$1,234,550

PROJECT EVALUATION

Based on the analysis provided above, the Little River Off-Channel Reservoir project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	Reasonably low-cost project for development of raw water supplies.
Location	4	Accessibility to Brazos Basin demands in Region H through bed and banks conveyance. However, conveyance distance
Water Quality	3	No known issues related to water quality.
Environmental Land and Habitat	3	Environmental impacts associated with the site can be mitigated.
Environmental Flows	2	Reduction in instream flows limited by flow requirements for Brazos River Basin.
Local Preference	2	Some opposition to project development but less than on-channel alternatives that have been proposed.
Institutional Constraints	3	Permitting and property acquisition required for project development.
Development Timeline	3	Approximate 20-year development timeline.
Sponsorship	3	Project to be developed by Brazos River Authority pending customer demand.
Vulnerability	2	Some risk from natural and man-made disasters due to impoundment of water.
Impacts on Other Projects	4	Project has potential to be integrated into System Operation Permit though enhancing overall basin storage.

WATER USER GROUP APPLICATION

The Little River Off-Channel Reservoir project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

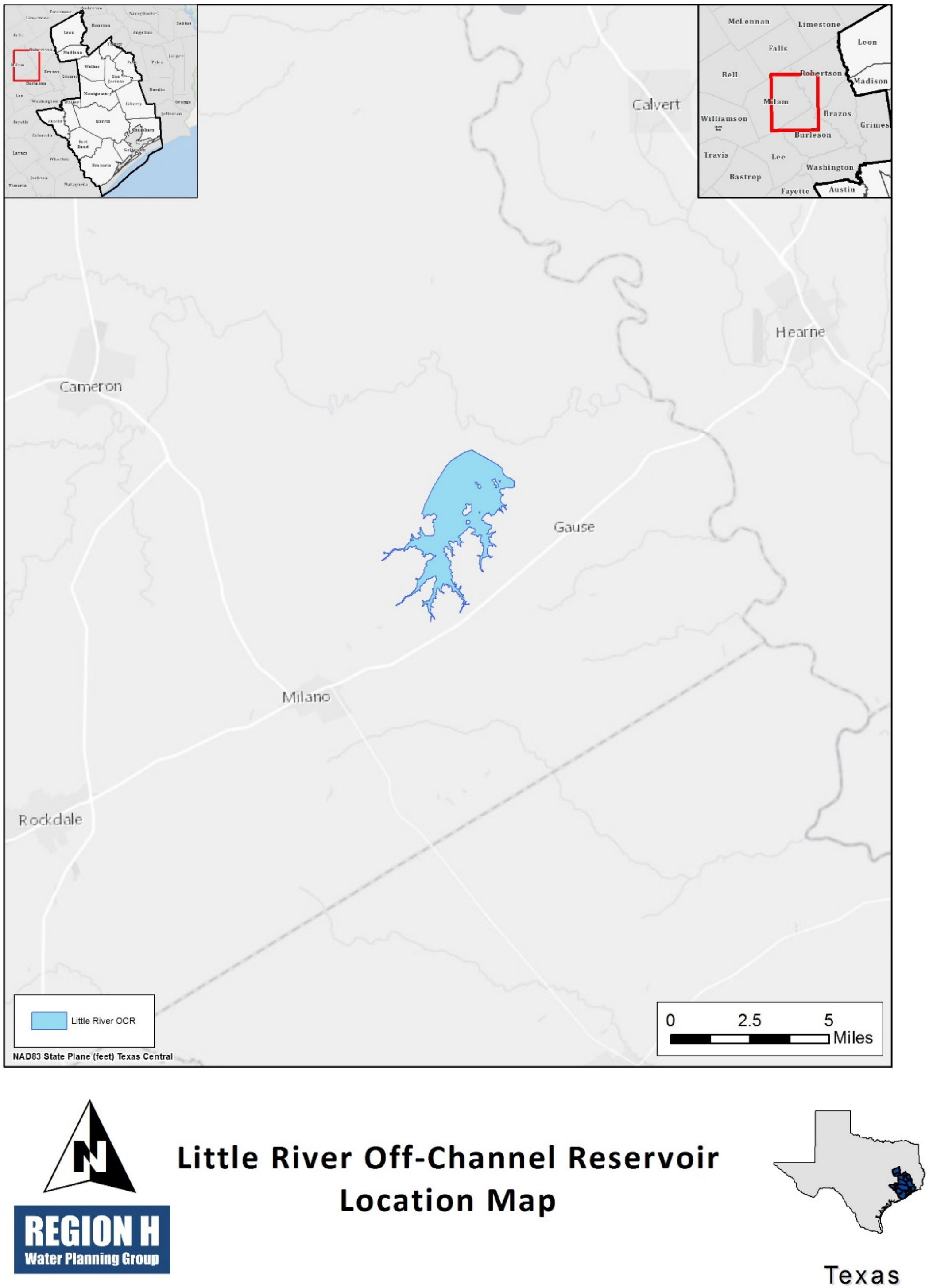
CRITERIA	WUG SUITABILITY
Proximity	Project is intended to serve customers in the lower Brazos River Basin.
Size	The magnitude of the project makes is adequate for serving moderately large demands through the sale of water to WWPs that serve a large geographic area.

CRITERIA	WUG SUITABILITY
Water Quality	The project will produce raw water that nay be treated through additional projects to provide for treated, potable water.
Unit Cost	The unit cost for the project is relatively low for a reservoir project and competitive with other projects in the lower Brazos River basin.
Other Factors	

REFERENCES

2011 Brazos G Regional Water Plan. Brazos G Regional Water Planning Group. September 2010.

LOCATION MAP



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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Lone Star Lake
Project ID:	SWDV-007
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	6,030 ac-ft/yr (5.4 mgd)
Implementation Decade:	2040 potential
Development Timeline:	30 years
Project Capital Cost:	$95,194,853 (Sept. 2013)
Unit Water Cost (Rounded):	$1,031 per ac-ft (during loan period) $47 per ac-ft (after loan period)

PROJECT DESCRIPTION

Population growth within the San Jacinto River Basin coupled with groundwater reduction requirements mandated by the Lone Star Groundwater Conservation District (LSGCD) and Harris-Galveston Subsidence District (HGSD) have driven interest in developing alternatives to groundwater supplies. Surface water supplies in the San Jacinto Basin currently consist primarily of Lake Conroe and Lake Houston, along with a number of smaller run-of-river water rights. One option that has been proposed is development of additional reservoir storage capacity in the form of an impoundment in western Montgomery County on Lake Creek, a tributary to the West Fork of the San Jacinto River.

PROJECT ANALYSES

The project analyses for Lone Star Lake include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM) for the San Jacinto Basin was modified to include the environmental flow standards adopted by the Trinity and San Jacinto Rivers and Galveston Basin and Bay Area Stakeholder Committee (BBASC) in the absence of a model developed by TCEQ. The model was then further modified to include a control point representing the location of Lone Star Lake based on an area-weighted section of the basin in order to provide for hydrology to the reservoir. Simulations were executed in an iterative fashion until a firm yield could be determined for the project.

Environmental Considerations

Lone Star Lake is a significant project and has the potential for significant impacts to land area. *Table 1* lists the threatened and endangered species of Montgomery County as well as other species of concern.

Table 1 – Threatened and Endangered Species of Montgomery County

AMPHIBIANS[1]		FEDERAL STATUS	STATE STATUS
Houston toad	*Anaxyrus houstonensis*	LE	E

BIRDS[1]		FEDERAL STATUS	STATE STATUS
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	
Bald Eagle	*Haliaeetus leucocephalus*	DL	T
Henslow's Sparrow	*Ammodramus henslowii*		
Peregrine Falcon	*Falco peregrinus*	DL	T
Piping Plover	*Charadrius melodus*	LT	T
Red-cockaded Woodpecker	*Picoides borealis*	LE	E
Sprague's Pipit	*Anthus spragueii*	C	
White-faced Ibis	*Plegadis chihi*		T
Whooping Crane	*Grus americana*	LE	E
Wood Stork	*Mycteria americana*		T

FISHES[1]		FEDERAL STATUS	STATE STATUS
Creek chubsucker	*Erimyzon oblongus*		T
Paddlefish	*Polyodon spathula*		T

INSECTS[1]		FEDERAL STATUS	STATE STATUS
A mayfly	*Pseudocentroptiloides morihari*		
A mayfly	*Plauditus gloveri*		
Gulf Coast Clubtail	*Gomphus modestus*		
Texas Emerald Dragonfly	*Somatochlora margarita*		

MAMMALS[1]		FEDERAL STATUS	STATE STATUS
Louisiana black bear	*Ursus americanus luteolus*	LT	T
Plains spotted skunk	*Spilogale putorius interrupta*		
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*		T
Red wolf	*Canis rufus*	LE	E
Southeastern myotis bat	*Myotis austroriparius*		

MOLLUSKS[1]		FEDERAL STATUS	STATE STATUS
Creeper (squawfoot)	*Strophitus undulates*		T

MOLLUSKS[1]		FEDERAL STATUS	STATE STATUS
Fawnsfoot	*Truncilla donaciformis*		
Little spectaclecase	*Villosa lienosa*		
Louisiana pigtoe	*Pleurobema riddellii*		T
Sand pocketbook	*Lampsilis satura*		T
Texas pigtoe	*Fusconaia askewi*		T
Wabash pigtoe	*Fusconaia flava*		

REPTILES[1]		FEDERAL STATUS	STATE STATUS
Alligator snapping turtle	*Macrochelys temminckii*		T
Louisiana pine snake	*Pituophis ruthveni*	C	T
Texas horned lizard	*Phrynosoma cornutum*		T
Texas/Canebrake rattlesnake	*Crotalus horridus*		T

PLANTS[1]		FEDERAL STATUS	STATE STATUS
Bristle Nailwort	*Paronychia setacea*		
Correll's false dragon-head	*Physostegia correlli*		

[1] LE, LT - Federally Listed Endangered/Threatened; SAE, SAT - Federally Listed Endangered/Threatened by Similarity of Appearance; C - Federal Candidate for Listing; DL, PDL - Federally Delisted/Proposed for Delisting; NL - Not Federally Listed; E, T - State Listed Endangered/Threatened; "blank" - Rare, but with no regulatory listing status.

Permitting and Development

Based on a preliminary desktop review, the following environmental permits and permitting activities are likely to apply:

- U.S. Army Corps of Engineers (USACE) Section 404 Permit – Reservoir development will involve modifications to a water of the U.S. As such, the project must be federally permitted using a Section 404 Permit of the Clean Water Act. Due to the magnitude of impacts, construction of this reservoir would require a Section 404 Individual Permit.
- National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) – An EIS would likely be required as part of the Section 404 Permitting process.
- Cultural Resources Survey and National Register of Historic Places (NRHP) Testing – As part of the Section 404 Permit processing and EIS development, cultural resources surveys and NRHP testing will likely need to be completed. Any significant sites impacted may require mitigation.
- Mitigation Plan – A mitigation plan will be required as part of the Section 404 Permit. Mitigation will most likely involve purchase of mitigation bank credits or construction of mitigation sites to offset impacts to waters of the U. S. Due to the large amount of impacts to wetlands and other waters of the U. S., mitigation credits may be limited and mitigation may require permittee responsible mitigation.
- U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD)

Ancillary Studies – USFWS and TPWD are stakeholders in the Section 404 Permitting process, and, as such, they will require ancillary studies to be completed. These studies will include surveys for federal threatened and endangered species and habitat modeling to assess impacts of the proposed project.

- Constructing the dam to form Lone Star Lake will remove a large portion of the floodplain from flood storage; however, this loss would be offset by the water storage capacity created by dam construction.
- In addition to wetlands, the project area contains large amounts of non-wetland riparian areas, including bottomland hardwoods. Mitigation for impacts to these areas would likely be required.

Total permitting time associated with the project is estimated as at least fifteen years, with a total project development time of up to 30 years.

Cost Analysis

A preliminary planning level cost estimate was prepared for the Lone Star Lake project. Costs were developed for the dam and spillway as well as other associated infrastructure and construction components. Costs for facility relocations were also estimated. Costs for the reservoir were developed based on a combination of recent FNI projects and other cost scaling based on the Engineering News Record (ENR) indices. Generalized assumptions were made for the embankment height and spillway width, along with various other parameters. No hydrologic assessment was performed in determining these parameters.

Table 2 summarizes the component costs of key facilities. Costs are presented in September 2013 dollars and include a contingency of 35% including professional services.

Based on these costs as presented and assuming full utilization of the reservoir yield of 6,030 acre-feet per year, the unit cost for water from the project is approximately $1,031 per acre-foot during the debt term and $47 per acre-foot following the retirement of the debt on the project (40 years).

Table 2 – Lone Star Lake Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					January 13, 2013
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$34,761,080	$34,761,080
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$12,166,378	$12,166,378
3	LAND AND EASEMENTS	1	LS	$21,280,608	$21,280,608
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$21,280,608	$21,280,608
5	INTEREST DURING CONSTRUCTION	1	LS	$5,706,179	$5,706,179
	PROJECT CAPITAL COST				$95,194,853

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$5,932,576	$5,932,576	$5,932,576	$5,932,576
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$282,445	$282,445	$282,445	$282,445
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$6,215,021	$6,215,021	$6,215,021	$6,215,021

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$6,215,021	$6,215,021	$6,215,021	$6,215,021
2	YIELD	-	-	6,030	6,030	6,030	6,030
3	UNIT COST	$0	$0	$1,031	$1,031	$1,031	$1,031
	TOTAL UNIT COST						$1,031

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	DAMS AND RESERVOIRS	1	LS	$18,829,680	$18,829,680
2	RELOCATIONS	1	LS	$15,931,400	$15,931,400
	PROJECT COST				$34,761,080

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	DAMS AND RESERVOIRS	1.5	%	$18,829,680	$282,445
2	RELOCATIONS	0.0	%	$15,931,400	$0
	ANNUAL OPERATION AND MAINTENANCE COST				$282,445

PROJECT EVALUATION

Based on the analysis provided above, the Lone Star Lake project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	Project unit cost is high during the anticipated 40 year loan period.
Location	5	Project is located high levels of future demand in Montgomery County.
Water Quality	4	On-channel reservoir may have some limited beneficial impact to water quality.
Environmental Land and Habitat	1	The development of an on-channel reservoir will have significant impacts to local habitat and resources.
Environmental Flows	2	Project will develop water and result in a reduction of environmental flows but within the limits of the adopted flows standards.
Local Preference	3	Some local support has been expressed for an additional reservoir within Montgomery County.
Institutional Constraints	2	Some opposition to permits likely based on magnitude of the project.
Development Timeline	2	The project may require 30 years to develop.
Sponsorship	2	No sponsor has yet committed to the project.
Vulnerability	2	Some potential risk from natural or man-made disaster associated with the impoundment of water.
Impacts on Other Projects	3	Project has little to no potential impact on other potential projects.

WATER USER GROUP APPLICATION

The Lone Star Lake project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

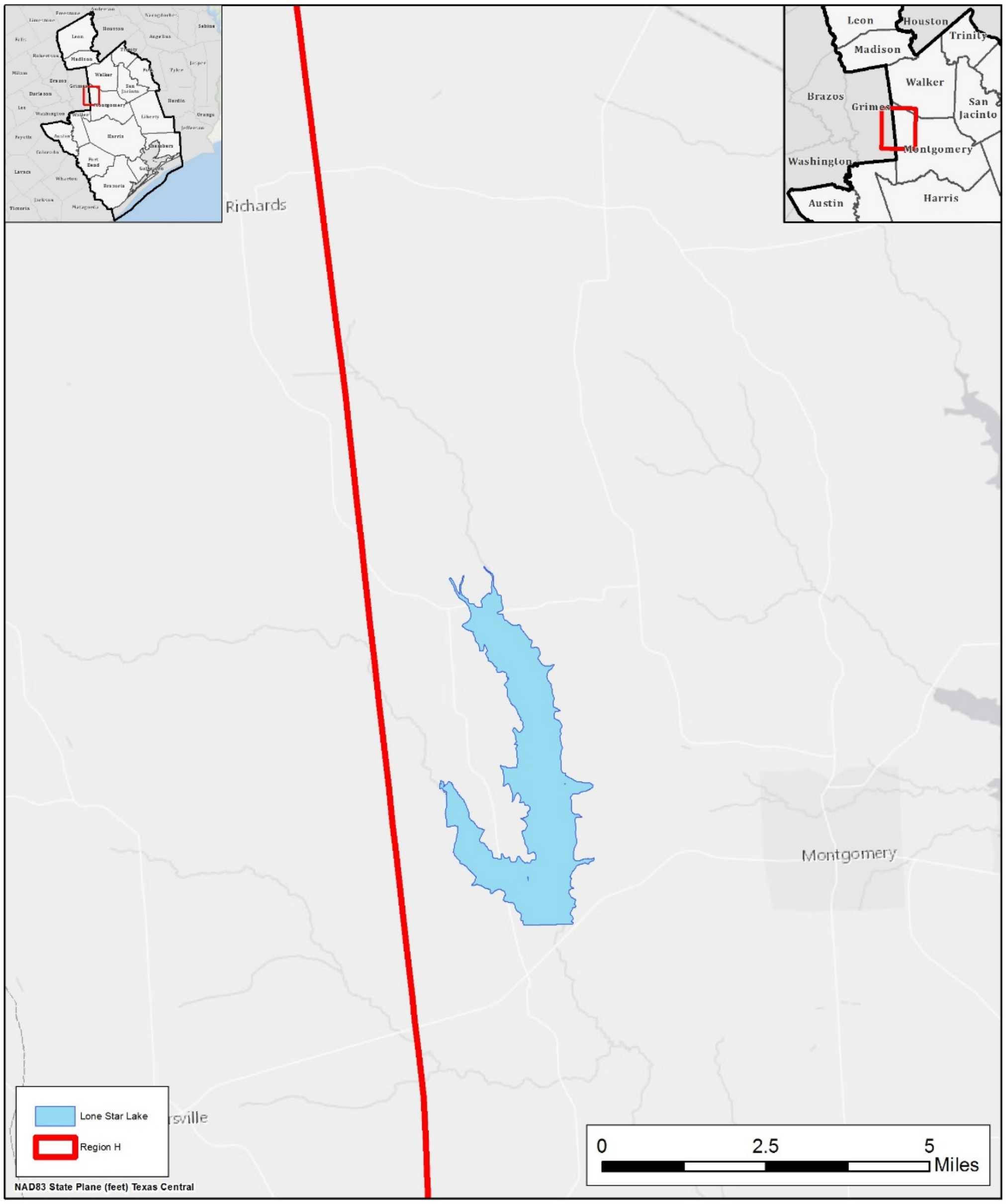
CRITERIA	WUG SUITABILITY
Proximity	The project is located near demand growth in Montgomery County but also has the potential to supply water downstream through bed and banks transfer.

CRITERIA	WUG SUITABILITY
Size	The yield of this project makes it poorly suited for meeting the demands of large WUGs and WWPs.
Water Quality	The raw water produced by this project will require treatment for use in domestic and some industrial applications.
Unit Cost	The unit cost of this project is relatively high compared to other projects in the San Jacinto River basin.
Other Factors	

REFERENCES

Texas Parks and Wildlife, http://www.tpwd.state.tx.us/gis/ris/es/ES_Reports.aspx?county=Montgomery, Accessed January 9, 2014.

LOCATION MAP



REGION H
Water Planning Group

Lone Star Lake
Location Map

Texas

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Brazosport Water Authority Treatment Plant Expansion
Project ID:	TRET-001
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	8,400 ac-ft/yr (7.5 mgd)
Implementation Decade:	2020
Development Timeline:	2 years
Project Capital Cost:	$15,951,976 (Sept. 2013)
Unit Water Cost (Rounded):	$353 per ac-ft (during loan period) $194 per ac-ft (after loan period)

STRATEGY DESCRIPTION

The Brazosport Water Authority (BWA) serves seven communities in the southern Brazoria County area in addition to potable service to Dow Chemical and two Texas Department of Criminal Justice (TDCJ) units. In December, 2013, BWA concluded a Texas Water Development Board (TWDB) Regional Facility Planning Grant study to examine the potential for serving the current BWA service area Brazoria County in the future. In addition to the development of a reverse osmosis (RO) water treatment plant (WTP) at the side of the current BWA surface water treatment plant, the study also recommended expansion of BWA's conventional treatment plant capacity in order to accommodate additional growth within and surrounding the existing service area of the facility.

STRATEGY ANALYSES

The project analyses for BWA Treatment Plant Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The proposed project will include the expansion of BWA's 19.97 MGD conventional filtration treatment plant by an additional 7.5 MGD. This project will work in conjunction with the proposed brackish groundwater and RO facilities to provide adequate supplies to meet future needs to be served by BWA.

Environmental Considerations

Development of this project may impact environmental conditions in the immediate vicinity of the plant through disturbance of habitat.

According to the USFWS Online Endangered Species list, the following threatened or endangered species are found in Brazoria County: brown pelican (Pelecanus occidentalis), green sea turtle (Chelonia mydas), hawksbill sea turtle (Eretmochelys imbricata), Kemp's ridley sea turtle (Lepidochelys kempii), leatherback sea turtle (Dermochelys coriacea), loggerhead sea turtle (Caretta caretta), piping plover (Charadrius melodus), and whooping crane (Grus americana). Of these species, the brown pelican, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and piping plover are coastal species and should not occur on the project site.

Whooping cranes are listed as endangered in Brazoria County. The cranes breed in Canada and winter on the Texas Gulf Coast at the Aransas National Wildlife Refuge and may migrate through the project area during the spring and fall. Whooping cranes would be unlikely to use the site during migration due to the forested nature of the project area.

Permitting and Development

Proposed project activities at the project site would all occur within Zone AE of an existing floodplain (Flood Insurance Rate Map {FIRM} 48039C0615H). Activities within the floodplain may require a permit from or coordination with the local floodplain administrator and must comply with applicable FEMA-approved state or local floodplain requirements.

Cost Analysis

Costs for the proposed project were provided by BWA and adjusted for use in regional planning. These costs are summarized below in *Table 1*.

Table 1 – BWA Treatment Plant Expansion Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					January 28, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$11,450,000	$11,450,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$4,007,500	$4,007,500
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$494,476	$494,476
	PROJECT CAPITAL COST				$15,951,976

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$1,334,851	$1,334,851	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,628,480	$1,628,480	$1,628,480	$1,628,480	$1,628,480	$1,628,480
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$2,963,331	$2,963,331	$1,628,480	$1,628,480	$1,628,480	$1,628,480

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$2,963,331	$2,963,331	$1,628,480	$1,628,480	$1,628,480	$1,628,480
2	YIELD	8,400	8,400	8,400	8,400	8,400	8,400
3	UNIT COST	$353	$353	$194	$194	$194	$194
	TOTAL UNIT COST						$247

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$1,610,000	$1,610,000
2	WATER TREATMENT PLANTS	1	LS	$9,840,000	$9,840,000
	PROJECT COST				$11,450,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$1,610,000	$40,250
2	WATER TREATMENT PLANTS	1.0	LS	$1,588,230	$1,588,230
	ANNUAL OPERATION AND MAINTENANCE COST				$1,628,480

WATER MANAGEMENT STRATEGY EVALUATION

Based on the analysis provided above, the BWA Treatment Plant Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

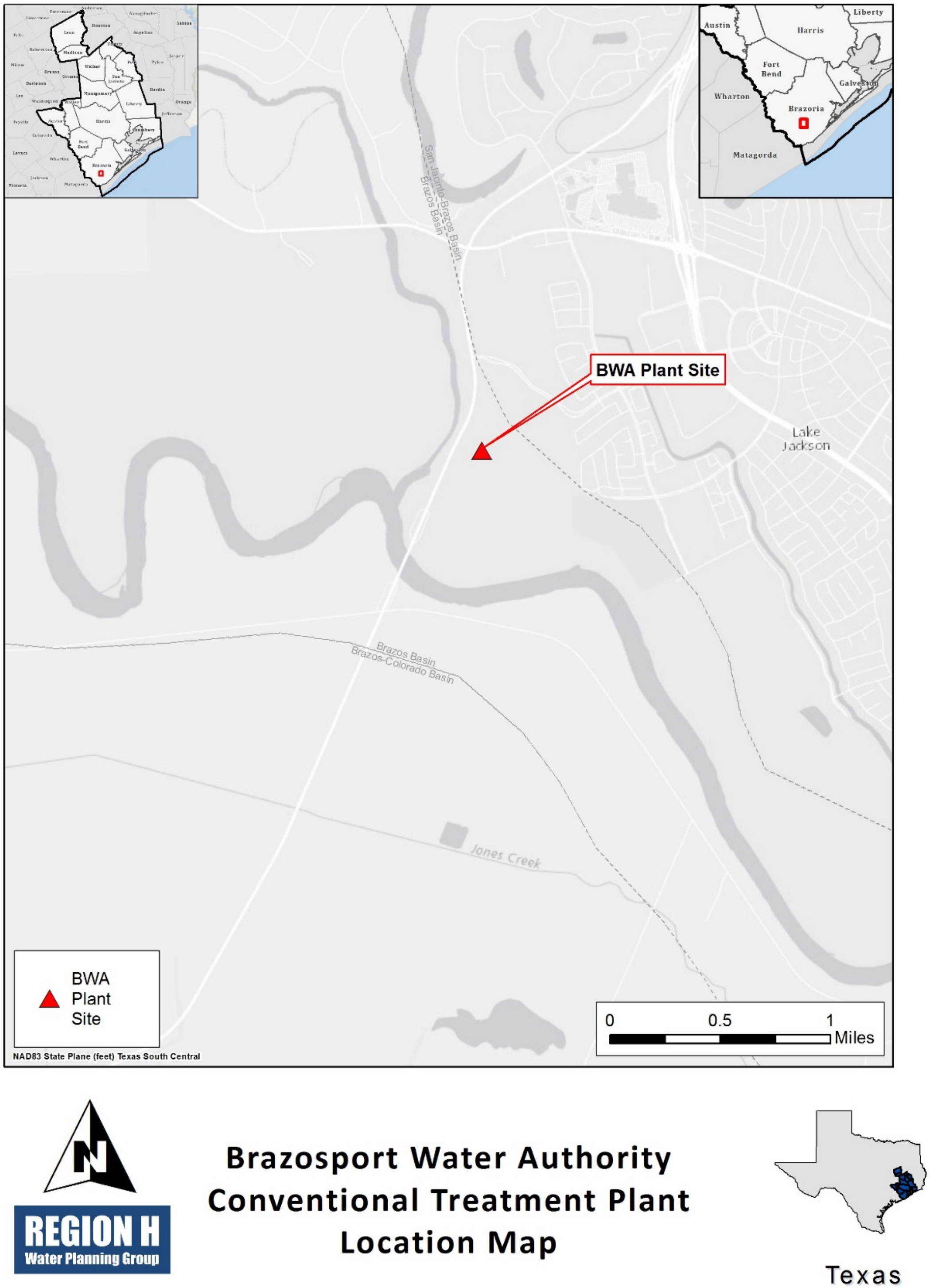
CRITERIA	RATING	EXPLANATION
Cost	4	Relatively low cost project.
Location	3	Conveyance required to provide water to diverse BWA service area.
Water Quality	3	No known water quality issues.
Environmental Land and Habitat	5	Very limited impacts associated with existing BWA plant site.
Environmental Flows	3	No change in river diversions directly associated with project.
Local Preference	4	Local support from BWA customers.
Institutional Constraints	3	Minimal permitting effort associated with project.
Development Timeline	5	Project can be implemented in a relatively short time period.
Sponsorship	5	Project is under development.
Vulnerability	4	No substantial risk from natural and man-made disasters.
Impacts on Other Projects	5	Project works in conjunction with BWA brackish groundwater project to provide a reliable water supply.

WATER USER GROUP APPLICATION

The BWA Treatment Plant Expansion project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the strategy as well as other factors that may relate to the auditability of the strategy to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project is positioned to provide water within the current BWA customer service area.
Size	Project is sized to provide adequate, dry year supply, for BWA customer use.
Water Quality	Project will provide treated water for potable, municipal and industrial use.
Unit Cost	Unit cost is suited to use in municipal supply.
Other Factors	Project is identified for BWA service area.

LOCATION MAP



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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Houston Water Purification Plant Expansion
Project ID:	TRET-002
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	74,963 – 116,258 ac-ft/yr (67 - 104 mgd)
Implementation Decade:	2040
Development Timeline:	5 years
Project Capital Cost:	$288,529,429 (Sept. 2013)
Unit Water Cost (Rounded):	$386 per ac-ft (during loan period) $183 per ac-ft (after loan period)

PROJECT DESCRIPTION

The City of Houston (COH) operates three major surface water treatment plants in Harris County. Collectively, these facilities provide treated water to the COH distribution system as well as a number of regional partners and contract customers. The facilities provide an important tie between raw water supplies in the Trinity and San Jacinto River Basins to demands as far west as the Brazos River Basin in Fort Bend County.

The East Water Purification Plant (EWPP) is located in eastern Harris County and is currently rated for 350 MGD. The largest share of this capacity is introduced to the COH distribution system for service to the Houston area including contract customers in Harris County. In addition, this facility also provides for the first phases of conversion for the West Harris County Regional Water Authority (WHCRWA) and North Fort Bend Water Authority (NFBWA).

The Southeast Water Purification Plant (SEWPP) provides water for COH as well as several co-participants in the facility. The 200 MGD capacity of the plant is distributed among the COH as well as the Gulf Coast Water Authority (GCWA), Clear Lake City Water Authority (CLCWA), Clearbrook City MUD, the La Porte Area Water Authority (LPAWA), Harris County MUD 55, Pasadena, South Houston, Webster, Friendswood, and Baybrook MUD 1.

The Northeast Water Purification Plant (NEWPP) is located in northeastern Harris County and currently provides 80 MGD of capacity to COH as well as the North Harris County Regional Water Authority (NHCRWA) and Central Harris County Regional Water Authority (CHCRWA). This facility will be expanded in the coming years to accommodate additional needs of COH, NHCRWA, and, CHCRWA, as well as additional contract supply for WHCRWA and NFBWA. Details regarding this project are contained in a separate project memorandum.

PROJECT ANALYSES

The project analyses for Houston Water Purification Plant Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost. This memorandum describes projected needs for expansion of the EWPP and SEWPP while details regarding the NEWPP are contained in a separate memorandum.

Supply Development

Identification of potential future treatment capacity expansion was based on a decadal comparison of estimated water needs for the COH system to existing and planned treatment capacities at the three major COH water treatment plants, as shown in *Table 1*. Existing customer sales and capacity reservation volumes were subtracted from the capacity of each plant to determine the portion of treatment capacity retained by COH. Because the plant capacities represent peaked operation, this value was divided by an estimated peaking factor of 1.4 to determine an average daily flow (ADF) production capacity. The ADF was then subtracted from the estimated volume required for COH self-supply and future growth in treated water sales and a peaking factor of 1.4 applied to this difference; the resultant value reflects the potential need for water treatment capacity beyond the capacities currently in place or under development. As shown in the table, the estimated values for 2020 and 2030 are extremely small relative to COH's overall treatment capacity and would likely be easily absorbed by existing infrastructure. By 2040, it is anticipated based on the Regional Plan analysis that development of additional treatment units, possibly at the existing SEWPP plant site, would be required. For purposes of cost estimation for the Regional Plan it was assumed that this would include 94 mgd in additional capacity in year 2040 and an additional 52 mgd by 2060.

Table 1 – Summary of Reuse Authorizations and Availability

		2020	2030	2040	2050	2060	2070
Existing / Scheduled Capacities (MGD)	NEWPP	400	400	400	400	400	400
	EWPP	350	350	350	350	350	350
	SEWPP	200	200	200	200	200	200
	Total	950	950	950	950	950	950
Existing / Scheduled COH Capacities (MGD)	NEWPP	91.6	91.6	91.6	91.6	91.6	91.6
	EWPP	252.4	252.4	252.4	252.4	252.4	252.4
	SEWPP	69.1	69.1	69.1	69.1	69.1	69.1
	Total	413.2	413.2	413.2	413.2	413.2	413.2
Peaking Factor		1.4	1.4	1.4	1.4	1.4	1.4
ADF COH Capacity	(MGD)	295.1	295.1	295.1	295.1	295.1	295.1
	(Ac-Ft/Yr	330,536	330,536	330,536	330,536	330,536	330,536
COH Treated Water Demand	Total (Ac-Ft/Yr)	337,354	341,931	393,347	405,499	425,186	446,794
	Excess (Ac-Ft/Yr)	6,818	11,395	62,811	74,963	94,650	116,258
	Excess (MGD)	6.1	10.2	56.1	66.9	84.5	103.8
Peaking Factor		1.4	1.4	1.4	1.4	1.4	1.4
Additional Plant Capacity (MGD)		8.5	14.2	78.5	93.7	118.3	145.3

Environmental Considerations

The WPP sites were fully acquired during the development of the initial-phase projects. Impacts will be associated with the development of property that was disturbed during the construction of the initial project. Improvements to the intake structure and pipeline conveyance to the plants may also involve mitigation efforts.

Permitting and Development

Development of expanded distribution infrastructure will cause some degree of surface disturbance, which may require permitting and mitigation. This is expected to be minimal, as the majority of construction would be expected to occur on existing plant sites. Any infrastructure constructed outside of the plant site would require additional permitting.

Cost Analysis

Planning level cost estimates for the project were developed using standard Regional Planning cost reference data and scaled to a September 2013 equivalent cost in accordance with TWDB requirements. The project was estimated to require two phases of treatment development, with an initial 94 mgd treatment capacity expansion in year 2040 and a second 52 mgd expansion in year 2060. Estimated costs are presented in *Table 2*.

Table 2 – COH Treatment Plant Expansion Costs

OPINION OF PROBABLE CONSTRUCTION COST					February 18, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$202,676,239	$202,676,239
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$70,931,090	$70,931,090
3	LAND AND EASEMENTS	1	LS	$499,377	$499,377
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$5,478,947	$5,478,947
5	INTEREST DURING CONSTRUCTION	1	LS	$8,943,775	$8,943,775
	PROJECT CAPITAL COST				$288,529,429

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$0	$0	$15,347,181	$15,347,181	$8,796,768	$8,796,768
2	OPERATION AND MAINTENANCE (O&M)	$0	$0	$12,490,495	$12,490,495	$19,582,088	$19,582,088
3	PUMPING ENERGY COSTS	$0	$0	$1,064,117	$1,064,117	$1,652,027	$1,652,027
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$0	$0	$28,901,793	$28,901,793	$30,030,883	$30,030,883

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$0	$0	$28,901,793	$28,901,793	$30,030,883	$30,030,883
2	YIELD	-	-	74,963	74,963	116,258	116,258
3	UNIT COST	$0	$0	$386	$386	$258	$258
	TOTAL UNIT COST						$308

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$9,006,225	$9,006,225
2	PIPELINES	1	LS	$111,877	$111,877
3	WATER TREATMENT PLANTS	1	LS	$193,558,138	$193,558,138
	PROJECT COST				$202,676,239

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$9,006,225	$225,156
2	PIPELINES	1.0	%	$111,877	$1,119
3	WATER TREATMENT PLANTS	1.0	LS	$19,355,814	$19,355,814
	ANNUAL OPERATION AND MAINTENANCE COST				$19,582,088

PROJECT EVALUATION

Based on the analysis provided above, the Houston Water Purification Plant Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	4	Cost is relatively low and decreases after debt service.
Location	3	Conveyance required to make water supply available to intended users. This is planned under other projects.
Water Quality	3	No known issues related to water quality.
Environmental Land and Habitat	4	Expansion to be constructed on existing plant site.
Environmental Flows	3	No direct impact to environmental flows although water diverted for treatment may reduce flows and wastewater.
Local Preference	3	No known significant opposition.
Institutional Constraints	3	Permits expected with minimal problems. Property available.
Development Timeline	5	Each expansion phase could be implemented in approximately 5 years or less.
Sponsorship	3	Sponsor identified and currently engaged in development of other treatment expansion projects.
Vulnerability	4	Minor risks from natural and man-made disasters associated with source availability.
Impacts on Other Projects	5	Treatment capacity expansion is a significant piece of the overall water supply project for Harris and Fort Bend Counties as the means of treating water delivered by existing sources and future supply projects.

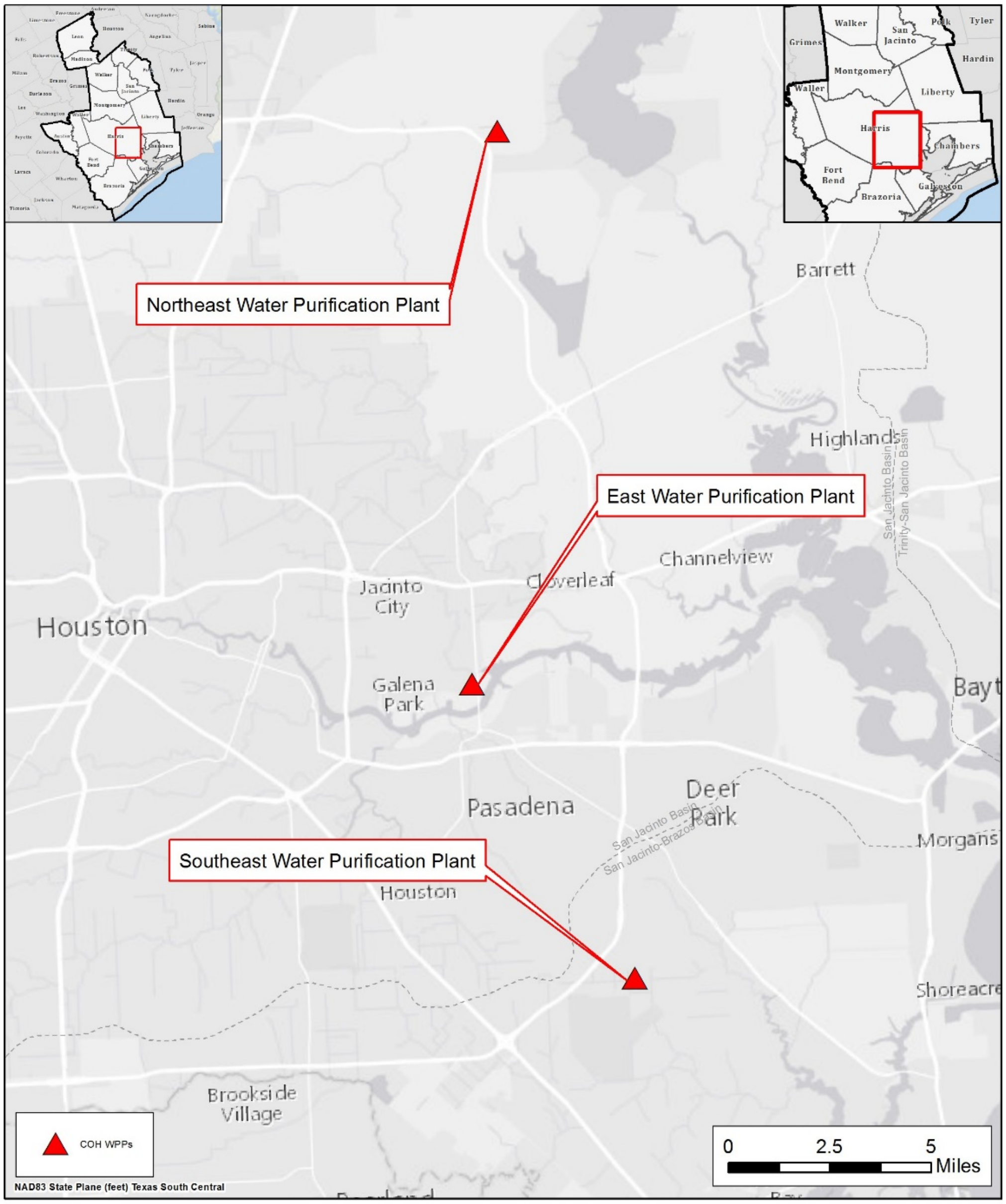
WATER USER GROUP APPLICATION

The Houston Water Purification Plant Expansion project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	The project can be made available to meet demands in the immediate vicinity of the plant or conveyed through additional projects to other demand areas.
Size	The magnitude of the project was developed based on surface water needs projected for COH and its customers.

CRITERIA	WUG SUITABILITY
Water Quality	This project provides treated surface water for a variety of uses.
Unit Cost	The unit cost of this project makes it an acceptable project for municipal and other potable water demands.
Other Factors	This project represents additional treated water capacity beyond the level currently implemented or in development.

LOCATION MAP



Houston Water Purification Plants Location Map

REGION H Water Planning Group

Texas

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REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	CLCND West Chambers System
Project ID:	TRET-003
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	2,800 ac-ft/yr (2.5 mgd)
Implementation Decade:	2020
Development Timeline:	2 years
Project Capital Cost:	$24,657,839 (Sept. 2013)
Unit Water Cost (Rounded):	$1,354 per ac-ft (during loan period) $617 per ac-ft (after loan period)

PROJECT DESCRIPTION

Western Chambers County consists of a number of smaller communities that are not connected by a comprehensive water system. Mont Belvieu, Old River-Winfree, Cove, and Beach City make up the named Water User Groups in the area with population also contained in unincorporated, County-Other portions of the county. Additionally, the edges of Baytown also extend into this area and influence overall growth. In addition, Segment I of the Grand Parkway also represents a significant influence in the development of this area by providing enhanced connectivity with other portions of the greater-Houston area.

Aside from the City of Baytown which currently purchases surface water from the City of Houston, the remaining population in this area is served by groundwater production from the Gulf Coast Aquifer. Historically, this water supply has proven of sufficient quantity and quality to serve needs in the area. However, increasing growth in western Chambers County will continue to strain the sustainability of this resource.

The Chambers-Liberty Counties Navigation District (CLCND) has proposed an alternative to groundwater growth in western Chambers County through the development of a surface water treatment plant along the Coastal Water Authority (CWA) Cedar Point Lateral. Here, raw water from the CLCND Trinity River supplies can be delivered and treated for distribution throughout this area of the county.

PROJECT ANALYSES

The strategy analyses for CLCND West Chambers System include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

CLCND owns rights to nearly 113,000 acre-feet of water from the Trinity River and Lake Anahuac. Recently, CLCND was granted certificate of adjudication 08-4279C which amended their right to water from the 08-4279B certificate to allow for the diversion of up to 80,000 acre-feet of water annually at the site of the CWA Main Pump Station. This amendment allows for the entry of this water into western Chambers County for a number of uses.

CLCND developed a concept for the plant site and developed preliminary costs for the treatment plant. Once customers are under contract for treated water, the facility can be developed for finishing of the raw water supply which will go to offset future growth from groundwater.

Environmental Considerations

This project will divert water from the Trinity River. This will result in a reduction of inflows to Trinity Bay but this is within the limits of pre-existing permits. Additionally, the use of this water in western Chambers County will provide return flows to the bay.

Permitting and Development

Required water rights permitting is already completed for this project. Additional permits will be required for the development of treatment and distribution infrastructure.

Cost Analysis

Costs were prepared by CLCND in preparation of the initial concept for the project. These costs have been adjusted accordingly to the requirements of regional plan development and are provided below in *Table 1*.

Table 1 – CLCND West Chambers System Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					January 8, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$17,820,000	$17,820,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$5,753,500	$5,753,500
3	LAND AND EASEMENTS	1	LS	$160,000	$160,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$160,000	$160,000
5	INTEREST DURING CONSTRUCTION	1	LS	$764,339	$764,339
	PROJECT CAPITAL COST				$24,657,839

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$2,063,351	$2,063,351	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$1,726,700	$1,726,700	$1,726,700	$1,726,700	$1,726,700	$1,726,700
	TOTAL ANNUAL COST	$3,790,051	$3,790,051	$1,726,700	$1,726,700	$1,726,700	$1,726,700

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$3,790,051	$3,790,051	$1,726,700	$1,726,700	$1,726,700	$1,726,700
2	YIELD	2,800	2,800	2,800	2,800	2,800	2,800
3	UNIT COST	$1,354	$1,354	$617	$617	$617	$617
	TOTAL UNIT COST						$862

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PIPELINES	1	LS	$9,670,000	$9,670,000
2	WATER TREATMENT PLANTS	1	LS	$8,150,000	$8,150,000
	PROJECT COST				$17,820,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PIPELINES	1.0	%	$9,670,000	$96,700
2	WATER TREATMENT PLANTS	1.0	LS	$1,630,000	$1,630,000
	ANNUAL OPERATION AND MAINTENANCE COST				$1,726,700

PROJECT EVALUATION

Based on the analysis provided above, the CLCND West Chambers System strategy was evaluated across eleven different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	1	The cost of this strategy is fairly high, which is not uncommon for treated water development and delivery.

CRITERIA	RATING	EXPLANATION
Location	3	Conveyance required to deliver water throughout western Chambers County.
Water Quality	4	Surface water will improve water supply quality for users in the service area.
Environmental Land and Habitat	3	Limited impacts anticipated with plant site and transmission corridors.
Environmental Flows	2	Some reduction of instream flows and bay and estuary inflows within the terms of existing permits. Mitigated by return flows in close proximity to diversion.
Local Preference	4	Some local support for project development.
Institutional Constraints	3	Some permitting required for development.
Development Timeline	5	Project can be developed within approximately two years.
Sponsorship	4	CLCND is the identified sponsor for the project.
Vulnerability	4	Some limited risk associated with conveyance infrastructure including existing canals and proposed pipelines.
Impacts on Other Projects	3	No known impact to other strategies.

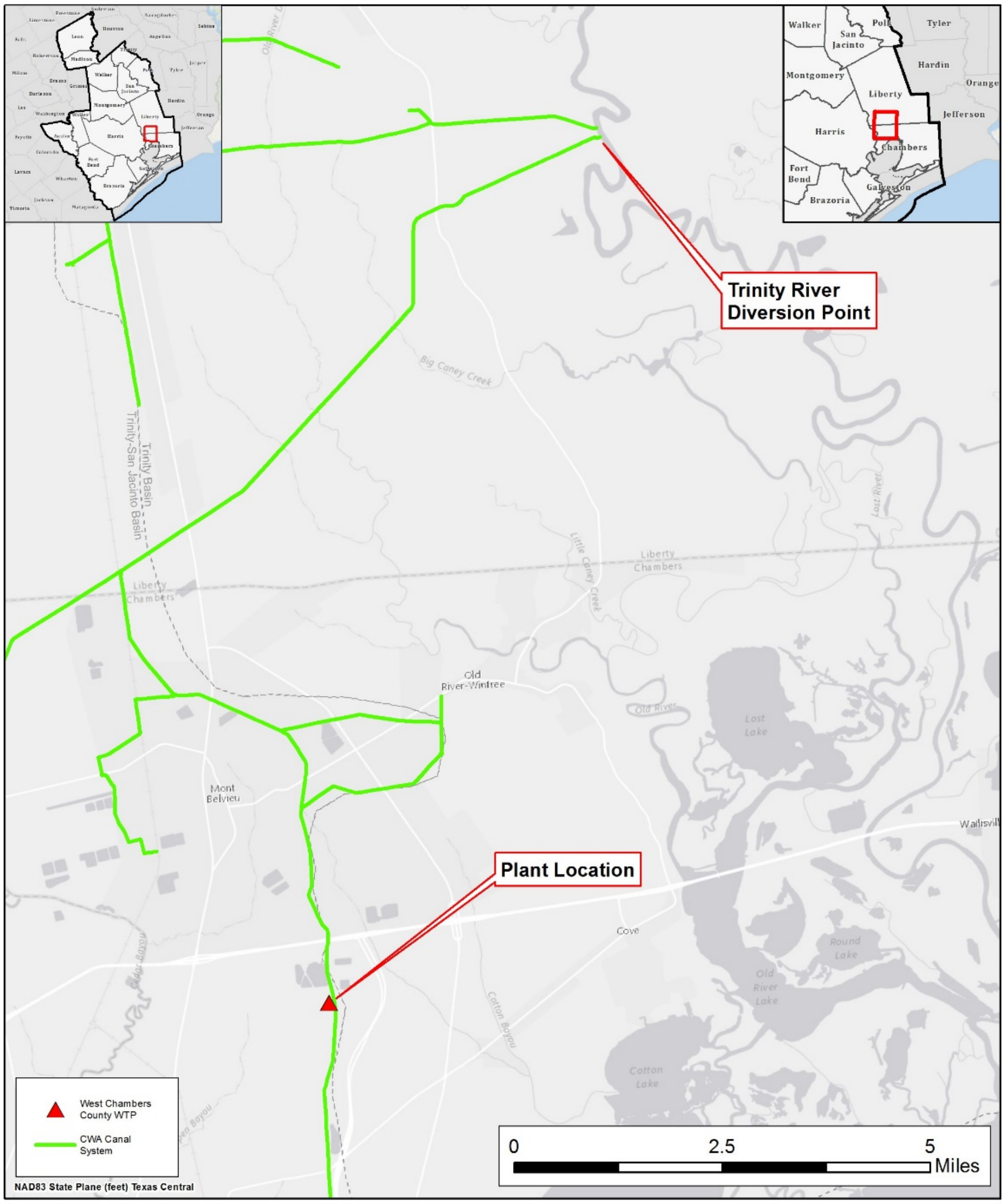
WATER USER GROUP APPLICATION

The CLCND West Chambers System strategy was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the strategy as well as other factors that may relate to the auditability of the strategy to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Project is intended to serve communities in western Chambers County.
Size	The relatively small project serves as a preliminary supply of surface water for this portion of the county and can be scaled in order to serve a much larger population, pending growth.
Water Quality	This project may provide treated water for municipal, commercial, and some light industrial needs.

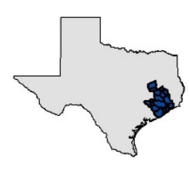
CRITERIA	WUG SUITABILITY
Unit Cost	The cost of water from this project makes it suitable only for municipal use and other uses requiring potable water.
Other Factors	CLCND is in the process of identifying specific water users to participate in the project.

LOCATION MAP



REGION H
Water Planning Group

West Chambers County System Location Map



REGION H PROJECT ANALYSIS TECHNICAL MEMORANDUM

Project Name:	Northeast Water Purification Plant Expansion
Project ID:	TRET-004
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	358,400 ac-ft/yr (320 mgd)
Implementation Decade:	2020 (Phase 1 in 2021, Phases 2, 3, and 4 in 2025)
Development Timeline:	9 years
Project Capital Cost:	$1,263,612,418 (Sept. 2013)
Unit Water Cost (Rounded):	$784 per ac-ft (during loan period) $489 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Northeast Water Purification Plant (NEWPP) is an 80 MGD facility located in northeast Harris County. The plant diverts water from nearby Lake Houston and treats it for use by the City of Houston (COH), North Harris County Regional Water Authority (NHCRWA), and Central Harris County Regional Water Authority (CHCRWA). The facility serves as the sole source of treated surface water for NHCRWA and CHCRWA, enabling them to meet the groundwater reduction requirements of the Harris-Galveston Subsidence District (HGSD).

The NEWPP will continue to serve these users with treated surface water as their demands and conversion requirements increase over time. An increased level of conversion will be needed in order to allow the three current customers to meet their conversion requirement of 80 percent by 2025. In addition, the West Harris County Regional Water Authority (WHCRWA) and North Fort Bend Water Authority (NFBWA) will rely on water from this plant in order to meet their 2025 conversion obligations. Meeting these future conversion targets will require the combined benefit of the individual authority Groundwater Reduction Plans (GRPs) and their associated infrastructure, the expanded NEWPP, and the Luce Bayou transfer project.

PROJECT ANALYSES

The project analyses for NEWPP Expansion include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

The projected plant capacity was developed based on estimated needs by the project participants. These shares are shown blow in *Table 1*.

Table 1 – NEWPP Prorata Shares

Participant	Prorata Share
NHCRWA	113.00
CHCRWA	4.88
NFBWA	68.50
WHCRWA	82.42
COH	51.20
TOTAL	**320.00**

The expansion is expected to be developed in two phases. The first will begin in 2018 to add an 80 MGD module to the existing plant. Second, third, and fourth phases will begin in 2019 to add an additional three 80 MGD modules for a total of 320 MGD for the expansion.

Environmental Considerations

The NEWPP site was fully acquired during the development of the initial-phase project. Impacts will be associated with the development of property that was disturbed during the construction of the initial project. Improvements to the intake structure and pipeline conveyance to the plant may also involve mitigation efforts.

Permitting and Development

Permitting requirements for this project are subject to the scope of the initial permitting process conducted for the NEWPP site. Infrastructure constructed outside of theses permits will require additional permitting efforts.

Cost Analysis

Costs for the proposed expansion were provided by COH. These were adapted to meet regional planning requirements for presentation of project costs and are shown believe in *Table 2*.

Table 2 – Northeast Water Purification Plant Expansion Costs

OPINION OF PROBABLE CONSTRUCTION COST					January 10, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$1,020,310,000	$1,020,310,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$112,210,000	$112,210,000
3	LAND AND EASEMENTS	1	LS	$0	$0
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$131,092,418	$131,092,418
	PROJECT CAPITAL COST				$1,263,612,418

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$105,738,241	$105,738,241	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$175,323,750	$175,323,750	$175,323,750	$175,323,750	$175,323,750	$175,323,750
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$281,061,991	$281,061,991	$175,323,750	$175,323,750	$175,323,750	$175,323,750

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$281,061,991	$281,061,991	$175,323,750	$175,323,750	$175,323,750	$175,323,750
2	YIELD	358,400	358,400	358,400	358,400	358,400	358,400
3	UNIT COST	$784	$784	$489	$489	$489	$489
	TOTAL UNIT COST						$588

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$104,450,000	$104,450,000
2	WATER TREATMENT PLANTS	1	LS	$860,810,000	$860,810,000
3	OTHER	1	LS	$55,050,000	$55,050,000
	PROJECT COST				$1,020,310,000

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION AND MINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5	%	$104,450,000	$2,611,250
2	WATER TREATMENT PLANTS	1.0	LS	$172,162,000	$172,162,000
3	OTHER	1.0	%	$55,050,000	$550,500
	ANNUAL OPERATION AND MAINTENANCE COST				$175,323,750

PROJECT EVALUATION

Based on the analysis provided above, the NEWPP Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	2	High project cost
Location	3	Conveyance required to make water supply available to intended users. This is planned under other projects.
Water Quality	3	No known issues related to water quality.
Environmental Land and Habitat	4	Expansion to be constructed on existing plant site.
Environmental Flows	3	No direct impact to environmental flows although water diverted for treatment at the NEWPP may reduce flows and wastewater
Local Preference	5	Substantial support for project development.
Institutional Constraints	4	Property acquired and preliminary steps under way.
Development Timeline	4	Project development timeline of less than 10 years.
Sponsorship	5	Sponsors identified and engaged in project development.
Vulnerability	4	Minor risks from natural and man-made disasters associated with source availability.
Impacts on Other Projects	5	NEWPP expansion is a significant piece of the overall water supply project for Harris and Fort Bend Counties as the means of treating water delivered by Luce Bayou before transmission to regional water authority customers.

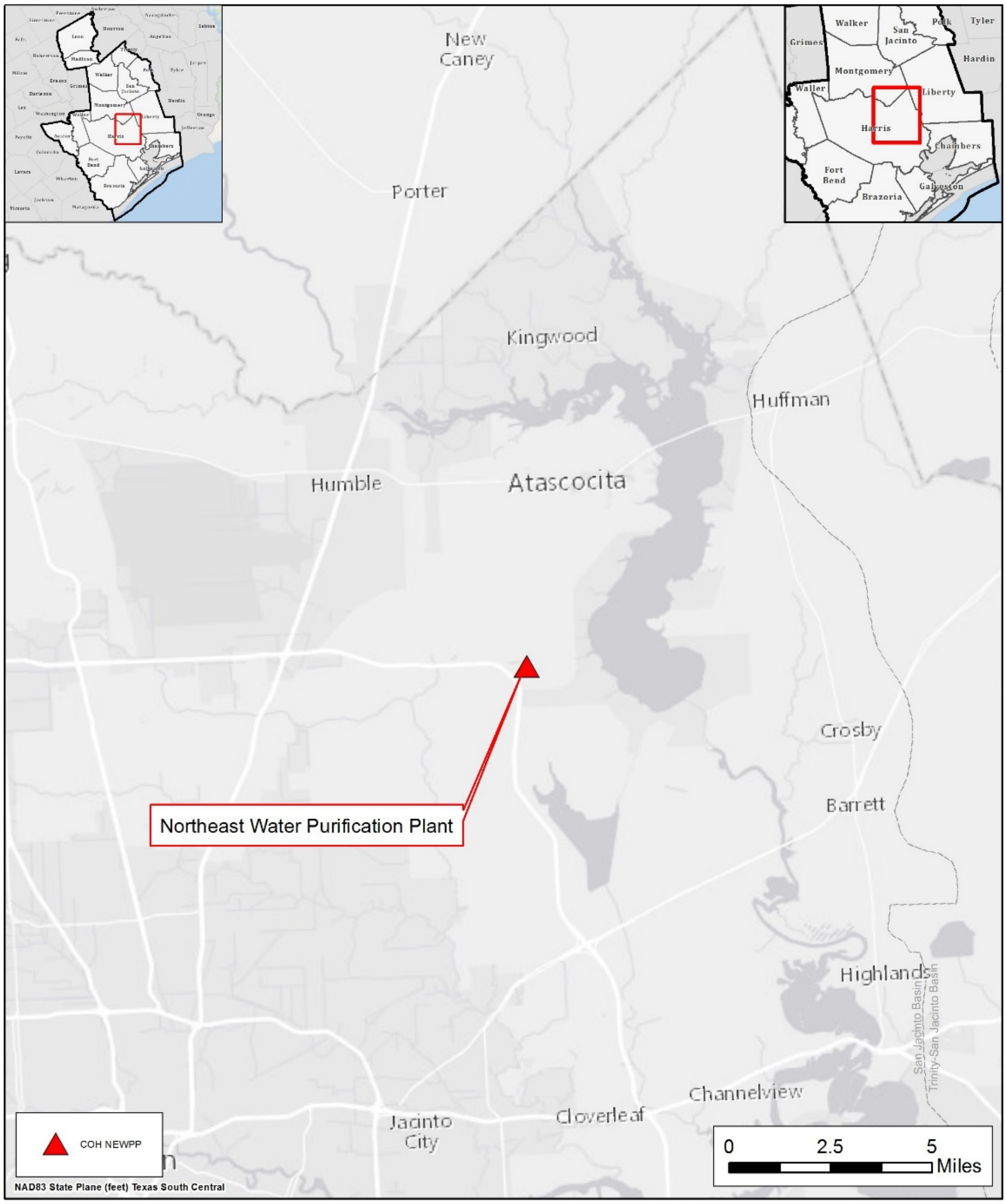
WATER USER GROUP APPLICATION

The NEWPP Expansion project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	Treated water from the NEWPP expansion can be made available to meet demands in the immediate vicinity of the plant or conveyed through additional projects to other demand areas.

CRITERIA	WUG SUITABILITY
Size	The expansion provides a sizable amount of treated surface water for use throughout the greater Houston area. The total volume is divided among project participants.
Water Quality	The project provides treated surface water for potable uses such as for meeting municipal demands.
Unit Cost	The unit cost of this project makes it an acceptable project for municipal and other potable water demands.
Other Factors	The participants in this project have been identified and are moving forward with project development.

LOCATION MAP



Northeast Water Purification Plant Location Map

REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	City of Pearland Surface Water Treatment Plant
Project ID:	TRET-005
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	11,200 – 22,400 ac-ft/yr (10 - 20 mgd)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$112,947,347 (Sept. 2013)
Unit Water Cost (Rounded):	$839 per ac-ft (during loan period) $230 per ac-ft (after loan period)

PROJECT DESCRIPTION

To plan for future growth and reduce dependence on groundwater, the City of Pearland has contracted with the City of Houston for treated surface water from the Southeast Water Purification Plant and with Gulf Coast Water Authority for raw surface water supplies. The City of Pearland is in the process of planning and developing a surface water treatment plant (SWTP) in order to utilize their contracted raw surface water.

PROJECT ANALYSES

The project analyses for the City of Pearland SWTP include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

This project is supplied by contractual agreements for supply from existing availability. Development of the City of Pearland SWTP project will require development of a surface water treatment plant and associated infrastructure. The initial phase of SWTP development will have a capacity of 10 MGD (11,200 ac-ft/yr). Development of a preliminary engineering report and pilot testing are scheduled for year 2017, with design during years 2017-2018 and construction anticipated to be completed by year 2022. The project also includes an expansion of the SWTP to a capacity of 20 MGD (22,400 ac-ft/yr) by year 2030.

Environmental Considerations

One impact associated with the implementation of this water management project is the increase in GCWA diversions from the Brazos River. Increased diversion of water from the Brazos River will result in some minimal decreases in instream flow downstream of the GCWA pump stations. However, these diversions will be made from existing water rights currently owned by the GCWA, contracted by the

City of Pearland, and no new water rights permits are required for this project. Otherwise implementation of this project should produce minimal environmental impacts.

Permitting and Development

Because the supply source for this project is from existing water rights and will be delivered through GCWA's canal system, permitting of new surface water rights or modification of existing rights to add a diversion point will not be required.

Cost Analysis

Capital costs for the initial 10 MGD surface water treatment plant are summarized in the City of Pearland's 2015-2019 Capital Improvement Plan. Costs associated with environmental studies, mitigation, and interest during construction are not identified as separate items, but for purposes of the regional plan it is assumed that these values are included in the estimates for other capital cost components. An estimated capital cost of $40 million for the year 2030 expansion of the SWTP was provided by Pearland. The costs presented in this memorandum do not include the purchase cost of water. Annual costs presented in *Table 1*, including debt service and costs for operations and maintenance, were calculated using standard cost estimation procedures for Region H.

Table 1 – City of Pearland SWTP Project Cost Estimate

OPINION OF PROBABLE CONSTRUCTION COST					December 15, 2014
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$49,937,361	$49,937,361
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$20,582,346	$20,582,346
3	LAND AND EASEMENTS	1	LS	$2,427,640	$2,427,640
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$0	$0
5	INTEREST DURING CONSTRUCTION	1	LS	$0	$0
6	FUTURE 10 MGD EXPANSION	1	LS	$40,000,000	$40,000,000
	PROJECT CAPITAL COST				$112,947,347

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$6,104,185	$9,451,358	$3,347,173	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$3,298,058	$5,153,215	$5,153,215	$5,153,215	$5,153,215	$5,153,215
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$9,402,243	$14,604,574	$8,500,389	$5,153,215	$5,153,215	$5,153,215

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$9,402,243	$14,604,574	$8,500,389	$5,153,215	$5,153,215	$5,153,215
2	YIELD	11,200	22,400	22,400	22,400	22,400	22,400
3	UNIT COST	$839	$652	$379	$230	$230	$230
	TOTAL UNIT COST						$389

PROJECT EVALUATION

Based on the analysis provided above, the City of Pearland SWTP project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	2	Costs are somewhat high during debt service but are reduced considerably after completion of debt service.
Location	5	Source located near points of demand with minimal conveyance infrastructure required.
Water Quality	3	No known issues regarding water quality.
Environmental Land and Habitat	4	Minimal impacts anticipated.
Environmental Flows	2	Some decrease in environmental flows below diversion point. Diversion is from an existing water right.
Local Preference	4	No known opposition.
Institutional Constraints	3	Minimal permitting challenges or opposition expected.
Development Timeline	5	Project development, including permitting, could be accomplished in approximately 5 years or less.
Sponsorship	4	Sponsor is identified and committed to project.
Vulnerability	5	Minimal risk associated with this project.
Impacts on Other Projects	3	No significant impacts recognized to other projects.

WATER USER GROUP APPLICATION

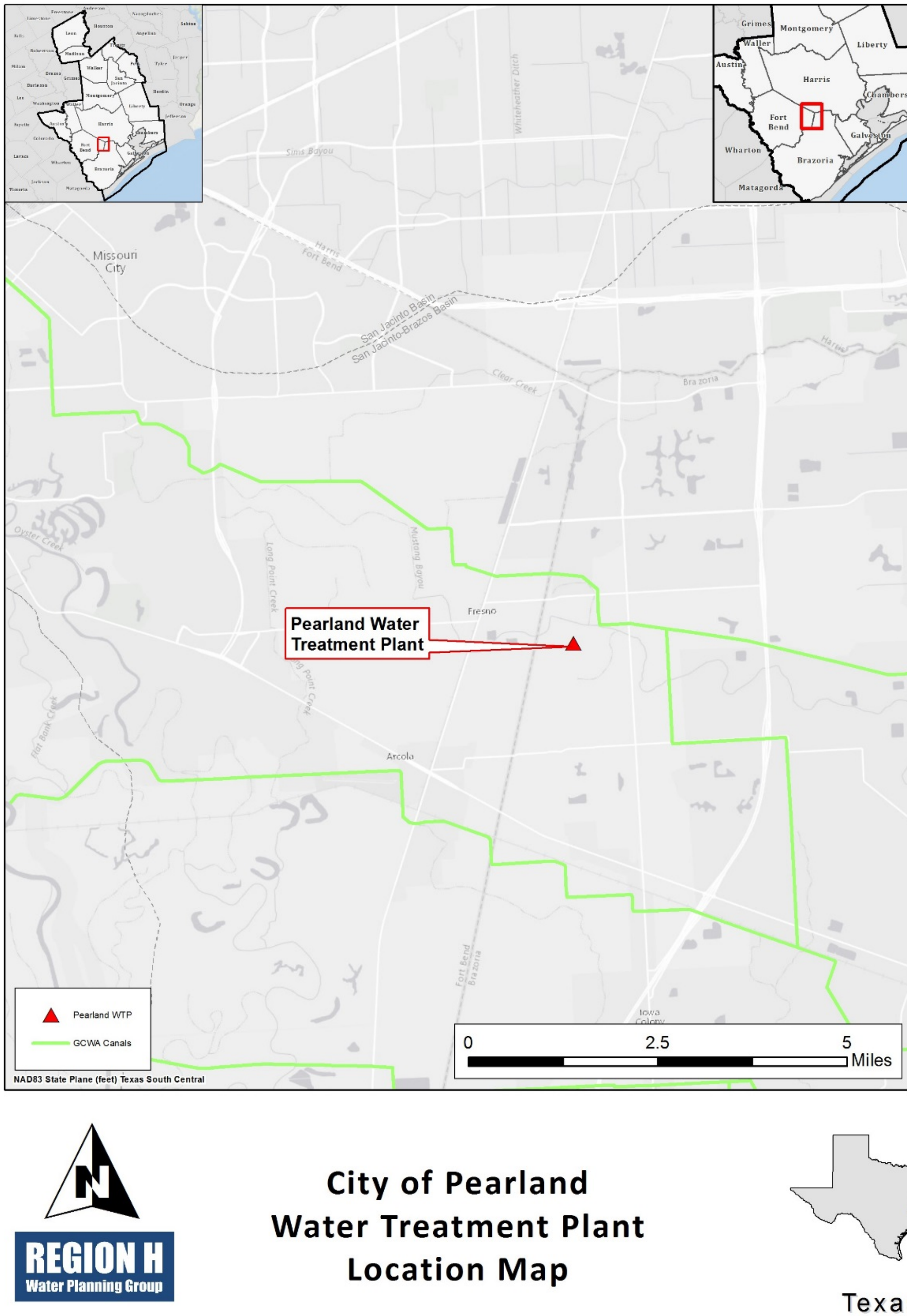
Determination of the Water User Groups (WUGs) to which the project may be applied was evaluated based on the criteria below. This information was considered in context of the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the applicability of the project to the WUGs served. It is anticipated that the project will only serve the City of Pearland and any entities that it provides with water supply.

CRITERIA	WUG SUITABILITY
Proximity	Project is located in close proximity to intended points of use.
Size	Project is of appropriate size to utilize the City of Pearland's surface water contracts.
Water Quality	This project is expected to provide water of acceptable quality.
Unit Cost	The cost of this project is moderately high but decreases substantially after completion of debt service.
Other Factors	This project reduces groundwater dependence.

REFERENCES

City of Pearland, *2015 – 2019 5-Year Capital Improvement Program*, November 2014.

LOCATION MAP



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REGION H PROJECT ANALYSIS
TECHNICAL MEMORANDUM

Project Name:	Brazos Saltwater Barrier
Project ID:	OTHR-001
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	72,396 ac-ft/yr (64.64 mgd)
Implementation Decade:	2020 (2025)
Development Timeline:	10 years
Project Capital Cost:	$55,771,408 (Sept. 2013)
Unit Water Cost (Rounded):	$69 per ac-ft (during loan period) $5 per ac-ft (after loan period)

PROJECT DESCRIPTION

The Lower Brazos River is tidally influenced, with the extent of the area of brackish water fluctuating seasonally. Municipal and industrial water users in the Freeport area face water quality concerns as the saltwater wedge moves upstream of the Brazoria Pump Station during periods of low flow in the Brazos River. During these time, a constant and adequate flow of water from higher in the Brazos River Basin is required in order to allow for the diversion of water supplies of sufficient quality. A saltwater barrier has the potential to reduce impacts to water quality in the lower basin and, therefore reduce the volume of water required for successful diversion of fresh water from the Brazos River. Water stored in reservoirs within the basin which would otherwise be released to counter saltwater intrusion would therefore be available for other beneficial uses. The proposed project is for the development of a saltwater barrier to protect the Harris Pump Station although alternative concepts to protect the Brazoria Pump Station have also been explored.

The Dow Chemical Company owns water right 12-5328, which authorizes the diversion of 305,656 acre-feet per year from the Brazos River for industrial, municipal and irrigation use. Dow provides a portion of this supply to meet the needs of eight surrounding industries in Brazoria County. The Brazosport Water Authority (BWA) owns water right 12-5366, which authorizes the diversion of 45,000 acre-feet per year from the Brazos River for municipal use. The BWA provides treated water to the cities of Angleton, Brazoria, Clute, Freeport, Lake Jackson, Oyster Creek and Richwood, as well as two TDCJ prison units in Brazoria County. These are the two most-downstream water rights for municipal and industrial demand. The U.S. Department of Energy holds water right 12-5332 downstream at the mouth of the Brazos River, but it is primarily for mining (non-potable) use. Within Brazoria County there are several irrigation water right holders on the Brazos River, but all divert above Dow and BWA. Dow has a 16,000 ac-ft contract with Brazos River Authority (BRA) for water quality releases.

Dow and the BWA share diversion and storage facilities along the Brazos River. As illustrated in the exhibit, the Brazoria pump station is located at river mile 24, and diverts river flows into the Brazoria Reservoir (off-channel). The reservoir is permitted to store 21,973 acre-feet of water. Water released from the reservoir flows into Buffalo Camp Bayou, and thence to the BWA treatment plant in Lake Jackson and the Dow inlet at their Freeport Plant. The Harris pump station is located at river mile 44, and diverts into Harris Reservoir (also off-channel). The reservoir is permitted to store 10,200 acre-feet of supply. Water released from Harris Reservoir flows into Oyster Creek above the City of Angleton, and is transferred to Buffalo Camp Bayou downstream at the Lake Jackson pump station.

The TCEQ Water Quality Inventory defines the Brazos River as tidal below river mile 25, which corresponds to the observed situation at the Harris and Brazoria pump stations. Measured salinities at the Harris pump station range from 50 parts per million (ppm) to 200 ppm, which is typical for river flows. Measured salinities at the Brazoria pump station range from 100 parts per million (ppm) to values in excess of 10,000 ppm. Seawater has a salinity of 3.5%, or 35,000 ppm, causing the tidal reach of the Brazos River to become brackish during lower flows. (For comparison, typical values in Galveston Bay are approximately 15,000 ppm.) This brackish zone decreases in an upstream direction, and also stratifies within the channel, with the denser brackish water below the less-dense fresh water. This forms a triangular zone of brackish water, referred to as a salt wedge. TCEQ Rule 30 TAC 290 – Public Drinking Water, defines a secondary standard for Total Dissolved Solids (TDS) less than 1,000 ppm. Due to the expense and effort required to desalinate brackish water, Dow and BWA divert at their upstream pump station (Harris) when salinities at Brazoria exceed approximately 500 ppm. Note that while seasonal use of the Harris intake is normal and expected, permanent use of this intake would effectively remove the Brazoria Reservoir from the Dow/BWA system, decreasing the yield due to the loss of storage capacity.

As an alternative to using the Harris pump station, Dow and BWA may purchase stored water from the Brazos River Authority (BRA). The BRA operates a system of reservoirs in the middle and upper basin, and by releasing stored water for diversion downstream, the base flow of the Brazos River can be raised above the 1750 cfs required to hold the salt wedge below the Brazoria diversion point. This project has several drawbacks. First, the nearest BRA reservoir is over 100 river miles upstream, making any release subject to channel losses and erroneous diversions by other water rights holders. Second, it requires releasing stored water during the drier periods when the salt water wedge is not already controlled by the stream flows. Finally, the BRA requires payment for this water. Using NPV analysis, the cost of additional water is more than the cost of additional treatment and pumping required during periods when the Harris pump station is used.

Currently, all available evidence indicates that the salt wedge’s influence does not currently extend to the Harris pump station. However, it is projected that future conditions of increased diversions and reduced return flows, coupled with a severe drought would allow the salinity to become unacceptable at the Harris pump station. It is recommended that additional bathymetry data should be obtained for future modeling studies as this project progresses. It should also be noted that the Brazoria Reservoir is important to ensure the yield of the Dow and BWA water rights. There are benefits from installing a saltwater barrier downstream of the Brazoria pump station under the current conditions, simply to decrease the raw-water conveyance and treatment costs.

PROJECT ANALYSES

The project analyses for Brazos Saltwater Barrier include evaluations of the potential supply to be created, environmental factors involved in the project, permitting and development considerations, and an analysis of project cost.

Supply Development

Dow Chemical has engaged in studies to determine the effective of a saltwater barrier project to protect the Harris Pump Station. These studies have demonstrated benefit to the construction of a saltwater barrier for use during low-flow conditions.

Model analysis have been developed using the Texas Commission on Environmental Quality (TCEQ) Water Availability Mode (WAM) Run 3 for the Brazos River. Some issues considered in this analysis are the benefits of conservation by Dow and improvements to reservoir storage and pump station performance capturing river flows. In addition, the studies have examines the impacts of infringement on Dow's water rights caused by upstream diverters. These users are attempting to capture water during extreme conditions when Dow requires this supply in order to make diversions from the river. Development of a saltwater barrier will enhance this ability without a priority call being made on the river and allowing upstream diverters continue diversions under dry conditions.

Environmental Considerations

The construction of the proposed Brazos Saltwater Barrier may have both temporary and permanent impacts on the Brazos estuary, and the downstream and immediate upstream reaches of the Brazos River. Temporary construction may include such impacts as increased turbidity, BOD and contaminant loads in the river, depending on the nature of the sediment entering the river due to disturbance of river bottom sediments and adjacent upland areas. These impacts could be expected to occur in the project area and points downstream on the Brazos River to as far south as the Gulf of Mexico and the Brazos River Estuary. Long-term impacts would result from changes to flows in the River as a result of the operation of the barrier. These impacts could include impediments to fish migration, changes (reductions) in the amounts of sediments and nutrients reaching the Gulf of Mexico and Brazos Estuary, localized changes in hydrology of adjacent wetlands downstream of the facility, and increased sedimentation in the river channel immediately upstream of the barrier. It should be noted that the Brazos River Estuary is one of the smallest in the State and in some respects is less studied than other larger or more productive estuaries. Studies of the estuary are currently underway through efforts associated with the Texas Instream Flow Program as well as through activities associated with Senate Bill 3. The project may also result in permanent impacts to any upstream reservoirs currently used to flush saltwater from the channel during periods of low flow. These could include more stable water levels in the lake, which in turn would result in higher productivity of the lake fisheries and increased value of the lake as a recreational resource.

Permitting and Development

Constructing the proposed Brazos Saltwater Barrier would require several state and federal permits. The project would require a Section 404\Section 10 permit from the U.S. Army Corps of Engineers, most likely an individual permit as opposed to one of the Nationwide Permits. If a bridge or other obstruction to navigation would result from the project, a Section 9 bridge permit from the U. S. Coast Guard would be required. Additionally, a Section 401 water quality certification would be required from the Texas Commission on Environmental Quality (as part of the Section 4040 permit). A Texas Pollution Discharge Elimination System general permit for construction would require submittal of a Notice of Intent and development of a Storm Water Pollution Prevention Plan (with monitoring of the construction site). If substantial materials are excavated from the River, a Sand, Marl and Gravel permit must be obtained from the Texas Parks and Wildlife Department and any structures placed in a tidal water of the State of Texas must be granted an easement from the Texas General Land Office unless exempted by law. Many of these permit actions would require secondary reviews, such as archeological and threatened and endangered species investigations of the project site.

Cost Analysis

Preliminary costs have been developed for the construction of the Harris site for the saltwater barrier. AT the time of study, bathymetry was not available for the development of specific cost estimates for this site. Therefore, the costs shown are identical to the costs developed for the Brazoria site. These are shown below in *Table 1*.

Table 1 – Brazos Saltwater Barrier Project Costs

OPINION OF PROBABLE CONSTRUCTION COST					January 24, 2015
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT CAPITAL COST SUMMARY					
1	CONSTRUCTION COST	1	LS	$35,880,000	$35,880,000
2	ENGINEERING, FINANCIAL, AND LEGAL SERVICES AND CONTINGENCIES	1	LS	$14,710,000	$14,710,000
3	LAND AND EASEMENTS	1	LS	$880,000	$880,000
4	ENVIRONMENTAL - STUDIES AND MITIGATION	1	LS	$1,760,000	$1,760,000
5	INTEREST DURING CONSTRUCTION	1	LS	$2,541,408	$2,541,408
	PROJECT CAPITAL COST				$55,771,408

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	DEBT SERVICE	$4,666,914	$4,666,914	$0	$0	$0	$0
2	OPERATION AND MAINTENANCE (O&M)	$358,800	$358,800	$358,800	$358,800	$358,800	$358,800
3	PUMPING ENERGY COSTS	$0	$0	$0	$0	$0	$0
4	PURCHASE COST OF WATER	$0	$0	$0	$0	$0	$0
	TOTAL ANNUAL COST	$5,025,714	$5,025,714	$358,800	$358,800	$358,800	$358,800

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		2020	2030	2040	2050	2060	2070
1	ANNUAL COST	$5,025,714	$5,025,714	$358,800	$358,800	$358,800	$358,800
2	YIELD	72,396	72,396	72,396	72,396	72,396	72,396
3	UNIT COST	$69	$69	$5	$5	$5	$5
	TOTAL UNIT COST						$26

PROJECT EVALUATION

Based on the analysis provided above, the Brazos Saltwater Barrier project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

CRITERIA	RATING	EXPLANATION
Cost	5	Project is a low-cost alternative for making more water available in the basin during drought conditions.

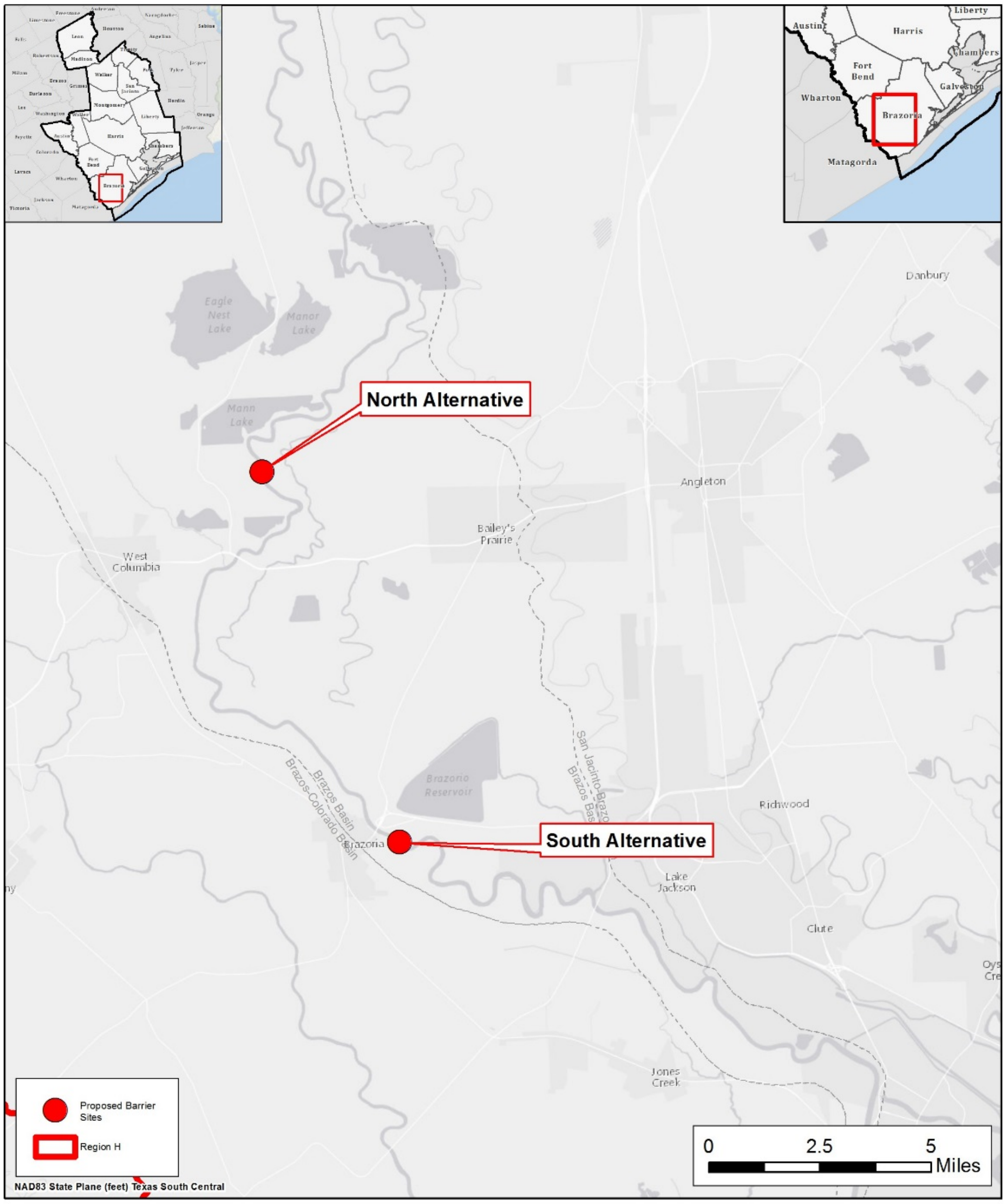
CRITERIA	RATING	EXPLANATION
Location	5	Project benefit is not location-specific as it impacts water rights throughout the basin.
Water Quality	5	Project significantly reduces water quality issues during low-flow conditions.
Environmental Land and Habitat	2	Environmental issues associated with development in the Brazos River. Project will protect upstream portions of the basin from saltwater intrusion.
Environmental Flows	2	Project will enable the reduction of instream flows in the lower basin in order to add water availability.
Local Preference	4	Local support by industry in Brazoria County.
Institutional Constraints	2	Permits required and property acquisition essential in developing project.
Development Timeline	4	Project can be developed in a relatively short period of time, pending permitting.
Sponsorship	3	One sponsor, Dow Chemical, is committed the project as one of many water supply alternatives.
Vulnerability	3	Moderate risk associated with development of a significant structure in the Brazos River floodplain.
Impacts on Other Projects	5	Project may enhance yields of existing water rights and future supplies to be permitted in the Brazos River Basin.

WATER USER GROUP APPLICATION

The Brazos Saltwater Barrier project was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the project as well as other factors that may relate to the auditability of the project to the WUGs served.

CRITERIA	WUG SUITABILITY
Proximity	The benefits of the saltwater barrier are experienced directly in the lower Brazos River Basin but also upstream due to the reduced frequency of priority calls required for Dow to make its diversions.
Size	The magnitude of this project scales according to the magnitude of target diversions.
Water Quality	The project will make raw water supplies more available in the lower basin.
Unit Cost	The unit cost is very low for the yield enhancement during drought-of-record conditions.
Other Factors	The primary sponsor of this project is Dow Chemical Company although there are many more potential benefactors within the Brazos River Basin.

LOCATION MAP



REGION H Water Planning Group

Brazos Saltwater Barrier Location Map

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APPENDIX 5-C

SOCIOECONOMIC IMPACTS OF UNMET NEEDS

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APPENDIX 5-DB

DB17 REPORTS

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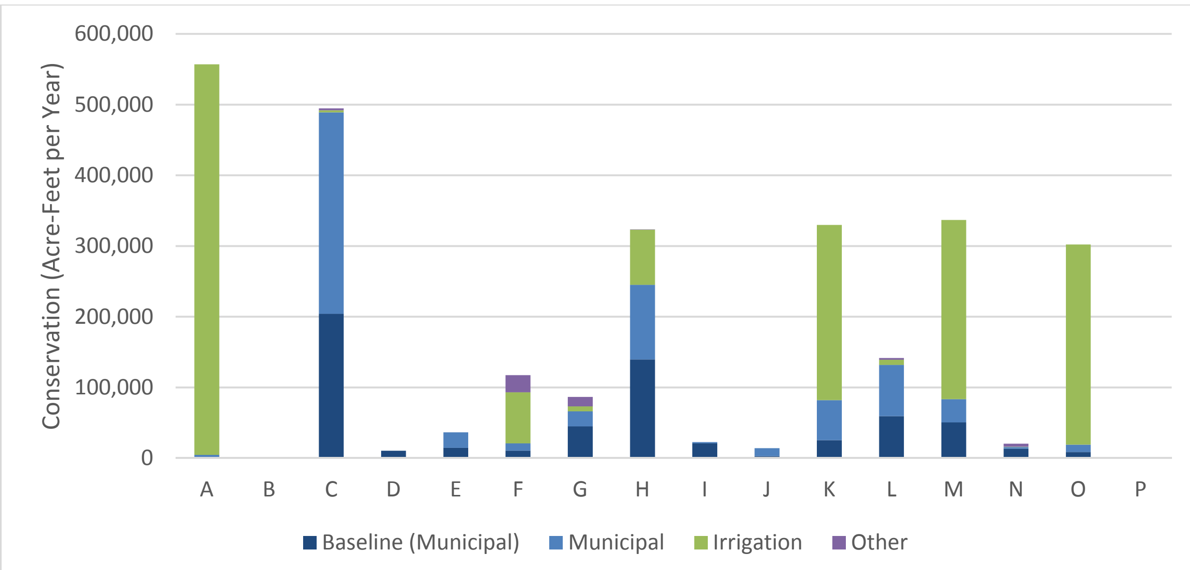
Chapter 5B – Conservation Recommendations

5B.1 INTRODUCTION

Water conservation plays an important role in meeting future water needs across the State of Texas. The 2012 State Water Plan (SWP) identified approximately 650,000 acre-feet of water that could be conserved annually through municipal practices and another 1.5-million acre-feet associated with irrigation use. These savings along with almost 50,000 acre-feet of savings in other sectors was applied above approximately 600,000 acre-feet of annual savings applied by the Texas Water Development Board (TWDB) in the initial development of demand projections. These savings, for all regions, are shown below in *Figure 5B-1*.

Figure 5B-1 – 2012 State Water Plan Year 2060 Conservation by Region



Conservation has been a prime project choice for regions throughout Texas due to the low cost and scalability of the approach. As Water Management Strategies (WMS) grow more expensive over time, the avoided cost of developing new infrastructure projects becomes more attractive. This is made all the more true by the minimal environmental impacts brought about by conservation projects over other strategies. Conservation can also be implemented at nearly any level because virtually all communities and demand centers have some potential for enhanced water use efficiency.

5B.1.1 Challenges

Various challenges exist for the implementation of water conservation practices. Perhaps the most significant is the lack of information available. Per-capita demand levels have not traditionally been followed as operational values and, when they are made available, can often be difficult to make use of due to the number of variables that may affect per-capita demand. Shifts in climate may dramatically influence outdoor water use and, in turn, per-capita demand. The only way to mitigate this data gap is the routine, annual collection of data to provide metrics on long-term benefits from conservation practices.

This need for data carries over to the regional planning process as well. It is difficult for a Regional Water Planning Group to identify and recommend conservation practices for various Water User Groups (WUGs) within its region without knowledge of incorporated practices and the observed, realized benefits from conservation.

There are also challenges associated with implementation of water conservation at the regional level brought about by the fragmentation of the water supply system. Regional planning groups are responsible for planning and have no power to enforce or incentivize the recommendations resulting from the planning process. Therefore, producing meaningful results from water conservation requires buy-in at the WUG-level from hundreds of entities. When compared to traditional projects that can be sponsored by one or a handful of major stakeholders to produce significant results, conservation has additional obstacles to overcome.

This lack of buy-in at the lowest levels is often associated with the lack of incentives to conserve. Although the total cost of water delivery such as treatment and pressure maintenance is driven by the total volume of water delivered, in many cases, the actual cost of water is independent of the volume consumed. In Region H, take-or-pay contracts are typical and, although they are easy to implement, they tend to offer little benefit to customers who conserve water. It is not until additional water must be purchased beyond the existing take-or-pay contract that a WUG would be financially compelled to conserve water to limit the need for contracting additional supply. While utilities enforce conservation rates on their customers to provide some utility in incentivizing conservation, the contractual arrangements that provide wholesale water to those utilities are often lacking similar provisions.

5B.1.2 Importance of Conservation

Despite the many obstacles in implementing conservation projects for mitigating regional demands, the potential benefits make such programs incredibly valuable. Routinely, water conservation programs show up in the regional planning process as some of the lowest-cost strategies available. This avoidance of major infrastructure projects through reducing demands has the potential to delay or even eliminate much more costly programs in the regional plans.

Conservation is a scalable approach that can be applied to WUGs of virtually any size. Typically, larger WUGs with larger water needs can also benefit the most from conservation programs. Conservation programs have the opportunity to eliminate or mitigate the need for additional water for virtually all WUGs.

The TWDB has also placed a major emphasis on conservation through the implementation of its funding programs. Under the State Water Implementation Fund for Texas (SWIFT), TWDB has set aside at least 20 percent of the programs available funding for projects related to conservation and reuse. Furthermore, the rules adopted regarding the program provides consideration for “entities that have demonstrated water conservation or projects which will achieve water conservation, including preventing the loss of water” and provides opportunities for municipalities to demonstrate this through historical reduction in per-capita demand or the threshold for water loss. Agricultural projects may also demonstrate successful conservation through proposed projects.

5B.1.3 Continuous Process

Where most water development projects are discrete efforts that result in making a new water supply available, conservation in a continuous process. Conservation benefits are recognized gradually over time and, while this does not allow for rapid implementation of these projects, the long-term impact yields great value to water supply management.

In some way, this quality of conservation programs is ideally suited to the regional water planning process. As regional planning occurs on a cyclical basis, conservation programs can be continually examined and projections adjusted to account for trends in past performance. By design, each round of regional water planning examines trends in per-capita demands and, therefore, benefits from the conservation already implemented at the WUG level. Successful implementation of conservation programs would mean that future rounds of planning could see needs diminishing without the implementation of projects simply due to the reduced demands.

However, in order to achieve these goals, the process requires routine and robust data collection and analysis. This information is required at the regional level to accurately ascertain the extent of conservation benefit and to responsibly guide future projections. At the utility level, it is required to provide metrics of program performance and cost and generally give an understanding of what works and what changes need to be made.

5B.2 CONSERVATION IN REGION H

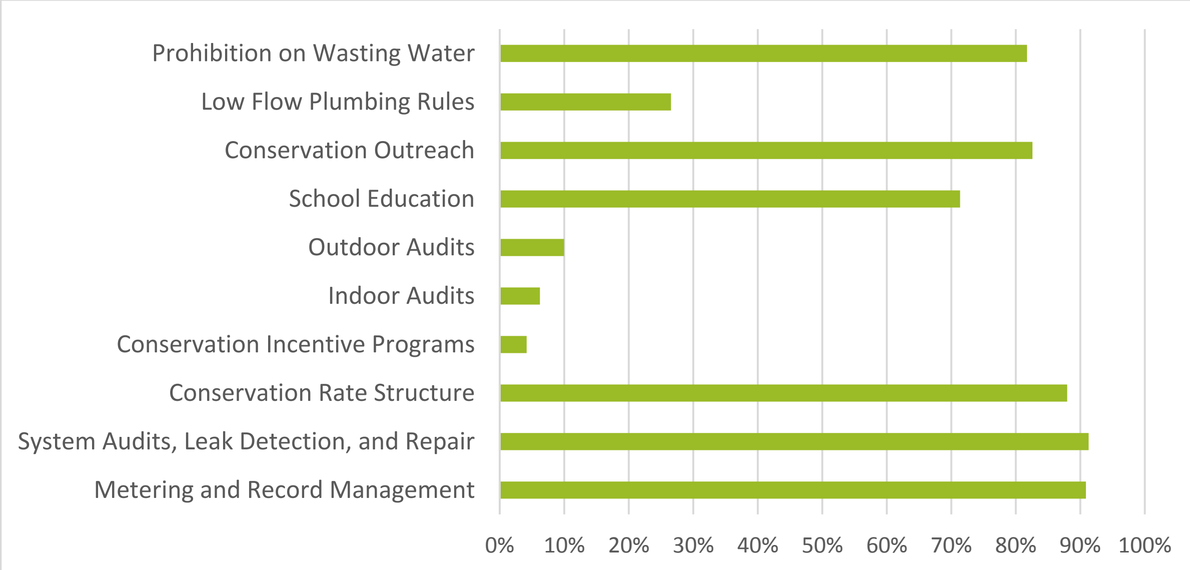
Recognizing the obvious benefits of responsible water management, Region H assigns high priority to the application of water conservation projects. Utilities within Region H are already taking advantage of a wide range of conservation practices although the level of effort and the associated benefits vary throughout. In the scope of regional planning process, conservation projects are applied before other strategies in the RWP and, where appropriate, for WUGs regardless of identified need.

5B.2.1 Current Conservation Efforts in Region H

Conservation efforts vary significantly across Region H. It is noted that different utilities take various levels of interest in effectively developing, deploying, and measuring their conservation programs. One place where this is demonstrated in the numerous approaches to water conservation planning prepared by Region H water suppliers.

A review of adopted water conservation measures from the submitted plans of 241 water systems in Region H were reviewed to identify prescribed practices. Popular approaches to conservation include metering and record management, system auditing and leak detection, conservation rate structures, and conservation outreach. Conservation incentive programs that encourage the adoption of high efficiency fixtures and appliances are very rare in Region H, as are indoor audit programs for water use. A summary of the adoption rate of various practices in Region H water conservation plans is summarized below in *Figure 5B-2*. Additional data is also being collected as part of the Goldwater Project and presented elsewhere in this chapter.

Figure 5B-2 – Percentage of Region H Water Conservation Plans Including Various Programs



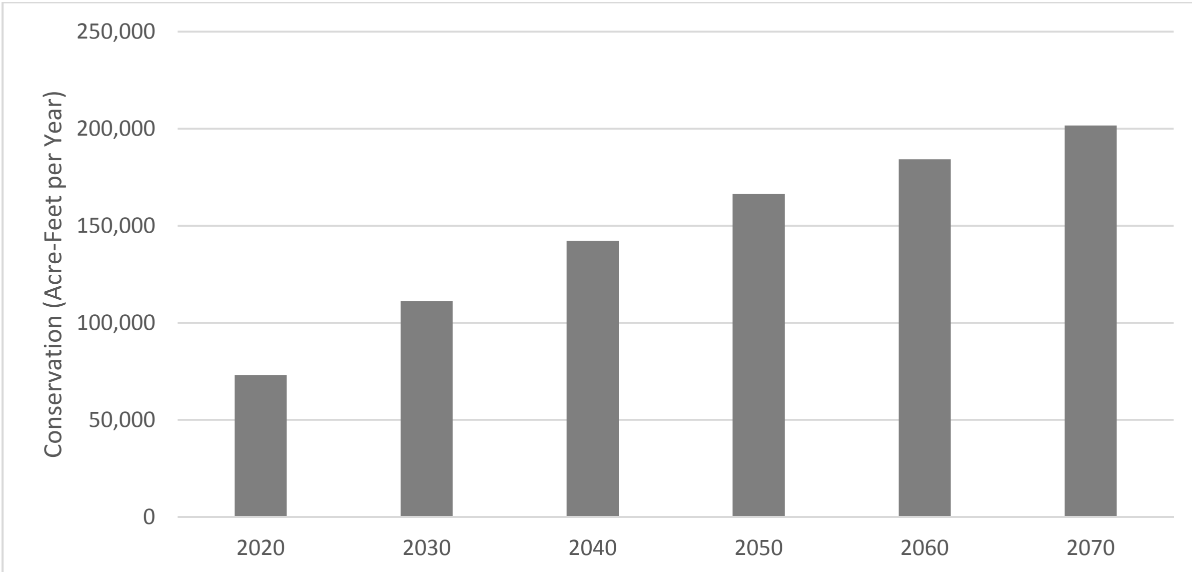
5B.2.2 Recommended Municipal Conservation

Municipal conservation is divided into Baseline Conservation, Water Loss Reduction, and Advanced Conservation. The last category, Advanced Conservation, was developed based on close interaction with the Goldwater Project for Region H.

Baseline Conservation is developed and applied to total water demands by TWDB staff in the early stages of RWP development. This conservation is described as conservation that is anticipated due to factors outside of the projects identified in regional planning. For instance, there are water savings that are projected to occur due to implementation of plumbing code requirements that favor water-efficient fittings and fixtures. As older communities age, the legacy fixtures are replaced with more water-efficient ones. Additionally, the availability of higher-efficiency appliances is another factor that may reduce net water demand in the future. TWDB's baseline conservation includes these efficiency enhancements over time by default.

Region H has adopted the TWDB recommendations in every cycle of regional water planning. Baseline Conservation savings for Region H are shown below in *Figure 5B-3*.

Figure 5B-3 – Region H 2016 RWP Baseline Conservation



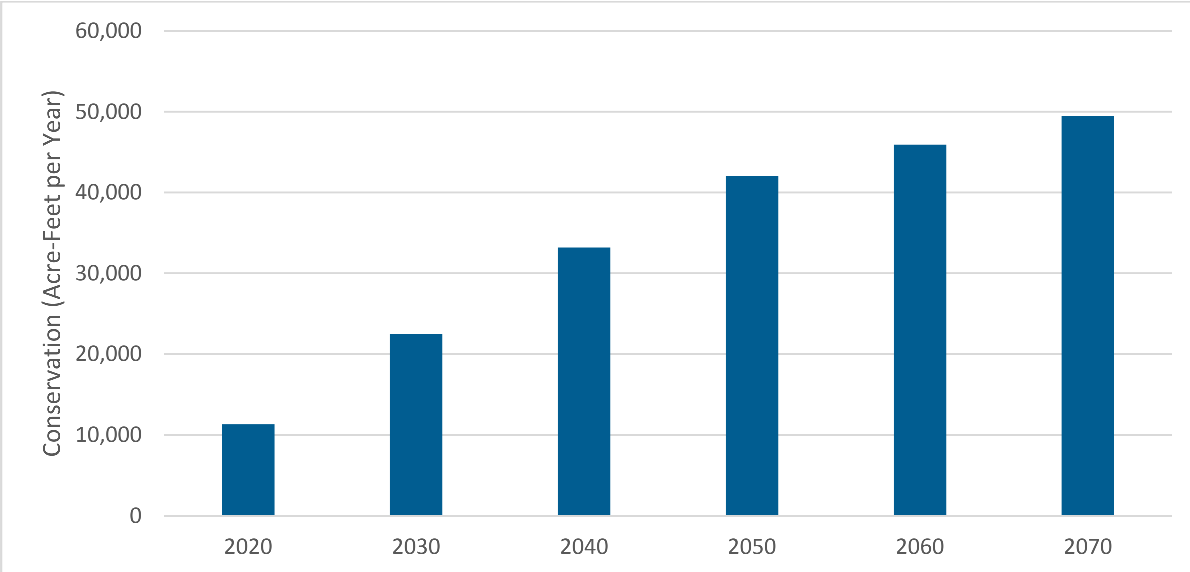
The 2010 Water Loss Audit Report prepared by TWDB represent the most recent source of summarized water loss data available for the development of the 2016 RWP. *Figure 5B-4* details the various components of water use in Region H as evaluated by this study. As demonstrated, real losses represent over 15 percent of the total water input to the region.

Figure 5B-4 – Region H Summary from 2010 Water Loss Audit Report

Region H 665 Audits Submitted	System Input Volume 702,498,747,696	Authorized Consumption 570,527,434,739 81.2%	Billed Consumption 555,838,304,896 79.1%	Billed Metered 555,609,659,853 79.1%	Revenue Water 555,838,304,896 79.1%
				Billed Unmetered 228,645,043 0.0%	
			Unbilled Consumption 14,689,129,843 2.1%	Unbilled Metered 7,758,976,293 1.1%	Non-revenue Water 146,904,342,195 20.9%
				Unbilled Unmetered 6,930,153,550 1.0%	
		Water Loss 132,372,265,647 18.8%	Apparent Loss 23,989,517,923 3.4%	Unauthorized Consumption 1,679,121,648 0.2%	
				Customer Meter Accuracy Loss 22,006,209,101 3.1%	
				Systematic Data Handling Discrepency 304,187,174 0.0%	
			Real Loss 109,059,675,934 15.5%	Reported Breaks and Leaks 11,712,207,418 1.7% Unreported Loss 99,795,102,209 14.2%	

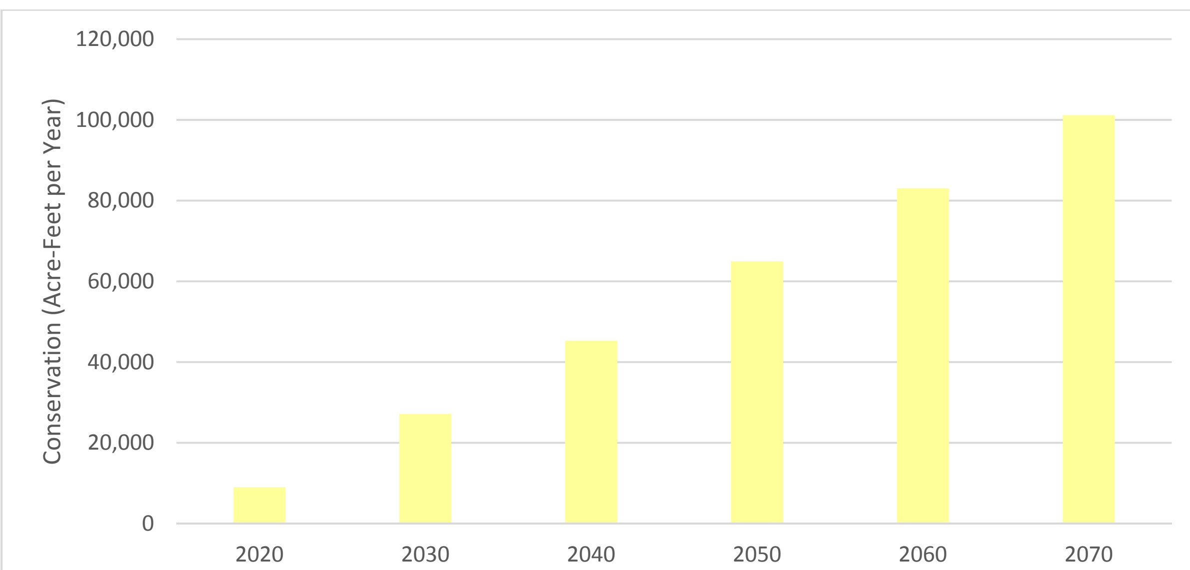
For the purposes of the 2016 RWP, Region H identified utilities with water loss greater than 10 percent as potential targets for water loss reduction. Water loss for utilities meeting this criterion was reduced one percent annually until they met the 10 percent threshold. No additional water loss reduction was applied to utilities with water loss identified at or below 10 percent. These results are shown below in *Figure 5B-5*.

Figure 5B-5 – Region H 2016 RWP Water Loss Reduction



Region H has traditionally reserved the term "Advanced Conservation" to represent conservation potential above the Baseline Conservation applied by TWDB. In the 2016 RWP, with the addition of Water Loss Reduction, Region H identifies Advanced Conservation as municipal methods above Baseline Conservation with the exception of Water Loss Reduction. These values were developed as part of the Goldwater Project and are a function of applying outdoor methods such as smart irrigation controllers and water budgets as well as incentive programs for accelerating the adoption of water-efficient fixtures and appliances. The resulting savings are shown below in *Figure 5B-6*.

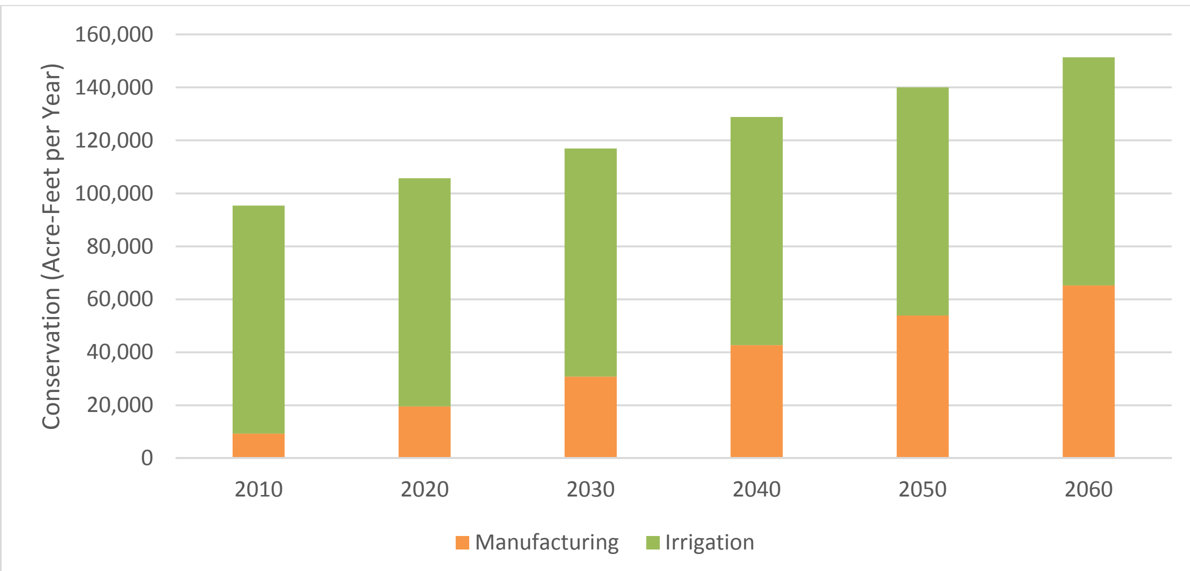
Figure 5B-6 – Region H 2016 RWP Advanced Conservation



5B.2.3 Recommended Non-Municipal Conservation

In addition to being a major population center, Region H is also filled with competing, non-municipal water demands that may also benefit from water-efficient practices. Significant manufacturing demands may benefit from conservation introduced over time as it becomes economical from a business perspective. This is especially the case as the cost of water escalates over time. Irrigation users have limited opportunity to fund substantial infrastructure projects to develop new water supplies. For these WUGs, conservation presents an affordable opportunity to maximize limited water supplies during drought of record conditions. The prescribed level of non-municipal conservation for the 2016 RWP is shown below in *Figure 5B-7*.

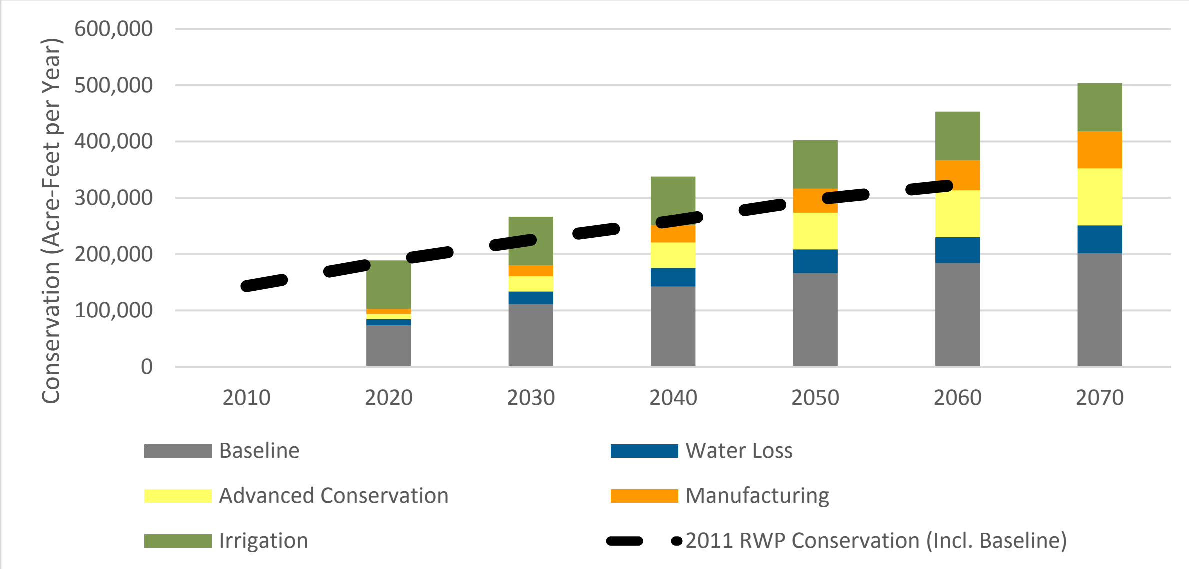
Figure 5B-7 – Region H 2016 RWP Non-Municipal Conservation



5B.2.4 Total Impact of Recommended Conservation in Region H

Collectively, conservation represents a major water management strategy for Region H. The sum total of conservation included in the 2016 RWP as baseline or strategies exceeds the level applied in the 2011 RWP. This is demonstrated below in *Figure 5B-8*.

Figure 5B-8 - Total Region H 2016 RWP Conservation vs 2011 RWP



A significant amount of growth identified in the 2016 RWP compared to previous plans can be accounted for in municipal conservation. The three components introduced above (Baseline Conservation, Water Loss Reduction, and Advanced Conservation) amount to a larger share of the total municipal water demand presented in the 2011 RWP. As Baseline Conservation is applied to total water demand rather than the net water demands generally discussed in plan development, it is necessary to describe the impact of these demand reductions in terms of total demand. Meanwhile, Water Loss Reduction and Advanced Conservation are applied to the net demand after Baseline Conservation is applied meaning their impacts can be compared against the resulting net demand. The actual impacts of all conservation methods are described below in *Table 5B-1*.

Table 5B-1 – Summary of Municipal Conservation Impacts by Decade

Conservation Metric	Basis	2020	2030	2040	2050	2060	2070
Baseline Conservation	% of Total Demand	5.5%	7.5%	8.7%	9.3%	9.5%	9.6%
Water Loss Reduction	% of RWP Net Demand	0.9%	1.6%	2.2%	2.6%	2.6%	2.6%
Advanced Conservation		0.7%	2.0%	3.0%	4.0%	4.8%	5.3%
Total Additional Conservation (Water Loss + Advanced)		*1.6%*	*3.6%*	*5.3%*	*6.6%*	*7.4%*	*8.0%*
Total Conservation Methods (Baseline + Water Loss + Advanced	**% of Total Demand**	**7.0%**	**10.8%**	**13.5%**	**15.4%**	**16.2%**	**16.8%**

5B.2.5 Water Conservation Planning

The Region H Water Planning Group (RHWPG) recognizes the benefits of conservation as part of a diverse water management portfolio. For this reason, the Group recommends water providers take special care in preparation of conservation programs which include the development of useful, comprehensive water conservation plans.

The RHWPG recommends the conservation plan development process begin with the templates developed by the Texas Commission on Environmental Quality (TCEQ). These templates have been developed for specific types of water providers and users and form a strong basis for development of conservation plans. The templates and other resources related to conservation planning may be found at the following location:

https://www.tceq.texas.gov/permitting/water_rights/conserve.html.

The RHWPG also recognizes and would like to stress that conservation efforts do not end at the development of conservation plans. It is imperative that conservation planning go beyond the statutory requirements to develop plans and perform required reporting. It is essential that utilities seek to identify and apply effective, meaningful conservation practices that are suited to their specific needs and customer base. In addition, continual, regular review of conservation progress and performance is required in order to accurately adjust plans and practices in order to achieve meaningful goals. Conservation plans should be regularly reviewed even between required submittal deadlines and adjusted, as necessary to optimize the cost-benefit of programs.

One factor that should be considered hen examining a water conservation strategy is the cost of water. Developing an effective, meaningful water rate structure can not only encourage responsible water use, but also aid in the funding of future projects. There are many resources available to assist in this process. One resource has been developed by the Sierra Club in conjunction with the University of North Carolina and can be found online:

http://texas2.sierraclub.org/community/designing-water-rate-structures-conservation-and-revenue-stability

Finally, it is absolutely essential to distinguish the purposes of water conservation plans and drought contingency plans. Each of these documents serves an important purpose in managing water resources but they are often confused and improperly associated in planning efforts. Utilities should remember to consider water conservation practices that encourage long-term reductions in water use that can be continued on a sustainable basis. Effective conservation plans should promote gradual and consistent reduction in water use over the life of the plan. Short-term measures that curtail water use to meet emergency, drought conditions are discussed in greater detail in ***Chapter 7***.

5B.3 GOLDWATER PROJECT

In September 2012, the RHWPG voted to fully endorse and support the Texas Water Foundation's Goldwater (Region H) Project (The Project), stating that it was "extremely critical that water planners have an accurate assessment of the quantity of water they can count on as a result of water conservation." Beginning in 2013, the Project set out to quantify and measure water conservation efforts in Region H. In short, the Project aims to combat the limitations in information that plague the successful implementation of conservation programs.

As planned, The Project has two primary goals related to water conservation within Region H:

1. To assist regional planners in accounting for the conservation targets set forth in the 2011 Region H RWP by tracking and measuring municipal conservation throughout Region H, and
2. To provide individual utilities with detailed reports that assist them in meeting their own water conservation goals with the need of the overall region in mind.

Additionally, the data synthesized from this analysis provides a fundamental basis for application of reasonable conservation goals for the 2016 RWP, referred to above as "Advanced Conservation."

5B.3.1 Approach

The Project approach is based on a number of data gathering, analysis, and dissemination steps that favor stakeholder input and cooperation. In general, the components are as follows:

- **Support and Stakeholders:** The Project has recruited a number of supporters and stakeholders in development of the project. This includes organizations such as the Region H Water Planning Group and the Harris-Galveston Subsidence District which provide regional knowledge and connection to key parties but also the cities, MUDs, water authorities, and other public water supplies that serve the region's population. It is these entities that have provided critical information to feed into the Project related to current conservation efforts and community profiles for analysis. Data was collected from these entities through extensive coordination with utility staff and information gathered through standardized forms and a survey process.
- **Alliance for Water Efficiency Tracking Tool:** In order to analyze the data collected from stakeholders, the Project utilized a sophisticated water-tracking tool developed by the Alliance for Water Efficiency based in Chicago, Illinois. The tracking tool evaluates the water saving, costs, and benefits of urban water conservation programs. In addition to providing a standardized methodology for water savings and benefit-cost accounting, the tool includes a library of predefined, fully parameterized conservation activities from which to construct conservation programs. The tool can be used for a number of tasks including:

    - Quickly comparing alternative conservation measures in terms of their water saving potential, impact on system costs, and potential benefits to utility customers;
    - Developing long-range conservation plans including the constriction of conservation portfolios containing up to 50 separate conservation program activities; and
    - Accounting for the tracking of implemented water saving, costs, and benefits of actual conservation activities over time.

- **Individual Reports and Regional Findings:** Each utility participating in the Project was analyzed on a basis of water purchase costs, costs for transmission and wastewater treatment, and customer rates using the tool. This provided a basis for each utility to plan their conservation programs. Figures were also considered in aggregate along with the results of the utilities enacting their conservation programs in unison. Approaches were considered for large, medium, and small cities as well as large and small utility districts. An example of an individual report for the City of Sugar Land can be found in ***Appendix 5B-A***. These reports include the following information for each stakeholder:

    - Political consensus and steps to reach it,

- Water tracking tool data points unique to each utility,
- Selected strategies for utility developed via staff interviews,
- Tool projections for selected strategies for the next five years,
- County outlook with specific utility in context, and
- Implementation successes and pitfalls.

5B.3.2 County Outlooks

County outlooks were prepared for each county with participating stakeholders. Potential conservation savings were developed for the portion of the county's population participating in the program. These rates of participation for the five core counties in Region H are shown below in *Table 5B-2*. Counties were limited in achieving their conservation goals based on the participating population. The Project did not wish to include conservation savings for entities who are not participating as utility-specific information is required to prescribe specific conservation practices for each one.

Table 5B-2 – Goldwater Project Participation Summary (Dec. 2014)

County	Participation Rate (% Population)	Participants	
		Cities	Districts
Brazoria	38.09%	2	0
Fort Bend	23.04%	1	19
Galveston	54.41%	2	2
Harris	60.14%	6	11
Montgomery	34.39%	1	11

Data was examined for the near-term conservation potential for participants in each county. Low and high projections of potential savings using conservation methods were prepared. The recommended practices and their adoption rates for low and high projections are shown in *Table 5B-3*.

Table 5B-3 – Goldwater Project Prescribed Conservation Activities

Activity	Class	Implementation Rates	
		Low	High
Residential HE Toilet Rebates	Single-Family	10%	50%
Residential HE Toilet Rebates	Multi-Family	10%	50%
Tank-Type HE Toilets	Commercial	10%	20%
Dishwasher Rebates	Commercial	10%	20%
Kitchen Spray Rinse Valve Replacement	Commercial	10%	20%
Large Landscape Water Budgets	Commercial, Multi-Family	40%	60%

These projections were then added to the estimated potential for water loss reduction to produce total conservation potential that could be compared against the conservation targets that were initially provided in the 2011 Region H RWP. These 2020 and 2025 projections and goals are shown below in *Figure 5B-9* through *Figure 5B-13*. It should also be noted that other programs, such as the WaterWise school program and other strategies not included here, are being quantified for specific utilities. The savings being achieved by these efforts are included in annual updates to the county outlooks.

Figure 5B-9 – Brazoria County Conservation Outlook

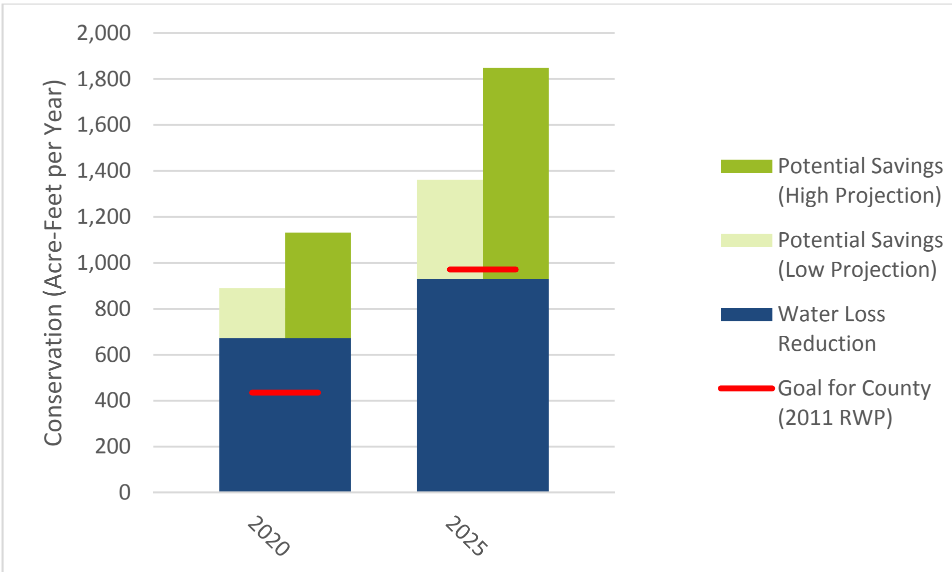


Figure 5B-10 – Fort Bend County Conservation Outlook

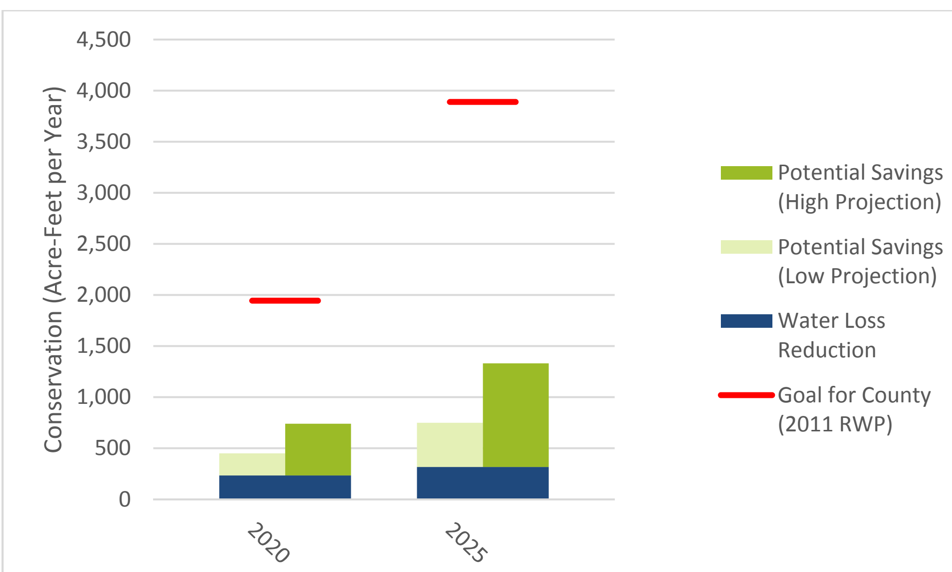


Figure 5B-11 – Galveston County Conservation Outlook

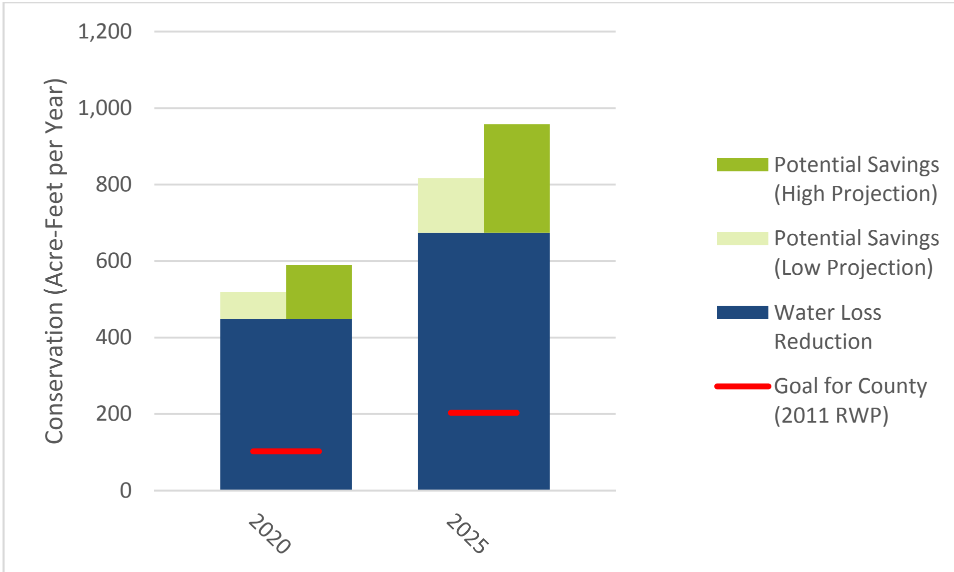


Figure 5B-12 – Harris County Conservation Outlook

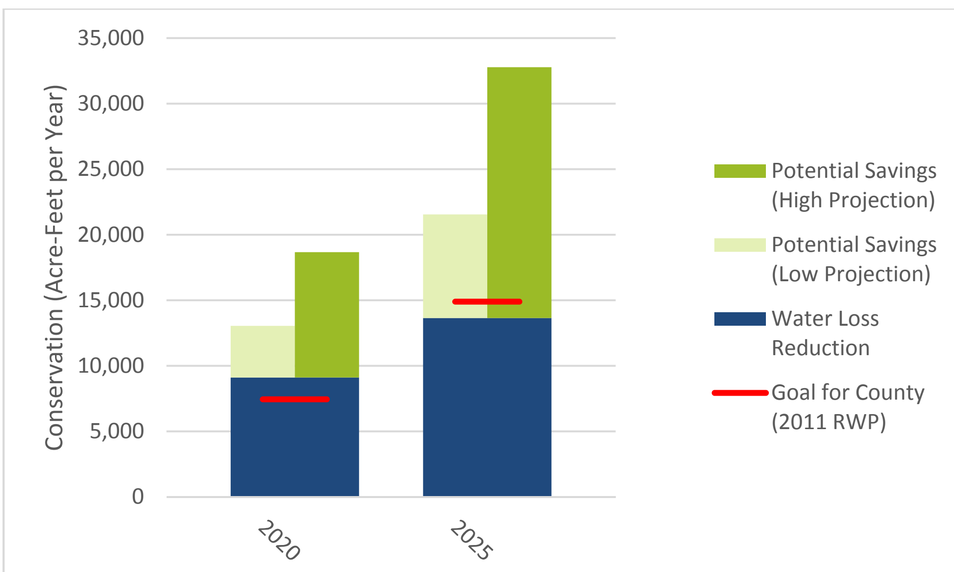
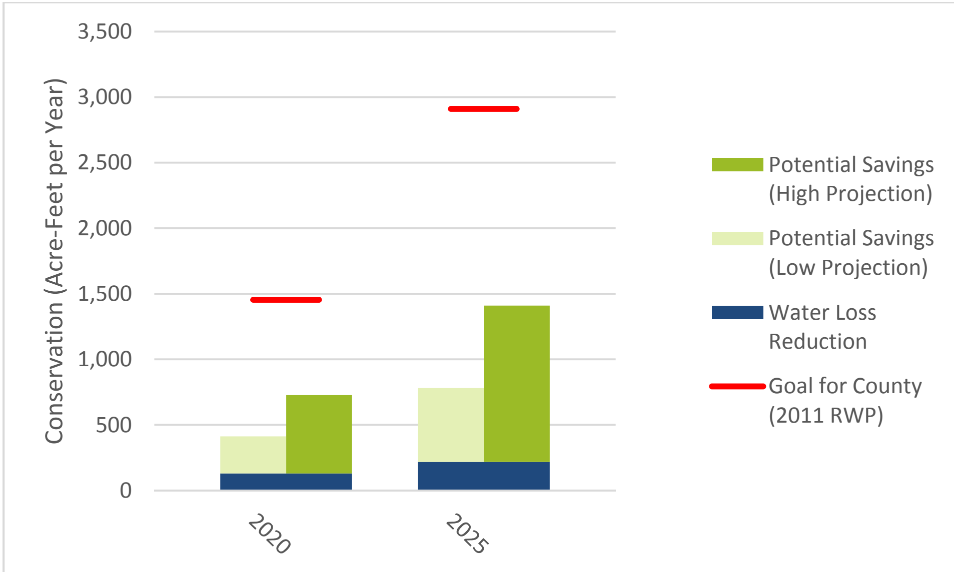


Figure 5B-13 – Montgomery County Conservation Outlook



Based on this analysis, it is apparent that a combination of county-wide initiatives to address water loss combined with some level of Advanced Conservation by entities participating in the Project is adequate to meet the 2020 and 2025 goals in three of the five core counties.

As demonstrated in *Figure 5B-10* and *Figure 5B-13*, these methods, combined, are not adequate to meet the goals outlined for Fort Bend and Montgomery Counties. This is due to a number of factors. For one, in this approach a small subset of the overall county municipal population is tasked with achieving a substantial share of the county's conservation goals. Participation by additional utilities will make a larger subset of the county populations available for the program and, therefore, additional savings can be accounted for in this process. Goldwater Project staff members are actively recruiting greater participation in these counties. In addition, potential water loss reduction for these counties is relatively limited. Much of the population in these suburban counties is served by relatively new infrastructure with limited existing loss rates. This provides limited opportunity to reduce water loss and add to the overall conservation toward meeting the county goal.

5B.3.3 Preliminary Results

The Goldwater Project represents an ongoing effort to quantify and provide guidance on the implementation of water conservation programs. However, the Project has already yielded results related to information collected in the initial phases of the project which provide meaningful and insightful observations regarding the implementation of conservation programs and about Region H.

The Goldwater Project recommends the following strategies to help achieve maximum adoption and water saving targets:

- Utilities implementing any of the conservation measures presented by the Project should closely monitor program progress. Program data should be used to refine estimates of current market penetration, if any measures center on fixtures. If the saving goals are not being achieved, the utilities and regional points of accountability should consider program modifications. If a program is not successful or cost-effective with the current design, it may be necessary to employ other distribution techniques.

- Utilities should follow the development of new technologies and consider adding new measures when proven to be effective.
- Each year a utility's conservation program should be evaluated for adjustments using the tracking tools to allow participation to compare against water saving goals.

Despite the opportunities recognized, the Goldwater Project also identified several key challenges to be faced in the implementation of water conservation programs:

- Regional communication. From interview responses, it was made clear that most utilities are completely unaware of impending regional shortages or any recommendations made by the Region H Water Planning Group to specifically address municipal conservation. Any formal plan going forward, should develop hard-and-fast conservation goals for every area of the region and establish a reliable, accurate communication structure that connects regional planners to all their component parts to periodically discuss projects.
- No mandatory measures can be implemented. Interviewees in the Project lamented that, until mandates are put in place, conservation will be performed in a piecemeal fashion. Goldwater believes that mandatory measures would ensure participation but is also aware of the unpopularity of such action. At present, organizing municipal conservation stakeholders may be the best starting point.
- Top-down repair initiatives. Most interviewees in the Project agreed that aggressively addressing water loss from the macro level should be the first step in any comprehensive conservation plan. Staff at cities with older infrastructures, cited significant damage to piping from the 2011 drought which means there is ample opportunity to save water through proper audits and repairs. New financing mechanisms being developed by TWDB could potentially be used to aggressively address this issue.

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APPENDIX 5B-A

SAMPLE UTILITY REPORT

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GOLDWATER PROJECT

Sugar Land Report
2014

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Table of Contents

I. Introduction

The severe drought in 2011 opened many eyes here in Texas. Water utilities, regional planners, end-use consumers and state legislators began to take notice. It became apparent that without action our state would suffer great economic and social loss if another such drought took place—we were simply unprepared.

The 2011 drought was the costliest in state history with a total cost of $7.62 billion. Cities like Wichita Falls and several in West Texas are still facing dire water supply conditions. Though many factors contribute to such shortages, it's clear that Texas cities must start using conservation as an inexpensive, fairly quick way to begin to address real upcoming water challenges.

State Water Plan

The state has long recognized the problem, creating the State Water Plan in 1961 with updates every five years and the last phase being completed in 2011.

The plan divides the state into 16 regions, lettered A – P. Each region possesses its own environmental characteristics and water supply concerns, and develops its own strategies to provide for the future.

Region H Plan

Region H, which encompasses Sugar Land, is a 15-county region surrounding Harris County and making up a full 25 percent of the state's population. It is complex due to a dynamic relationship among water wholesalers, cities, municipal utility districts (MUDs), groundwater districts and the end-consumer. The region's numerous, largely autonomous MUDs also make water conservation initiatives difficult to execute in a uniform, planned manner.

The Region H plan calls for 12 percent water savings over the planning period (through 2060) to come from water conservation. Of that 12 percent, seven percent—or 105,494 acre-feet—must come from municipal conservation. Industrial and irrigation conservation make up the remaining five percent.

Of the region's counties, the five largest must take on the brunt of this conservation, with Brazoria, Fort Bend, Galveston, Harris and Montgomery Counties needing to account for 97 percent of the savings, or 102,365 acre-feet. The plan's projected water savings by county are listed in Appendix B.

Purpose of Utility Plan

The purpose of this report is two-fold: 1) provide your utility with a useful report that will, ultimately, make it easier for the city to continue conserving in earnest, and 2) show what participation by your utility looks like vis-à-vis Fort Bend County's short- and long-term conservation goals.

Cost effective

The measures outlined in this report should provide cost effective options for your utility to consider. Each one should target a customer class that makes up a sizeable portion of Sugar Land's water consumption, have a net positive impact on rate and revenue requirements, and result in adequate water savings.

These measures are cost positive largely because the costs that your utility incurs on water purchases, energy for transmission and distribution and wastewater treatment expenses are outweighed by the savings that results from buying and using less water. If a measure's benefit-to-cost ratio exceeds a value of one, it is projected to ultimately "make" your utility money. If the ratio is below a value of one, the margin is too slim to safely project financial savings over the life of the program.

In Section V, you will find outputs from measures identified during interviews with utility staff. The benefit-cost ratio and the net present value for each measure are featured here along with other indicators of cost effectiveness.

Tool for City Council

This report is only as effective as city council allows it to be. This means that buy-in from decision makers is crucial to approval and, ultimately, implementation of these planned strategies.

Because each measure is projected to be cost effective, this report is intended to serve as a reinforcement tool and solid evidence that conservation can be a boon for the city, all while reducing demand for your utility and on the water systems that serve it.

SWIFT dollars

With the passing of Proposition 6 in November of 2013, the state legislature cleared the way for the State Water Implementation Fund for Texas (SWIFT) to create a loan bank for water projects enumerated in the state's regional plans. Loans may soon be available for funding conservation activities at half the market interest rate for most utilities.

The TWDB has just formulated the priority rules for the loan bank and a full 24 percent of all Texas' future water supplies are intended to come from water conservation.

In discussions with staff, the TWDB indicated that obtaining these loans can take as few as three months and can be for as little as $50,000. Depending on the size and breadth of conservation strategies your utility is planning to undertake, these loans present a great option for minimizing burden on revenue for the early life of each measure.

County on Track Leads to Region on Track

Each county in Region H is comprised of varying amounts of cities, MUDs, and WCIDs. Because of this and the inherent difficulties in meeting with utilities, some counties currently have much greater representation than others in the Goldwater Project.

In Fort Bend County, two cities and 18 muds make up 23.04 percent of the county. This means that, thus far, we are making county projections based only on those that are working with us for the project. It is our aim to recruit and include many more utilities as we progress through this second year of the project and as the project continues indefinitely in the coming years. With more complete participation, the onus placed on each utility decreases and the end-consumers required to adopt certain measures in each service area are reduced.

In this report, we are providing enough information so that your utility can assess its goals alongside those of the county. We note, of course, that your utility's specific goals are paramount and that you might be considering system loss repairs or other means of saving water that may contribute to the county's water savings goals. Our aim is to also track and quantify such efforts so that the RHPG can have an accurate representation of what activities are contributing to regional and sub-regional goals.

In the sections below, you will find guidance on how to build consensus around water conservation at the municipal level, results from the AWE tracking tool with your utility's specific data and selected measures, options on adjusting for a change in rate and revenue requirements, and tips on addressing implementation challenges. We hope that the report, as a whole, can take you from a starting point to actually implementing strategies that the Goldwater Project staff can then measure on a yearly basis.

Conservation Savings Quick-look Profile for Sugar Land*

*With a low-to-high range for implementation rates for the utility's chosen measures

Annual Goal for Fort Bend County (MG)	127
Sugar Land's Potential Annual Savings with Conservation Measures (MG) (Low Projection)	12.3
Sugar Land's Potential Annual Savings with Conservation Measures (MG) (High Projection)	45.2
Sugar Land's Potential 5-year Savings with Conservation Measures (MG) (Low)	61.5
Sugar Land's Potential 5-year Savings with Conservation Measures (MG) (High)	225.9
Sugar Land's Expected 5-year Savings from Water Loss Plan (MG) (TWDB submission)	141

Sugar Land's Water Conservation Plan Current GPCD (2013)	187
Sugar Land's Water Conservation Plan 5-year Goal GPCD	182
Potential 5-year Reduction in GPCD with Measures (Low)	1.99
Potential 5-year Reduction in GPCD with Measures (High)	7.32
Sugar Land's 5-year Water Loss Target GPCD (TWDB Submission)	17

Low Projection	
Costs for Suite of Programs over 5 years	$331,512
Benefits for Suite of Programs over 5 years	$1,097,611
Benefit-Cost Ratio	3.31

High Projection	
Costs for Suite of Programs over 5 years	$1,902,110
Benefits for Suite of Programs over 5 years	$5,341,502
Benefit-Cost Ratio	2.81

II. Political Consensus and Steps to Reach It

In the Goldwater Project's first stakeholder meeting, several attendees made the point that overcoming political inertia and dissidence with water conservation as a policy choice is possibly the greatest threat to achieving both short- and long-term goals for the Region.

In this section, based on meetings with several cities in Region H, we lay out important steps toward gaining the support of city decision makers so that conservation can become a reality.

1. *Make the decision to support conservation*

The most crucial and indispensable step for any utility is for city leadership to make the decision to support conservation. This means making conservation a priority and looking for the means to carry out a slate of different measures to reach stated goals. It means understanding that conservation is cheapest and most effective solution to responsible water usage; and it means being open-minded to diverse approaches to conservation and adapting to changing factors within your service area and water system. As Mayor Betsy Price of Ft. Worth recently decreed, "Water conservation is a decision that goes far beyond any of us. It's about making sure our future generations are afforded the same opportunities we had."[1]

2. *Make the decision to balance the budget*

Conserving water does not mean your utility must go into the red. On the contrary, the decision to conserve must be coupled with the commitment to balance the budget. The revenues from the city's base rate must be kept in the black. In Appendix E, we lay out several policy options to adjust for decreased revenue and increased rates that can result from using less water. The decision to conserve is a business decision just as much as it is a policy consideration. In addition, leadership must look at addressing system losses from leaks and evaporation, as well as conservation.

3. *It can be done*

Many utilities throughout the U.S. and, indeed, Texas have successfully struck the balance between conservation and its long-term benefits and the annual matter of keeping proper finances.

Putting off conservation activities will eventually result in your utility swapping one problem for another down the road. Increasing a utility's system capacity is a costly and lengthy process. Conservation begins the financial and water savings now and can prolong the need for additional infrastructure and other means of supply.

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[1] http://fortworthtexas.gov/mayor/message.aspx?id=127626

In our meetings with cities and stakeholders, it has been abundantly clear that most mayors and members of city councils are unaware of conservation efforts that those in public works and in the region desire. This must change.

4. *Include committee and city council members at as many decision points as possible*

Cities with a water conservation committee, water conservation manager (such as Sugar Land), and/or finance committees should strongly consider analyzing current fixed and variable operations and maintenance costs associated with the city's water system. If only 20 percent of costs are fixed and 80 percent are variable due to changes in demand, then conservation activities will inherently cause problems.

Be mindful of base rates and pay special attention to large consumers or consumer sectors that the city relies upon for water sales. If conservation curbed usage by these customers, would revenues adequately cover costs?

The more these committees can work together and with city council, the greater the chances of consensus and prudent decision-making for long-term water solutions.

5. *All at the table to make it viable*

Our findings suggest that ensuring as many of the following people work together to form water conservation policy will shorten the decision-making process and yield the best ultimate results:

a. Utility Director or Utility Billing Manager
b. Water Conservation Manager
c. Staff from Finance Department
d. City Manager or Administrator
e. Two City Council Members
f. Customer Representative from the Public

If these individuals cannot be present at each meeting, they could receive a briefing from staff soon after the meetings take place.

III. Water Tracking Tool Data

This section details the data points used to run the tool for your utility. The source for this data is listed under each value. If the Goldwater Team did not collect that particular data point from staff, it was found through other means that should be identified.

The tool uses this information to make accurate projections for the outputs it produces, including the water savings summary, utility costs and benefits, utility rates and revenues, and customer costs and benefits.

If you have questions about a particular data point, please contact our staff.

COMMON ASSUMPTIONS

1. **Analysis Start Year** = 2012

    Explanation: 2012 was chosen as the start year for uniformity throughout the region and completeness of data for all utilities participating in the project.

2. **Service Area Population:**[2]

    2012 – 84,511
    2020 – 105,510
    2030 – 114,908
    2040 – 122,172
    2050 – 129,275

3. **Service Area Population in 1990** = 44,251[3]

4. **Peak Season Start Date** = May 1

5. **Peak Season End Date** = October 1

6. **Nominal Interest Rate** = 5.25%[4]

    Explanation: The nominal interest rate is the current interest rate the utility pays to borrow money for long-term capital improvement projects. The tool uses this rate along with the assumed inflation rate to convert future costs and benefits of conservation to

[2] Source: Texas Water Development Board population projections for its 2016 State Water Plan
[3] Source: Sugar Land staff
[4] Source: Not provided by staff. Common interest rate.

their present values. If the utility has standard interest and inflation rate assumptions it uses for project planning, use those rates.

7. **Inflation Rate** = 2.3%[5]

8. **Year in Which to Denominate Costs & Benefits** = 2012

9. **Persons Per Household – SF** = 3.5[6]

Explanation: This is the estimated number of persons per household for single-family detached residences.

10. **Persons Per Household – MF** = 1.9

Explanation: This is the estimated number of persons per household for multi-family residences.

11. **Full Bathrooms Per Household – SF** = 1.75

12. **Half Bathrooms Per Household – SF** = 0.34

13. **Full Bathrooms Per Household – MF** = 1.29

14. **Half Bathrooms Per Household – MF** = 0.11[7]

15. **SF Housing Units Built Before 1992** = 15,949[8]

16. **MF Housing Units Built Before 1992** = 878[9]

17. **Reference ET (inches/yr)** = 64[10]

Explanation: This data represents the reference evapotranspiration for tall grass (e.g. blue fescue) for the service area. The tool uses this information to scale the unit water savings for landscape activities included in the model library to reflect local climate.

18. **Avg. Annual Rainfall (inches/yr)** = 42.00[11]

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[5] Source: Bureau of Labor Statistics
[6] Source: Sugar Land staff
[7] Source for Nos. 11-14: This data comes from the tracking tool's look-up table and is based on American Housing Survey results.
[8] Source: Sugar Land staff
[9] Source: Sugar Land staff
[10] Source: Based on data measured by Texas A&M University at College Station, Texas site for Tall Fescue Bluegrass
[11] Source: Sugar Land staff

19. **Region** = U.S.–South

Explanation: The tool uses the region selected (South) to adjust the water savings estimates included in its library to best reflect the regional climate and landscape irrigation requirements.

20. **Volume Units** = Million Gallons (MG)

21. **Select Water User Classes**:

Sugar Land staff provided the following customer classes to assess how each selected conservation strategy would affect a specific class of water user:

Single Family
Multi-Family
Commercial/Industrial/Institutional (CII)
Irrigation (includes lawn/outdoor meters)

22. **Utility Rates:**

Water and Sewer Rates

Single Family
$3.38/Thousand Gallons
$4.14/Thousand Gallons

Multi Family
$3.38/Thousand Gallons

CII
$3.38/Thousand Gallons

Irrigation
$1.46/Thousand Gallons[12]

[12] Source for all rates: Sugar Land staff. The rate used for the Irrigation class reflects landscape irrigation rates paid during peak season, which is when most water savings will occur from outdoor strategies chosen in the projections in this report.

Electricity Rates:[13]

Single Family and Multi-Family
$0.11/KWh

CII
$0.11/KWh

Nominal Rate of Increase = 3.0%

<u>SPECIFY DEMANDS WORKSHEET</u>

1. **Service Area Demands** = Demands grow with Population starting in 2012

2. **Peak Season** (2012) = 18.46 MGD[14]

3. **Off-Peak Season** (2012) = 13.01 MGD[15]

4. **Customer Demand Shares** =[16]

Single Family:
- Demand (MG) – 2,784 MG per year
- Accounts – 25,228

Multi-Family:
- Demand (MG) – 48 MG per year
- Accounts – 48

CII:
- Demand (MG) – 891 MG per year
- Accounts – 1,023

Irrigation:
- Demand (MG) – 865 MG per year
- Accounts – 1,576 MG per year

[13] Source: U.S. Energy Information Administration
[14] Source: Sugar Land staff
[15] Source: Sugar Land staff
[16] Source: Sugar Land staff

ENTER UTILITY AVOIDED COSTS WORKSHEET

1. **Method to Calculated Utility Avoided Costs** = Used the Model's Avoided Cost Calculator to Calculate Utility Benefits[17]

2. **Water Supply Variable O&M Costs**[18]

    a. **Purchase Cost** = $1,500.00 per MG
    b. **Energy for Transmission, Treatment, Distribution** = $345.50 per MG
    c. **Chemicals** = $42.00 per MG
    d. **Other Variable O&M** = $0.00

3. **Nominal Rate of Increase** = 3.0% [unless otherwise provided]

4. **Wastewater Variable O&M Costs**[19]

    a. **Energy for Transmission, Treatment, Discharge** = $376.21 per MG
    b. **Chemicals** = $49.50 per MG
    c. **Other Variable O&M** = $0.00

5. **Nominal Rate of Increase** = 3.0%[20]

6. **Current Peak Season Capacity** = 43.20 MGD[21]

7. **Minimum Peak Demand** = 18.46 MGD[22]

8. **Amount of New Capacity that will be Added** = 0.00 MGD

    Explanation: Sugar Land is not planning any expansion of capacity, per staff.

9. **Year New Capacity Needed Under Current Demand Projection** = 2071[23]

10. **System Expansion Cost** = $0.00

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[17] For formula see: AWE Water Conservation Tracking Tool User Guide. Page 103.
[18] Source: Sugar Land staff
[19] Source: Sugar Land staff
[20] Default value; no alternative value was provided.
[21] Source: Sugar Land staff
[22] Source: Value is calculated automatically
[23] Source: Value is calculated automatically

IV. Selected Strategies for Sugar Land

This section contains a short description of the activities chosen through staff interviews. Measures 3-6 below were seen as the most viable in the service area, but there should be ample information to assess all six. There is also an in-depth breakdown for each measure located in Appendix A.

In Appendix A, the default values listed in the multi-colored tables are based on extensive studies conducted by the AWE in developing the tool. Please note that participant and utility costs are denominated in 2012 dollars, not 2008 dollars as listed in those tables. You can refer to Appendix A for clarification of any default values the tool assumes for these measures.

When implementing any of these measures, the exact values for unit cost and estimated water savings, for example, would need to be entered into the tool for the most accurate projections. The city should have a number of third-party services in the region at its disposable to carry out the strategies on the ground. Our staff is available to consult with your utility about commonly used providers in the region. The Alliance for Water Efficiency can also help with further adjustments to the tool's inputs and its general use.

1. Residential High-efficiency Toilet Rebates for Single-family Households[24]

"High-efficiency" toilets (HET) are defined as those with flush volumes 1.28 gallons per flush (g/pf) or better. This strategy covers a variety of toilet technologies including dual-flush, pressure-assist, as well as redesigned gravity fed toilets.

Conditions: This program is targeted to replace 3.5+ g/pf fixtures. Savings from HE toilets depend considerably on the efficiency of the toilets they replace.

2. Residential low-flow showerhead replacement for Single-family Households[25]

Low-flow (LF) showerheads are showerheads rated at 2.5 gallons per minute (g/pm) or less (at pressure levels up to 80 psi).

Savings depends on the probability of installation and the existing fixtures replaced, which depend in part on the method of distribution (e.g., "hang and pray" or direct installation).

[24] AWE Water Conservation Tracking Tool User Guide. Page 138.
[25] AWE Water Conservation Tracking Tool User Guide. Page 150.

3. **Kitchen Pre-Rinse Spray Valve Replacement for Commercial-Industrial-Institutional customers**[26]

   Pre-rinse spray valves control water flow in sprayers that rinse food waste from pots, pans, utensils, and dishware before they enter a dishwasher. Water conserving valves consume less water and have equal or better rinsing effectiveness because of improved spray pattern design.

Figure 1

Examples of spray rinse valves selected for WaterSense labeling by the EPA.
Manufacturer: T&S Brass and Bronze works

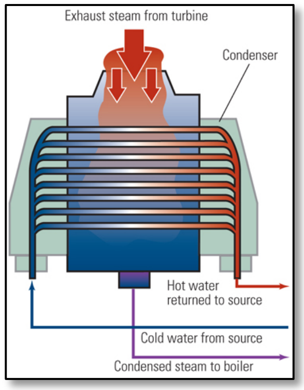
4. **Cooling Tower modifications for Commercial-Industrial-Institutional customers**[27]

   This activity includes reducing water consumed by cooling towers with the use of conductivity controllers and efficient management practices. Two broad categories of water loss in cooling towers include bleed-off (draining cooling water) and uncontrolled losses (drift loss from mist and leaks). In some parts of California nearly all cooling towers are re-circulating systems (as opposed to single pass systems) and many of these have conductivity controllers to automatically manage total dissolved solids by adjusting bleed-off and make-up. Water savings potential for multi-pass systems are related to (1) better-tuned conductivity controllers and (2) adding conductivity controllers if not present.

   Conditions: Program targeted at cooling towers without conductivity controllers.

[26] AWE Water Conservation Tracking Tool User Guide. Page 207.
[27] AWE Water Conservation Tracking Tool User Guide. Page 214.

Figure 2



Example diagram of a cooling tower and how it uses water.

For an excellent resource on the specifics of cooling tower management, please consult this URL:

http://energy.gov/eere/femp/best-management-practice-10-cooling-tower-management

5. **Tank-type high-efficiency toilet replacement for Commercial-Industrial-Institutional customers[28]**

"High-efficiency" toilets (HET) are defined as those with flush volumes 1.28 g/pf or better. This section covers a variety of toilet technologies including dual-flush, pressure-assist, as well as redesigned gravity fed toilets. Figure 3 features the typical design of a tank-type toilet.

Conditions: Program targeted to replace 3.5+ g/pf tank-type toilets with tank-type HE toilets.

Figure 3

[28] AWE Water Conservation Tracking Tool User Guide. Page 192.

6. Large Landscape Water Budgets for CII or Single-family Customers[29]

This activity includes water budgets for large landscapes that are tied to water rates and sometimes to other economic incentives such as equipment rebates. Large landscapes are generally considered those greater than two or three acres in irrigated area.

Conditions: Savings highly dependent on local climate.

This measure typically elicits many questions. East Bay Municipal Utility District in California executes an effective water budget program, and we have included some information from its website here.[30]

What is a water budget?

Water budgets are tools that inform commercial (or residential in some cases), large-landscape customers about how efficiently water is being used in their landscape.

An irrigation budget is based on the amount of a customer's irrigated area plus weather data specific to the region in which they live.

A water budget program is usually made free to customers with meters that serve irrigation exclusively, and not other water uses, such as indoor consumption. Typically, irrigation-only customers include homeowners associations, parks, golf courses, cities, counties, businesses, and some single-family residences.

What are the benefits of a water budget?

Like a financial budget, a water budget helps customers make the best of the resources they have. A water budget:

- Identifies the amount of irrigated area on the meter
- Compares actual water consumption to the water budget goals
- Helps customers become aware of leaks quickly
- Improves irrigation water management
- Lowers water bills
- Helps maintain a healthy landscape[31]

[29] AWE Water Conservation Tracking Tool User Guide. Page 221.
[30] http://www.ebmud.com/water-budget-program-iris
[31] http://www.ebmud.com/water-budget-program-iris

V. Tool Outputs for Selected Conservation Strategies for a 5-year Period

Figure 4

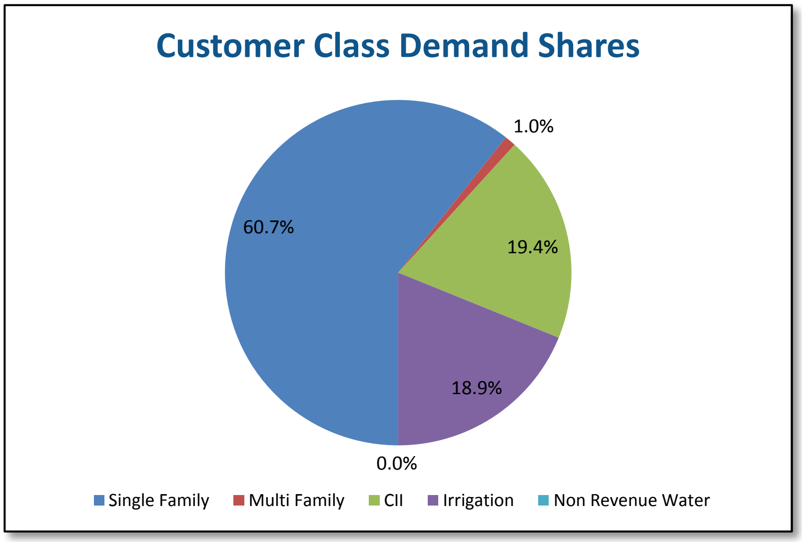


Figure 4 represents the customer class breakdown for Sugar Land. Strategies that affect single-family homes, commercial-industrial-institutional (CII) sites and irrigation customers could have a significant effect on water savings based on the high percentages those accounts make up for the utility.

It also shows how varying degrees of implementation (adoption) rates can still be effective if aimed at the larger customer classes.

Table 1

Customer Class	Share (%)	Demand (MG)	Accounts
Single Family	60.7%	2,784	25,228
Multi Family	1.0%	48	48
CII	19.4%	891	1,023
Irrigation	18.9%	865	1,576
Non Revenue Water	0.0%	0	0
Total	**100.0%**	**4,588**	**27,875**

Table 1 shows the precise number of accounts for each customer class. In the discussion about implementation rates below and in Tables 2 – 5, these numbers serve as a reference of just how many customers need to be reached to achieve the projected water savings. There will be slight adjustments to these totals from year to year as accounts fluctuate.

Table 2

Enter Annual Conservation Activity													
Class	Activity Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Single Family	Residential HE Toilets, SF					160	160	160	160	160			
Single Family	Residential LF Showerhead, SF					160	160	160	160	160			
CII	CII Spray Rinse Valve					40	40	40	40	40			
CII	Large Landscape Water Budgets					10	10	10	10	10			
CII	CII Cooling Tower					10	10	10	10	10			
CII	CII Tank-Type HE Toilet					20	20	20	20	20			

Table 3

Enter Annual Conservation Activity													
Class	Activity Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Single Family	Residential HE Toilets, SF					1600	1600	1600	1600	1600			
Single Family	Residential LF Showerhead, SF					1600	1600	1600	1600	1600			
CII	CII Spray Rinse Valve					80	80	80	80	80			
CII	Large Landscape Water Budgets					30	30	30	30	30			
CII	CII Cooling Tower					10	10	10	10	10			
CII	CII Tank-Type HE Toilet					80	80	80	80	80			

Table 4

Effective Conservation Activity										
Class	Activity Name	2012	2013	2014	2015	2016	2017	2018	2019	2020
Single Family	Residential HE Toilets, SF	0	0	0	0	160	320	480	640	800
Single Family	Residential LF Showerhead, SF	0	0	0	0	160	320	480	640	800
CII	CII Spray Rinse Valve	0	0	0	0	40	80	120	160	200
CII	Large Landscape Water Budgets	0	0	0	0	10	20	30	40	50
CII	CII Cooling Tower	0	0	0	0	10	20	30	40	50
CII	CII Tank-Type HE Toilet	0	0	0	0	20	40	60	80	100

Table 5

Effective Conservation Activity										
Class	Activity Name	2012	2013	2014	2015	2016	2017	2018	2019	2020
Single Family	Residential HE Toilets, SF	0	0	0	0	1,600	3,200	4,800	6,400	8,000
Single Family	Residential LF Showerhead, SF	0	0	0	0	1,600	3,200	4,800	6,400	8,000
CII	CII Spray Rinse Valve	0	0	0	0	80	160	240	320	400
CII	Large Landscape Water Budgets	0	0	0	0	30	60	90	120	150
CII	CII Cooling Tower	0	0	0	0	10	20	30	40	50
CII	CII Tank-Type HE Toilet	0	0	0	0	80	160	240	320	400

In this section, we provide a range in water savings based on meager adoption rates on the low end and substantial adoption rates on the high end. This will allow your utility to assess the degree to which it wants to undertake a given measure or suite of measures and understand the costs and benefits associated with an escalation in implementation.

Tables 2 and 3 indicate how many customer accounts each year need to adopt the measure listed on the left. Each measure affects a specific customer class for your utility. In these projections, the program lasts five years and assumes that a consistent number of accounts adopt the strategy each year. Table 2 is the low adoption rate projection and Table 3 is the high adoption rate projection. The actual adoption rates will vary, of course, and should be managed in an adaptive fashion based on real world results. See Section VII on implementation for tips on successfully seeing a program through to its end. Tables 4 and 5 indicate the cumulative number of accounts that should be adopting or participating in the strategy each year.

The low adoption rate for the top two measures—Residential high-efficiency toilet rebates for single-family homes and Residential low-flow showerheads for single-family homes—is 5% for both. These rates are calculated by determining what percentage 800 homes or accounts is out of 15,929, or the total amount of single-family households built before 1992 in the service area. The tool accounts for the 1991 State Water-Efficient Plumbing Act's directives that no new homes built after 1992 can have toilets exceeding 3.5 gallons per flush. Showerheads cannot exceed 2.5 gallons per minute as 1994.[32]

The high adoption rate projection for these two measures (Tables 3 and 5) is approximately 50% of the eligible customer base. It is also worth considering the showerhead measure for multi-family residences because identification and implementation at applicable apartment complexes and duplexes would be fairly easy.

The success of these two measures relies heavily on determining which homes would be eligible for these fixture replacements, developing a rebate program, and allocating the proper human and financial resources to implement the strategies over five years. City Council could also **pass an ordinance** to shift costs to the end consumer and to expedite the replacement rate.

The next four strategies were all assessed in our interviews with Sugar Land staff. They were considered the preferred strategies during our sessions, rather than the first two more traditional fixture replacement programs mentioned above. These strategies, particularly the Large Landscape Water Budgets would require relatively few accounts to adopt the measure to yield substantial water and financial savings.

Kitchen Pre-Rinse Spray Valve Replacement for CII customers.

These pre-rinse spray valves are used in schools, restaurants, some office buildings and other commercial kitchens. City staff can carry out implementation fairly easily once potential sites are identified. The low-end water saving projections (Tables 2 and 4) in this scenario would result from replacing 40 spray rinse valves per year for five years for a total of 200. This would be approximately a 20% implementation rate based on 1,023 CII accounts in your service area. The high projections (Tables 3 and 5) represent approximately a 40% implementation rate for eligible CII customers, or 80 spray valves per year for five years. Not all CII accounts have a commercial kitchen and some, like hotels, may have several.

[32] Showerhead efficiency is regulated nationwide by the Federal Energy Policy Act of 1992, effective January 1, 1994.

Large Landscape Water Budgets for CII or Single-family Homes.

The size of the landscape is assumed to be two to three acres or greater to achieve the projected savings listed in Tables 6 and 7. Ten CII customers or single-family homes are expected to adopt the budgets each year for five years, for a total of 50.

If it were assumed that there are at least 200 such customers that fit the large landscape profile, then 50 customers would represent a 25% adoption rate over the program length. The high projection assumes 150 customers meet the large landscape criteria and would represent a 75% adoption rate.

Cooling Tower modifications for CII customers.

The low projection model assumes 10 CII customers would adopt a cooling tower conductivity controller and efficient management practices each year for five years. The approximate adoption rate is difficult to know without more information on the customer make-up of the service area, but the measure is certainly achievable. This program's unit cost is easily the highest of all six scenarios and that should be a primary consideration in choosing its feasibility.

The high projection also assumes 50 customers over the five-year period to be cautious not to overestimate the number of CII accounts that could utilize a cooling tower conductivity controller.

Tank-type high-efficiency toilet replacement for CII customers.

The low projection model for this strategy assumes 20 HETs are replaced each year for five years for a total of 100. This is a modest adoption rate, when many convenience store locations, for example, have 3.5+ g/pf toilets of this type.

100 replacements would be approximately a 10% adoption rate of CII accounts, or a higher percentage depending on how many customers have the tank-type low-efficiency fixture.

The high projection model assumes 80 HETs are replaced each year for a total of 400. This would be approximately 40% of the CII customer base.

Water Savings Summary – Model Results

Tables 6 and 7 summarize projected water savings from the defined conservation activities described above. Code-driven savings from the natural replacement of toilets, showerheads, clothes washers and dishwashers were factored into these estimates, as well.

Table 6

Gross Water Savings (MG)

Class	Activity Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Single Family	Residential HE Toilets, SF	0.000000	0.0	0.0	0.0	1.6	3.1	4.7	6.3	7.9	7.9	7.9	7.9
Single Family	Residential LF Showerhead, SF	0.0	0.0	0.0	0.0	0.3	0.7	1.0	1.3	1.6	1.6	1.6	1.6
CII	CII Spray Rinse Valve	0.0	0.0	0.0	0.0	1.1	2.3	3.4	4.5	5.7	5.7	5.7	5.7
CII	Large Landscape Water Budgets	0.0	0.0	0.0	0.0	7.0	13.9	20.9	27.8	34.8	34.8	34.8	34.8
CII	CII Cooling Tower	0.0	0.0	0.0	0.0	2.1	4.2	6.3	8.4	10.5	8.4	6.3	4.2
CII	CII Tank-Type HE Toilet	0.0	0.0	0.0	0.0	0.2	0.5	0.7	0.9	1.1	1.1	1.1	1.1
Total Gross Water Savings		**0.0**	**0.0**	**0.0**	**0.0**	**12.3**	**24.6**	**36.9**	**49.3**	**61.6**	**59.5**	**57.4**	**55.3**

Table 7

Gross Water Savings (MG)

Class	Activity Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Single Family	Residential HE Toilets, SF	0.000000	0.0	0.0	0.0	15.7	31.5	47.2	63.0	78.7	78.7	78.7	78.7
Single Family	Residential LF Showerhead, SF	0.0	0.0	0.0	0.0	3.3	6.6	9.9	13.2	16.5	16.5	16.5	16.5
CII	CII Spray Rinse Valve	0.0	0.0	0.0	0.0	2.3	4.5	6.8	9.1	11.3	11.3	11.3	11.3
CII	Large Landscape Water Budgets	0.0	0.0	0.0	0.0	20.9	41.7	62.6	83.4	104.3	104.3	104.3	104.3
CII	CII Cooling Tower	0.0	0.0	0.0	0.0	2.1	4.2	6.3	8.4	10.5	8.4	6.3	4.2
CII	CII Tank-Type HE Toilet	0.0	0.0	0.0	0.0	0.9	1.8	2.8	3.7	4.6	4.6	4.6	4.6
Total Gross Water Savings		**0.0**	**0.0**	**0.0**	**0.0**	**45.2**	**90.4**	**135.5**	**180.7**	**225.9**	**223.8**	**221.7**	**219.6**

Each row projects the expected savings for a selected measure. Table 6 projects low-end gross water savings if all measures were implemented to the adoption rates described above. The low projection totals are as follows:

2016: 12.3 MG
2017: 24.6
2018: 36.9
2019: 49.3
2020: 61.6

The total water savings for the full five-year period is 61.6 MG or 12.3 MG saved per year. The greatest savings would result from Large Landscape Water Budgets at 7.0 MG per year, or 34.8 MG after five years.

Table 7 projects high-end gross water savings for significantly higher adoption rates throughout the service area. The high projection totals are as follows:

2016: 45.2 MG
2017: 90.4
2018: 135.5
2019: 180.7
2020: 225.9

Total water savings here for the full five-year period is 225.9 MG or 45.2 MG saved per year. The greatest savings would result from Large Landscape Water Budgets at 20.9 MG per year, or 104.3 MG after five years.

Tables 8 and 10 show low estimate gross water savings for each measure during peak and off-peak periods. Tables 9 and 11 show the high estimate.

Table 8

Peak Gross Water Savings (MG)													
Class	**Activity Name**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020	2021	2022	2023
Single Family	Residential HE Toilets, SF	0.0	0.0	0.0	0.0	0.7	1.3	2.0	2.6	3.3	3.3	3.3	3.3
Single Family	Residential LF Showerhead, SF	0.0	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.7	0.7	0.7	0.7
CII	CII Spray Rinse Valve	0.0	0.0	0.0	0.0	0.5	0.9	1.4	1.9	2.4	2.4	2.4	2.4
CII	Large Landscape Water Budgets	0.0	0.0	0.0	0.0	4.9	9.7	14.6	19.5	24.3	24.3	24.3	24.3
CII	CII Cooling Tower	0.0	0.0	0.0	0.0	1.5	2.9	4.4	5.9	7.3	5.9	4.4	2.9
CII	CII Tank-Type HE Toilet	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.5	0.5	0.5
Total Gross Water Savings		**0.0**	**0.0**	**0.0**	**0.0**	**7.7**	**15.4**	**23.1**	**30.8**	**38.5**	**37.1**	**35.6**	**34.1**

Table 9

Peak Gross Water Savings (MG)										
Class	**Activity Name**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Single Family	Residential HE Toilets, SF	0.0	0.0	0.0	0.0	6.6	13.2	19.8	26.4	33.0
Single Family	Residential LF Showerhead, SF	0.0	0.0	0.0	0.0	1.4	2.8	4.1	5.5	6.9
CII	CII Spray Rinse Valve	0.0	0.0	0.0	0.0	0.9	1.9	2.8	3.8	4.7
CII	Large Landscape Water Budgets	0.0	0.0	0.0	0.0	14.6	29.2	43.8	58.4	73.0
CII	CII Cooling Tower	0.0	0.0	0.0	0.0	1.5	2.9	4.4	5.9	7.3
CII	CII Tank-Type HE Toilet	0.0	0.0	0.0	0.0	0.4	0.8	1.2	1.5	1.9
Total Gross Water Savings		**0.0**	**0.0**	**0.0**	**0.0**	**25.4**	**50.8**	**76.2**	**101.5**	**126.9**

Table 10

Off Peak Gross Water Savings (MG)													
Class	**Activity Name**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020	2021	2022	2023
Single Family	Residential HE Toilets, SF	0.0	0.0	0.0	0.0	0.9	1.8	2.7	3.7	4.6	4.6	4.6	4.6
Single Family	Residential LF Showerhead, SF	0.0	0.0	0.0	0.0	0.2	0.4	0.6	0.8	1.0	1.0	1.0	1.0
CII	CII Spray Rinse Valve	0.0	0.0	0.0	0.0	0.7	1.3	2.0	2.6	3.3	3.3	3.3	3.3
CII	Large Landscape Water Budgets	0.0	0.0	0.0	0.0	2.1	4.2	6.3	8.3	10.4	10.4	10.4	10.4
CII	CII Cooling Tower	0.0	0.0	0.0	0.0	0.6	1.3	1.9	2.5	3.1	2.5	1.9	1.3
CII	CII Tank-Type HE Toilet	0.0	0.0	0.0	0.0	0.1	0.3	0.4	0.5	0.7	0.7	0.7	0.7
Total Gross Water Savings		**0.0**	**0.0**	**0.0**	**0.0**	**4.6**	**9.2**	**13.8**	**18.4**	**23.1**	**22.4**	**21.8**	**21.2**

Table 11

Off Peak Gross Water Savings (MG)										
Class	**Activity Name**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Single Family	Residential HE Toilets, SF	0.0	0.0	0.0	0.0	9.1	18.3	27.4	36.6	45.7
Single Family	Residential LF Showerhead, SF	0.0	0.0	0.0	0.0	1.9	3.8	5.7	7.7	9.6
CII	CII Spray Rinse Valve	0.0	0.0	0.0	0.0	1.3	2.6	3.9	5.3	6.6
CII	Large Landscape Water Budgets	0.0	0.0	0.0	0.0	6.3	12.5	18.8	25.0	31.3
CII	CII Cooling Tower	0.0	0.0	0.0	0.0	0.6	1.3	1.9	2.5	3.1
CII	CII Tank-Type HE Toilet	0.0	0.0	0.0	0.0	0.5	1.1	1.6	2.1	2.7
Total Gross Water Savings		**0.0**	**0.0**	**0.0**	**0.0**	**19.8**	**39.6**	**59.4**	**79.2**	**99.0**

Tables 12 and 13 display the range of potential wastewater savings for each activity and as a whole during the five-year period.

Table 12

Wastewater Savings (MG)										
Class	**Activity Name**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Single Family	Residential HE Toilets, SF	0.0	0.0	0.0	0.0	1.6	3.1	4.6	6.0	7.4
Single Family	Residential LF Showerhead, SF	0.0	0.0	0.0	0.0	0.3	0.6	0.9	1.1	1.3
CII	CII Spray Rinse Valve	0.0	0.0	0.0	0.0	1.1	2.1	3.1	3.9	4.6
CII	Large Landscape Water Budgets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CII	CII Cooling Tower	0.0	0.0	0.0	0.0	2.1	4.2	6.3	8.4	10.5
CII	CII Tank-Type HE Toilet	0.0	0.0	0.0	0.0	0.2	0.5	0.7	0.9	1.1
Total Wastewater Savings		**0.0**	**0.0**	**0.0**	**0.0**	**5.4**	**10.5**	**15.5**	**20.3**	**24.9**

Table 13

Wastewater Savings (MG)										
Class	**Activity Name**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Single Family	Residential HE Toilets, SF	0.0	0.0	0.0	0.0	15.7	31.0	45.7	60.0	73.8
Single Family	Residential LF Showerhead, SF	0.0	0.0	0.0	0.0	3.3	6.2	8.8	11.0	13.0
CII	CII Spray Rinse Valve	0.0	0.0	0.0	0.0	2.3	4.3	6.1	7.8	9.3
CII	Large Landscape Water Budgets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CII	CII Cooling Tower	0.0	0.0	0.0	0.0	2.1	4.2	6.3	8.4	10.5
CII	CII Tank-Type HE Toilet	0.0	0.0	0.0	0.0	0.9	1.8	2.7	3.5	4.3
Total Wastewater Savings		**0.0**	**0.0**	**0.0**	**0.0**	**24.3**	**47.5**	**69.6**	**90.7**	**110.9**

Annual Water Savings by Measure:

Figures 5 through 16 below show annual water savings by measure in greater detail. The figures feature a pair of projections – low and high – for each measure. For fixture replacement measures, see the definitions for active and passive water savings below and refer to the graphs to see how the two interact over the planning period.

Active Water Savings – This is the share of physical (or gross) water savings that directly results from conservation program implementation. It is equal to gross water savings minus water savings that would have been realized anyway because of code requirements or because of program freeriders. A program freerider is a participant that would have taken the same water conserving action in the same timeframe had the program not existed.[33]

Passive Water Savings – This is the share of physical (or gross) water savings that results from (1) plumbing/energy codes interacting with the natural replacement of toilets, showerheads, and other water using appliances whose current or future minimum efficiency is dictated by national, state, or local code requirements, plus (2) water savings from program freeriders.[34]

[33] AWE Water Conservation Tracking Tool User Guide. Page 9.
[34] AWE Water Conservation Tracking Tool User Guide. Page 9.

Figure 5

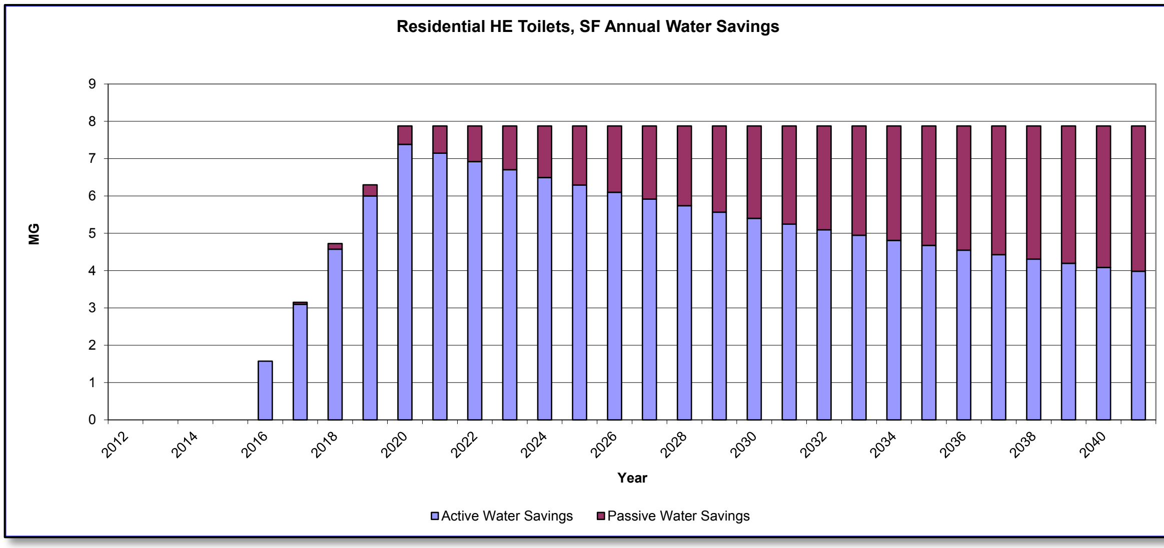


Figure 6

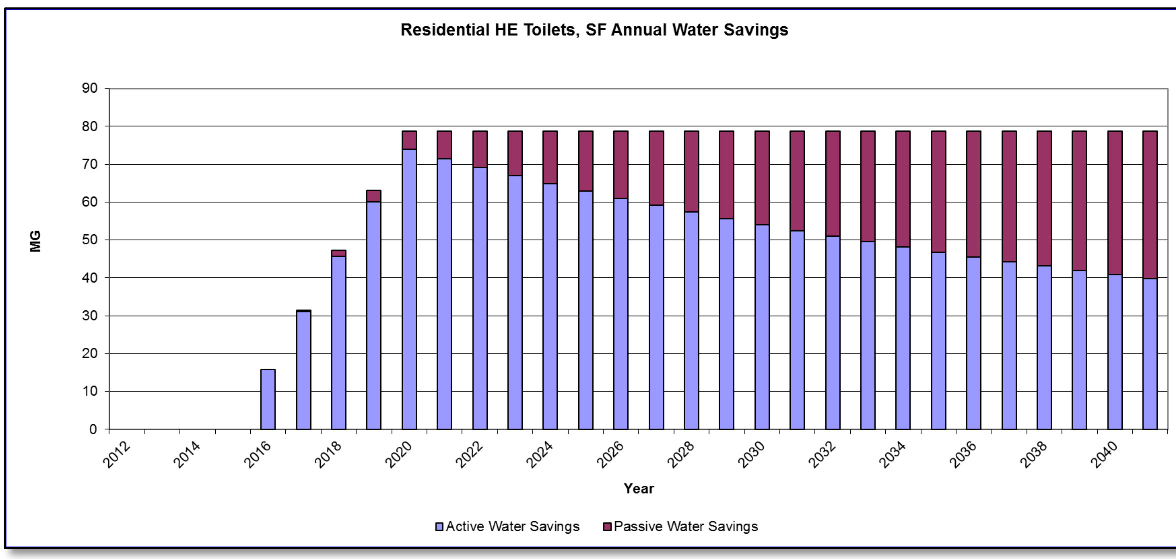


Figure 7

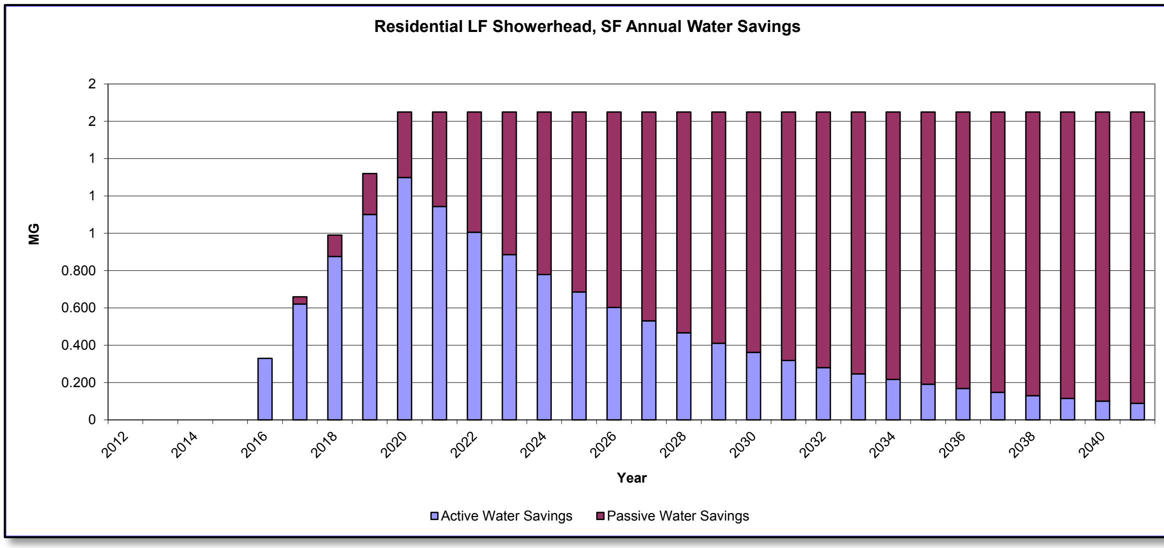


Figure 8

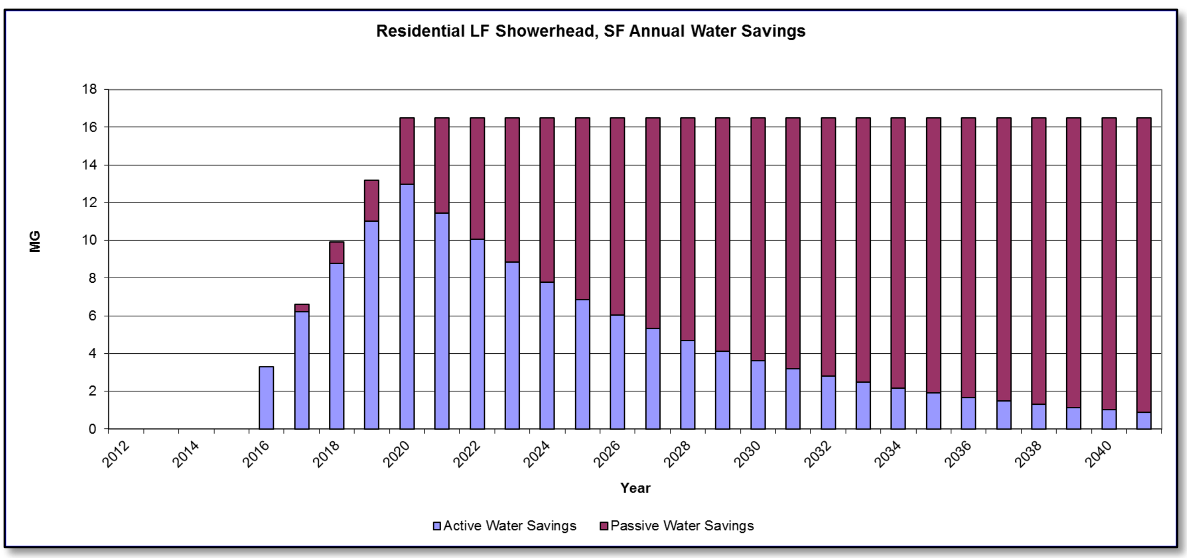


Figure 9

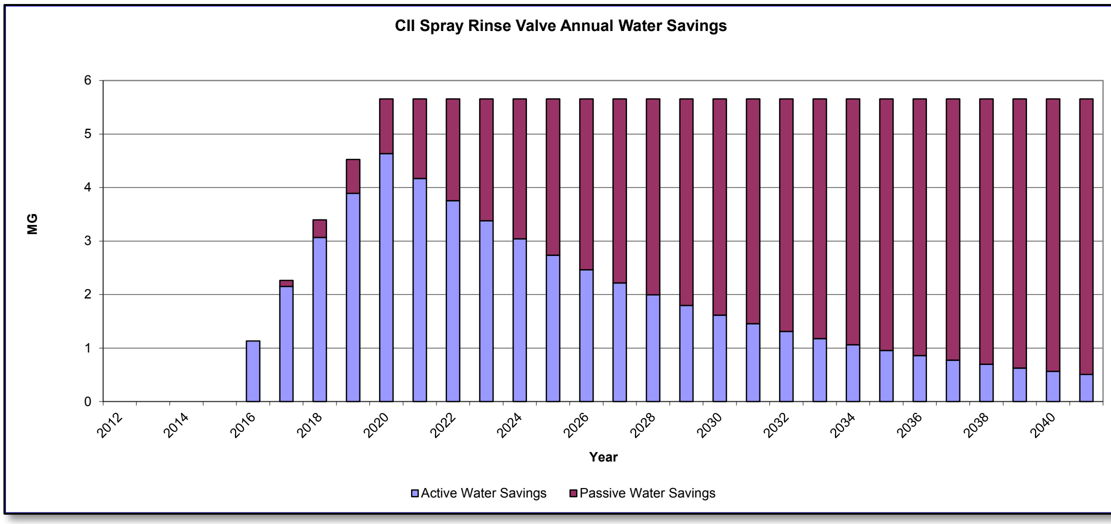


Figure 10

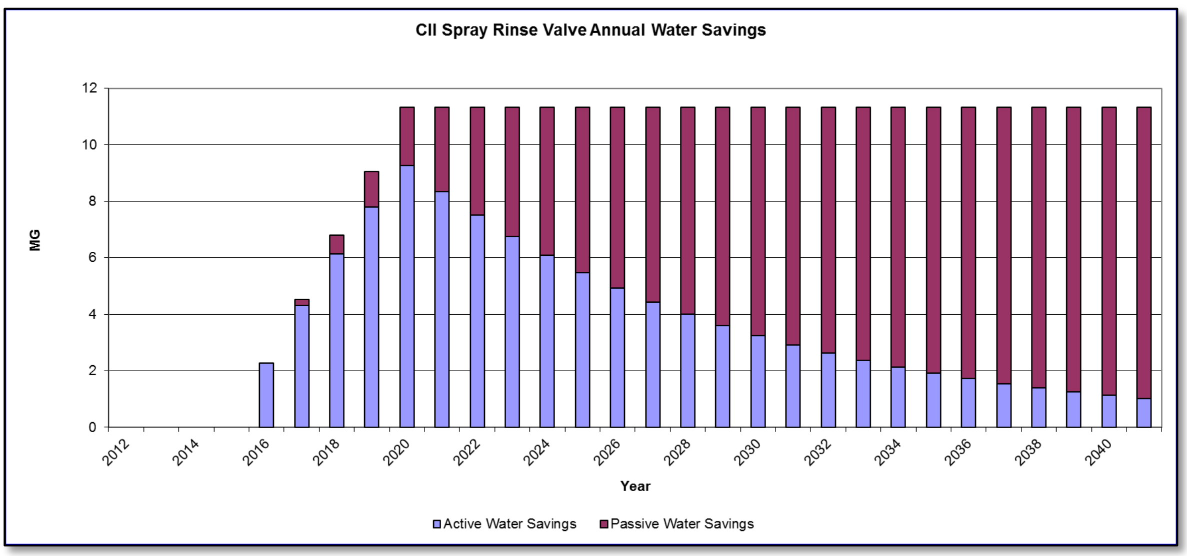


Figure 11

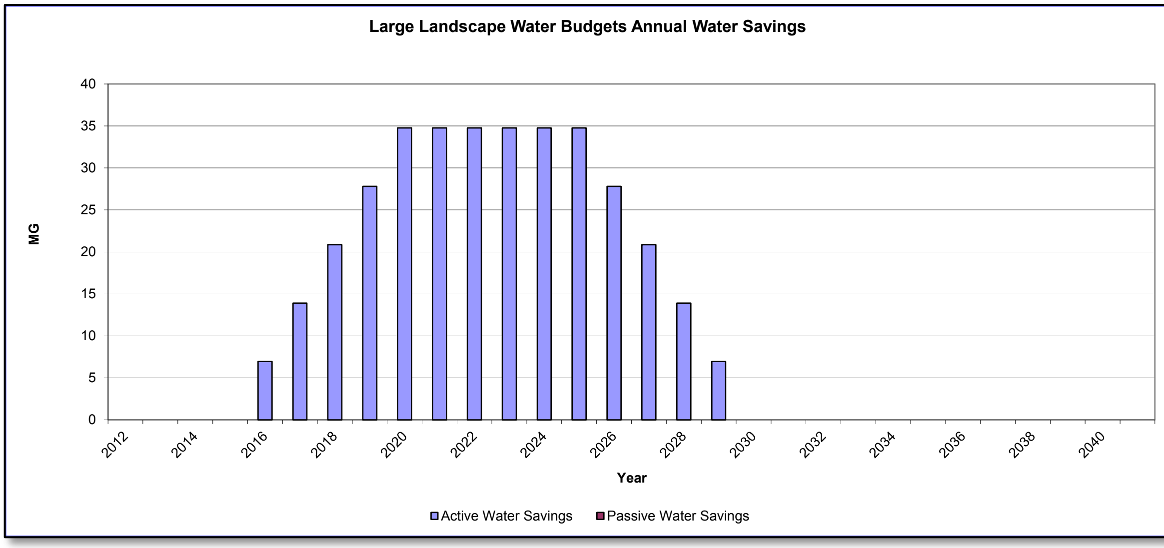


Figure 12

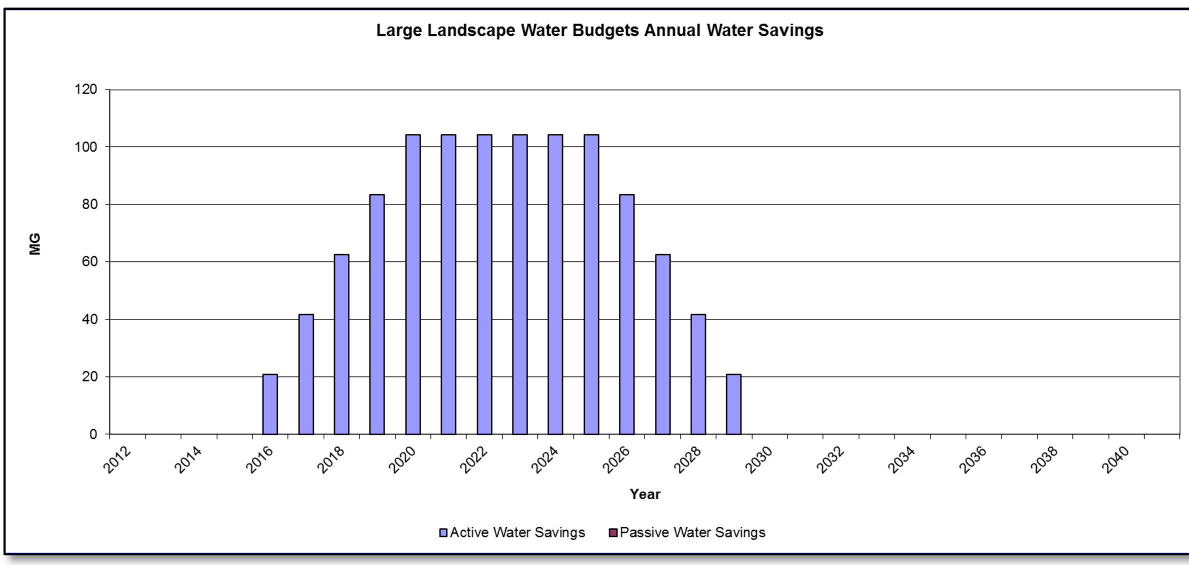


Figure 13

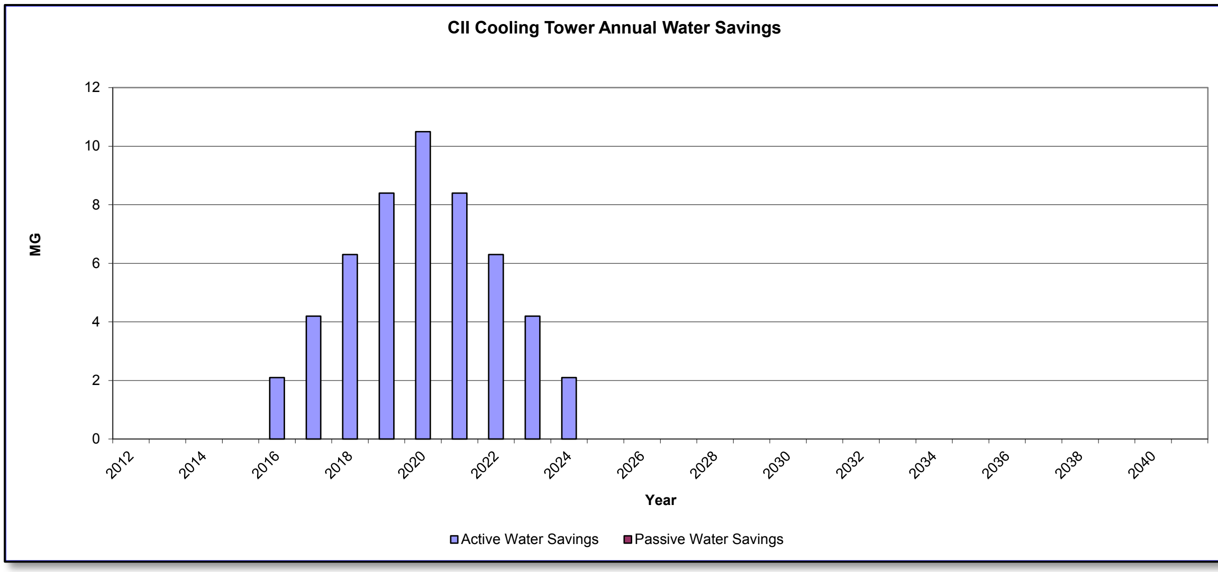


Figure 14

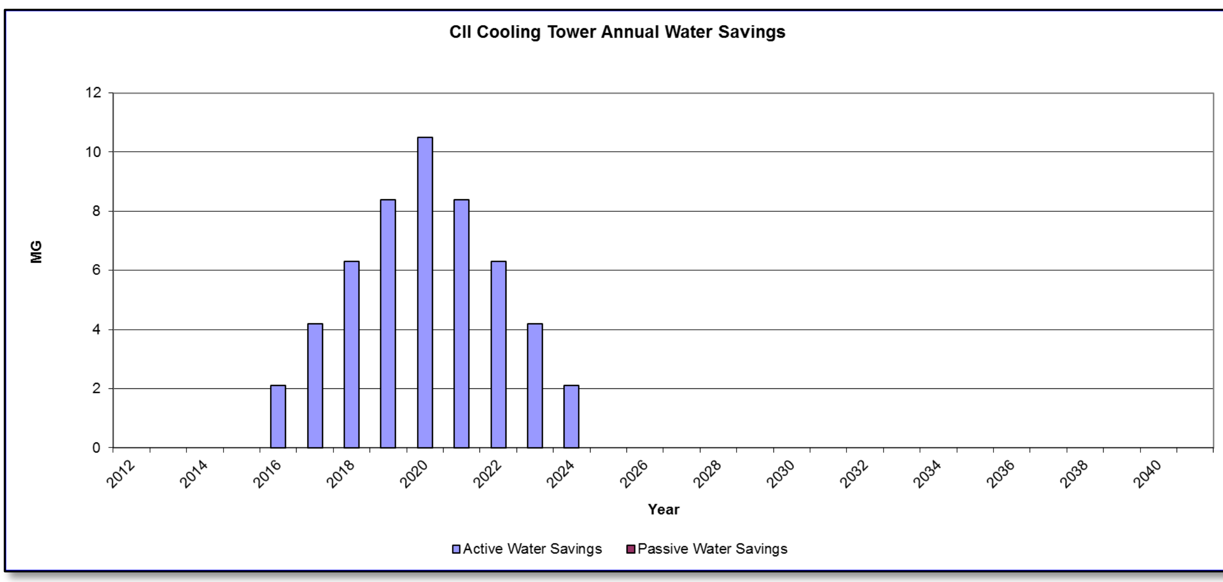


Figure 15

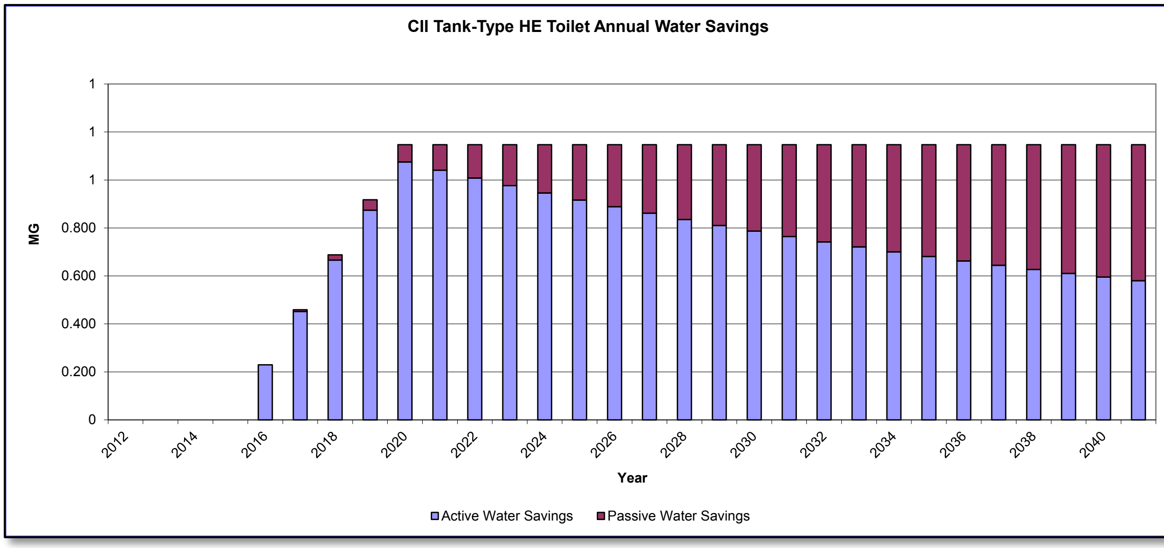
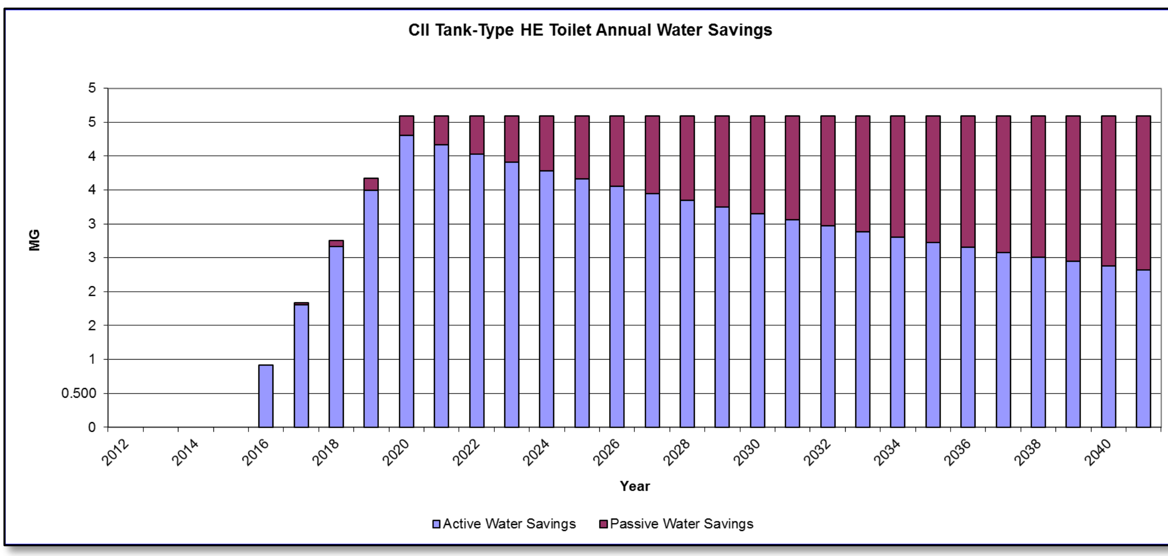


Figure 16



Tables 14 and 15 summarize how service area demands, per capita demands, service area water savings and customer class water savings will all be affected by natural plumbing code savings and by implementing this particular suite of conservation programs at both low (Table 14) and high (Table 15) levels.

Table 14

Water Demand Summary										
Service Area Demands	**Units**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Baseline Demands	MG	5,583	5,740	5,901	6,067	6,238	6,413	6,593	6,779	6,970
Baseline - Code Savings	MG	5,583	5,720	5,856	5,998	6,145	6,298	6,456	6,620	6,789
Baseline - Code Savings - Program Savings	MG	5,583	5,720	5,856	5,998	6,133	6,274	6,420	6,572	6,729
Per Capita Demands	**Units**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Baseline Demands	GPD	181.0	181.0	181.0	181.0	181.0	181.0	181.0	181.0	181.0
Baseline - Code Savings	GPD	181.0	180.4	179.6	178.9	178.3	177.7	177.2	176.7	176.3
Baseline - Code Savings - Program Savings	GPD	181.0	180.4	179.6	178.9	177.9	177.0	176.2	175.4	174.7
Service Area Water Savings	**Units**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Code Water Savings	MG	0.0	19.8	44.6	68.7	92.2	115.2	137.5	159.3	180.7
Program Water Savings	MG	0.0	0.0	0.0	0.0	12.3	24.4	36.3	48.1	59.6
Total Water Savings	**MG**	**0.0**	**19.8**	**44.6**	**68.7**	**104.6**	**139.6**	**173.8**	**207.4**	**240.4**
% of Baseline Demands	**%**	**0.0%**	**0.3%**	**0.8%**	**1.1%**	**1.7%**	**2.2%**	**2.6%**	**3.1%**	**3.4%**
Class Water Savings	**Units**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Single Family	MG	-	17.9	38.1	57.7	78.7	99.1	119.0	138.3	157.2
Multi Family	MG	-	0.6	1.5	2.4	3.2	4.1	4.9	5.7	6.5
CII	MG	-	1.4	5.1	8.7	22.6	36.4	50.0	63.4	76.7
Irrigation	MG	-	-	-	-	-	-	-	-	-
Non Revenue Water	MG	-	-	-	-	-	-	-	-	-
Total	**MG**	**-**	**19.8**	**44.6**	**68.7**	**104.6**	**139.6**	**173.8**	**207.4**	**240.4**

Table 15

Water Demand Summary										
Service Area Demands	**Units**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Baseline Demands	MG	5,583	5,740	5,901	6,067	6,238	6,413	6,593	6,779	6,970
Baseline - Code Savings	MG	5,583	5,720	5,856	5,998	6,145	6,298	6,456	6,620	6,789
Baseline - Code Savings - Program Savings	MG	5,583	5,720	5,856	5,998	6,100	6,209	6,324	6,445	6,574
Per Capita Demands	**Units**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Baseline Demands	GPD	181.0	181.0	181.0	181.0	181.0	181.0	181.0	181.0	181.0
Baseline - Code Savings	GPD	181.0	180.4	179.6	178.9	178.3	177.7	177.2	176.7	176.3
Baseline - Code Savings - Program Savings	GPD	181.0	180.4	179.6	178.9	177.0	175.2	173.6	172.1	170.7
Service Area Water Savings	**Units**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Code Water Savings	MG	0.0	19.8	44.6	68.7	92.2	115.2	137.5	159.3	180.7
Program Water Savings	MG	0.0	0.0	0.0	0.0	45.2	89.2	132.1	174.1	215.1
Total Water Savings	**MG**	**0.0**	**19.8**	**44.6**	**68.7**	**137.4**	**204.4**	**269.7**	**333.4**	**395.9**
% of Baseline Demands	**%**	**0.0%**	**0.3%**	**0.8%**	**1.1%**	**2.2%**	**3.2%**	**4.1%**	**4.9%**	**5.7%**
Class Water Savings	**Units**	2012	2013	**2014**	2015	2016	2017	2018	2019	2020
Single Family	MG	-	17.9	38.1	57.7	95.8	132.6	168.0	202.2	235.3
Multi Family	MG	-	0.6	1.5	2.4	3.2	4.1	4.9	5.7	6.5
CII	MG	-	1.4	5.1	8.7	38.3	67.7	96.7	125.5	154.0
Irrigation	MG	-	-	-	-	-	-	-	-	-
Non Revenue Water	MG	-	-	-	-	-	-	-	-	-
Total	**MG**	**-**	**19.8**	**44.6**	**68.7**	**137.4**	**204.4**	**269.7**	**333.4**	**395.9**

Financial Viability of Conservation Measures

The following tables are crucial to determining the financial value of each potential program. All of these measures are projected to keep revenues in the black and, indeed, several present an opportunity to save significant money compared with previous years without such conservation activities in place.

Table 16

Conservation Program Annual Budget (Nominal Dollars)									
Program Year	Total Annual Program Budget ($/Yr)	Program Overhead Not Counted Elsewhere	Public Information and Outreach	Residential HE Toilets, SF	Residential LF Showerhead, SF	CII Spray Rinse Valve	Large Landscape Water Budgets	CII Cooling Tower	CII Tank-Type HE Toilet
2012	$0			$0	$0	$0	$0	$0	$0
2013	$0			$0	$0	$0	$0	$0	$0
2014	$0			$0	$0	$0	$0	$0	$0
2015	$0			$0	$0	$0	$0	$0	$0
2016	$86,052			$35,047	$876	$6,571	$32,331	$6,845	$4,381
2017	$88,031			$35,853	$896	$6,722	$33,075	$7,003	$4,482
2018	$90,056			$36,678	$917	$6,877	$33,835	$7,164	$4,585
2019	$92,127			$37,521	$938	$7,035	$34,614	$7,328	$4,690
2020	$94,246			$38,384	$960	$7,197	$35,410	$7,497	$4,798
2021	$0			$0	$0	$0	$0	$0	$0
2022	$0			$0	$0	$0	$0	$0	$0

Table 17

Conservation Program Annual Budget (Nominal Dollars)									
Program Year	Total Annual Program Budget ($/Yr)	Program Overhead Not Counted Elsewhere		Residential HE Toilets, SF	Residential LF Showerhead, SF	CII Spray Rinse Valve	Large Landscape Water Budgets	CII Cooling Tower	CII Tank-Type HE Toilet
2012	$0			$0	$0	$0	$0	$0	$0
2013	$0			$0	$0	$0	$0	$0	$0
2014	$0			$0	$0	$0	$0	$0	$0
2015	$0			$0	$0	$0	$0	$0	$0
2016	$493,737			$350,471	$8,762	$13,143	$96,993	$6,845	$17,524
2017	$505,093			$358,532	$8,963	$13,445	$99,224	$7,003	$17,927
2018	$516,711			$366,778	$9,169	$13,754	$101,506	$7,164	$18,339
2019	$528,595			$375,214	$9,380	$14,071	$103,841	$7,328	$18,761
2020	$540,753			$383,844	$9,596	$14,394	$106,229	$7,497	$19,192
2021	$0			$0	$0	$0	$0	$0	$0
2022	$0			$0	$0	$0	$0	$0	$0

Tables 16 and 17 show the annual cost to the utility of each defined conservation measure at the low and high adoption rates discussed above. The tables also provide two columns for considering (1) costs for program overhead not captured in the individual measure costs and (2) costs for public information and outreach. These program activities, while not having specific water savings assumptions associated with them, are nonetheless essential cost components of most urban conservation programs.[35]

Table 18

Conservation Program Cost Analysis (2012 Dollars)			Amort. Years:	5
Class	Activity Name	Unit Cost ($/MG)	PV Cost	Amortized Cost
Single Family	Residential HE Toilets, SF	$ 1,188	$ 135,018	$ 29,384
Single Family	Residential LF Showerhead, SF	$ 351	$ 3,375	$ 735
CII	CII Spray Rinse Valve	$ 665	$ 25,316	$ 5,509
CII	Large Landscape Water Budgets	$ 481	$ 124,554	$ 27,107
CII	CII Cooling Tower	$ 630	$ 26,371	$ 5,739
CII	CII Tank-Type HE Toilet	$ 1,020	$ 16,877	$ 3,673
Subtotal Conservation Activities		**$ 693**	**$ 331,512**	**$ 72,147**
Total With Overhead & Public Information		**$ 693**	**$ 331,512**	**$ 72,147**

[35] AWE Water Conservation Tracking Tool User Guide. Page 54-55.

Table 19

Conservation Program Cost Analysis (2012 Dollars)		Amort. Years: 5		
Class	Activity Name	Unit Cost ($/MG)	PV Cost	Amortized Cost
Single Family	Residential HE Toilets, SF	$ 1,188	$ 1,350,181	$ 293,840
Single Family	Residential LF Showerhead, SF	$ 351	$ 33,755	$ 7,346
CII	CII Spray Rinse Valve	$ 665	$ 50,632	$ 11,019
CII	Large Landscape Water Budgets	$ 481	$ 373,663	$ 81,320
CII	CII Cooling Tower	$ 630	$ 26,371	$ 5,739
CII	CII Tank-Type HE Toilet	$ 1,020	$ 67,509	$ 14,692
Subtotal Conservation Activities		**$ 867**	**$ 1,902,110**	**$ 413,956**
Total With Overhead & Public Information		**$ 867**	**$ 1,902,110**	**$ 413,956**

Tables 18 and 19 show the unit cost ($/Unit Volume of Savings), present value cost, and annualized costs of conservation activities for your utility's low and high projections. The unit cost is a measure of the cost of the water savings activity. The present value cost is what your utility would need to spend or set aside today in order to fully fund the conservation program. The annualized cost is what your utility would need to expend annually if it were to finance the conservation program over a fixed number of years.[36]

Table 20

Conservation Benefit Analysis (2012 Dollars)						
Class	Activity Name	Unit Benefit ($/MG)	PV Benefit	Avoided Supply	Avoided Wastewater	Capacity Benefit
Single Family	Residential HE Toilets, SF	$ 2,686	$ 305,145	$ 248,988	$ 56,157	$ -
Single Family	Residential LF Showerhead, SF	$ 2,515	$ 24,201	$ 19,748	$ 4,453	$ -
CII	CII Spray Rinse Valve	$ 2,534	$ 96,541	$ 78,774	$ 17,767	$ -
CII	Large Landscape Water Budgets	$ 2,027	$ 524,953	$ 524,953	$ -	$ -
CII	CII Cooling Tower	$ 2,444	$ 102,327	$ 83,495	$ 18,832	$ -
CII	CII Tank-Type HE Toilet	$ 2,686	$ 44,444	$ 36,265	$ 8,179	$ -
Total		**$ 2,293**	**$ 1,097,611**	**$ 992,223**	**$ 105,388**	**$ -**

Table 21

Conservation Benefit Analysis (2012 Dollars)						
Class	Activity Name	Unit Benefit ($/MG)	PV Benefit	Avoided Supply	Avoided Wastewater	Capacity Benefit
Single Family	Residential HE Toilets, SF	$ 2,686	$ 3,051,447	$ 2,489,876	$ 561,571	$ -
Single Family	Residential LF Showerhead, SF	$ 2,515	$ 242,010	$ 197,477	$ 44,533	$ -
CII	CII Spray Rinse Valve	$ 2,534	$ 193,083	$ 157,549	$ 35,534	$ -
CII	Large Landscape Water Budgets	$ 2,027	$ 1,574,859	$ 1,574,859	$ -	$ -
CII	CII Cooling Tower	$ 2,444	$ 102,327	$ 83,495	$ 18,832	$ -
CII	CII Tank-Type HE Toilet	$ 2,686	$ 177,775	$ 145,059	$ 32,717	$ -
Total		**$ 2,435**	**$ 5,341,502**	**$ 4,648,315**	**$ 693,186**	**$ -**

Tables 20 and 21 show the unit benefit ($/Unit Volume of Savings), the present value benefits, and the present value benefit broken down between avoided capacity avoided supply, and

[36] AWE Water Conservation Tracking Tool User Guide. Page 55.

avoided wastewater costs for your utility's low and high projections. The present value benefit is the economic value of future cost savings today.[37]

Table 22

Utility Conservation Program NPV and B/C Ratio (2012 Dollars)			
Class	**Activity Name**	**NPV ($)**	**B/C Ratio**
Single Family	Residential HE Toilets, SF	$ 170,127	2.26
Single Family	Residential LF Showerhead, SF	$ 20,826	7.17
CII	CII Spray Rinse Valve	$ 71,225	3.81
CII	Large Landscape Water Budgets	$ 400,399	4.21
CII	CII Cooling Tower	$ 75,956	3.88
CII	CII Tank-Type HE Toilet	$ 27,567	2.63
Subtotal Conservation Activities		**$ 766,099**	**3.31**
Total With Overhead & Public Information		**$ 766,099**	**3.31**

Table 23

Utility Conservation Program NPV and B/C Ratio (2012 Dollars)			
Class	**Activity Name**	**NPV ($)**	**B/C Ratio**
Single Family	Residential HE Toilets, SF	$ 1,701,266	2.26
Single Family	Residential LF Showerhead, SF	$ 208,256	7.17
CII	CII Spray Rinse Valve	$ 142,451	3.81
CII	Large Landscape Water Budgets	$ 1,201,197	4.21
CII	CII Cooling Tower	$ 75,956	3.88
CII	CII Tank-Type HE Toilet	$ 110,266	2.63
Subtotal Conservation Activities		**$ 3,439,391**	**2.81**
Total With Overhead & Public Information		**$ 3,439,391**	**2.81**

Tables 22 and 23 show the net present value (NPV) and benefit-cost ratio (B/C ratio) for the conservation activities' low and high projections. NPV is simply the present value benefits less present value costs. The B/C ratio is the present value benefits divided by the present value costs. Both are measures of the conservation activity's economic worth from the perspective of the utility and its ratepayers. A positive NPV and a B/C ratio greater than one indicate the conservation activity would make your utility and its ratepayers better off—that is, the present value of future utility costs would be lower with the conservation than without it. Conversely, a negative NPV and a B/C ratio less than one indicate the conservation activity would make your utility and its ratepayers worse off.[38] Figures 17 – 20 below display this information in graph form and emphasize how the measures stack up from greatest to least cost effective for the life of the programs.

[37] AWE Water Conservation Tracking Tool User Guide. Page 56.
[38] AWE Water Conservation Tracking Tool User Guide. Page 56.

Figure 17

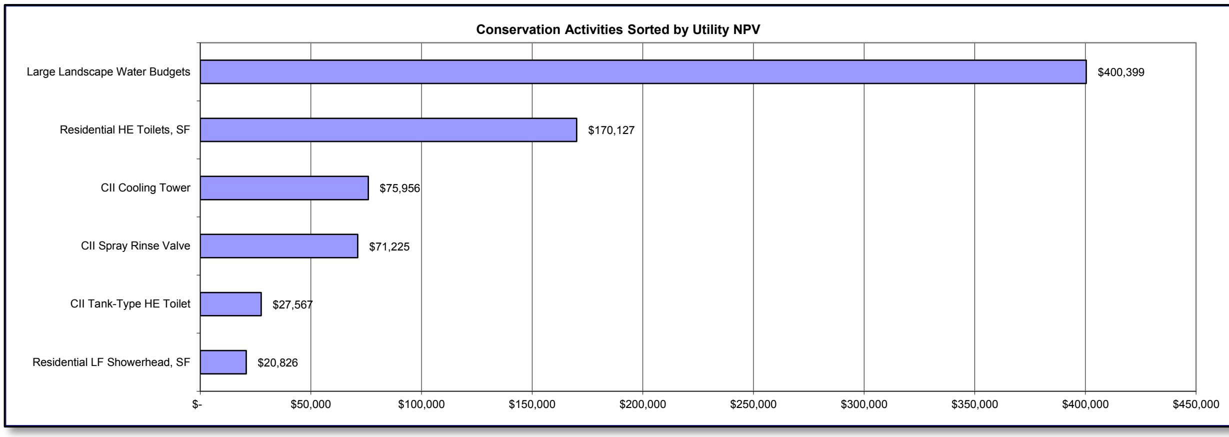


Figure 18

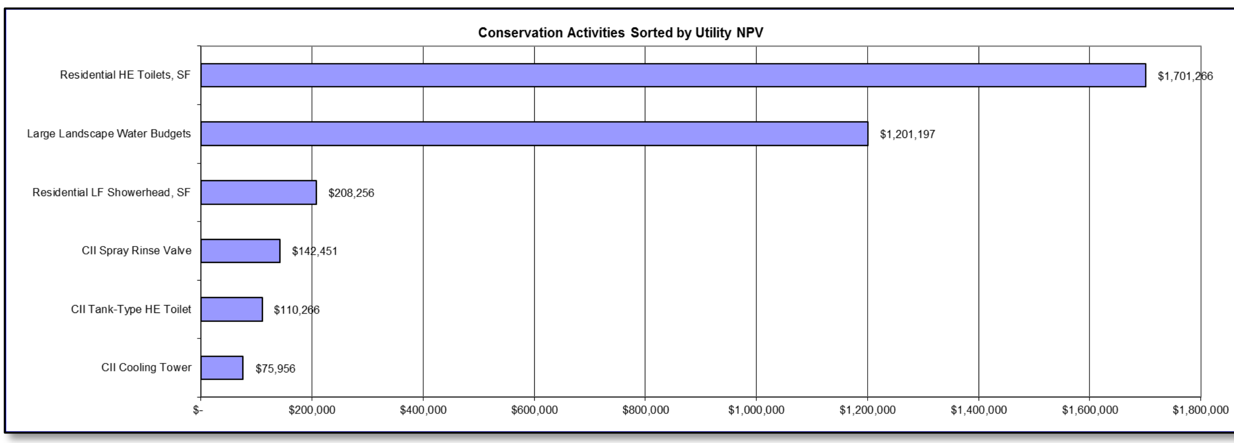


Figure 19

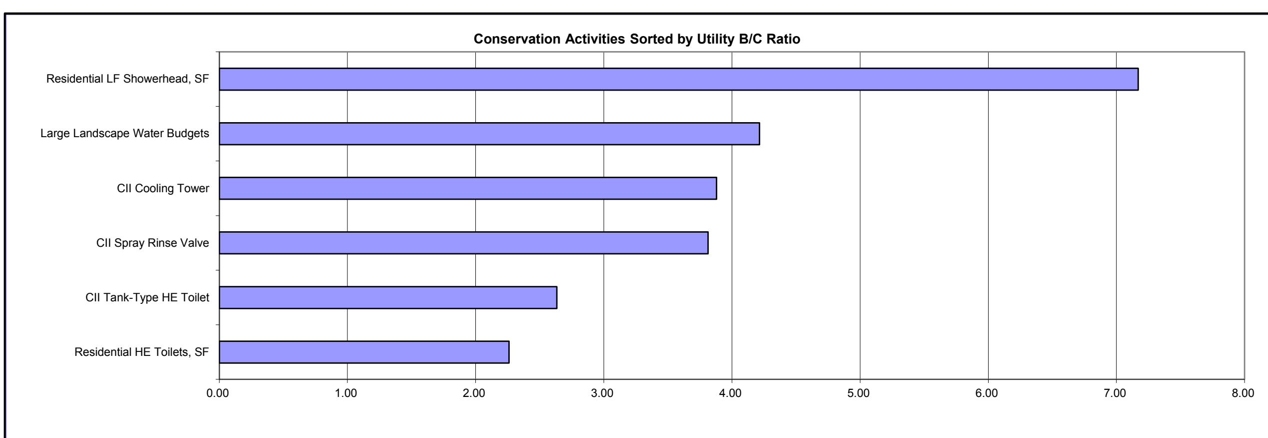


Figure 20

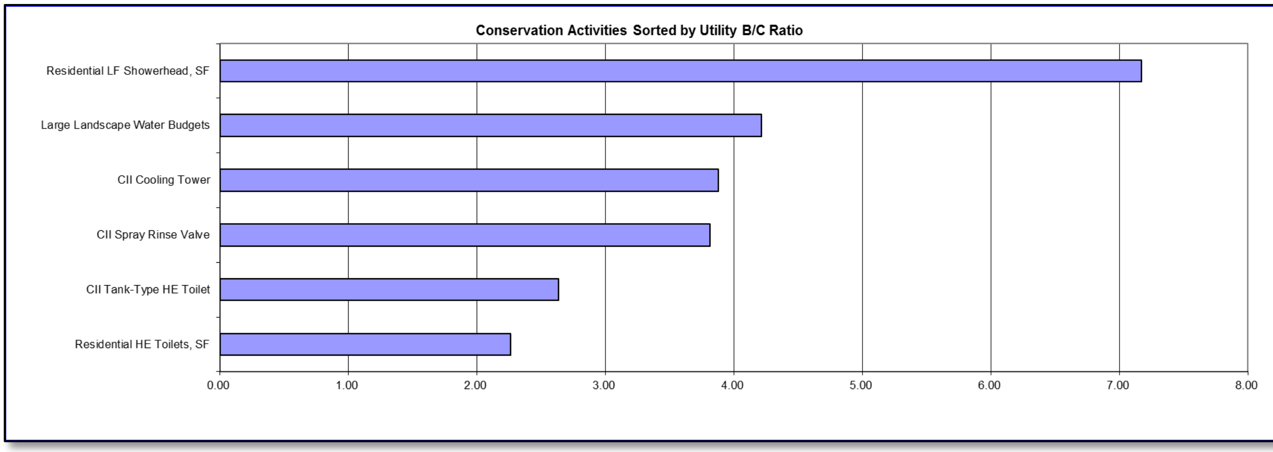


Table 24

Utility Revenue Requirement and Rate Impacts

Program Impact on...	Baseline	With Conserv.	Change to Baseline
Water Utility Annual Sales Revenue Requirement	25,783,093	$25,756,854	($26,239)
		% change from baseline	-0.10%
Avg. Water Rate ($/Thou Gal)	$3.71	$3.72	$0.00
		% change from baseline	0.07%
Annualized Bill Impact ($/Mo.)	56.31	$56.25	($0.06)
		% change from baseline	-0.10%

Table 25

Utility Revenue Requirement and Rate Impacts

Program Impact on...	Baseline	With Conserv.	Change to Baseline
Water Utility Annual Sales Revenue Requirement	25,783,093	$25,665,295	($117,798)
		% change from baseline	-0.46%
Avg. Water Rate ($/Thou Gal)	$3.71	$3.73	$0.01
		% change from baseline	0.38%
Annualized Bill Impact ($/Mo.)	56.31	$56.06	($0.25)
		% change from baseline	-0.44%

Figure 21

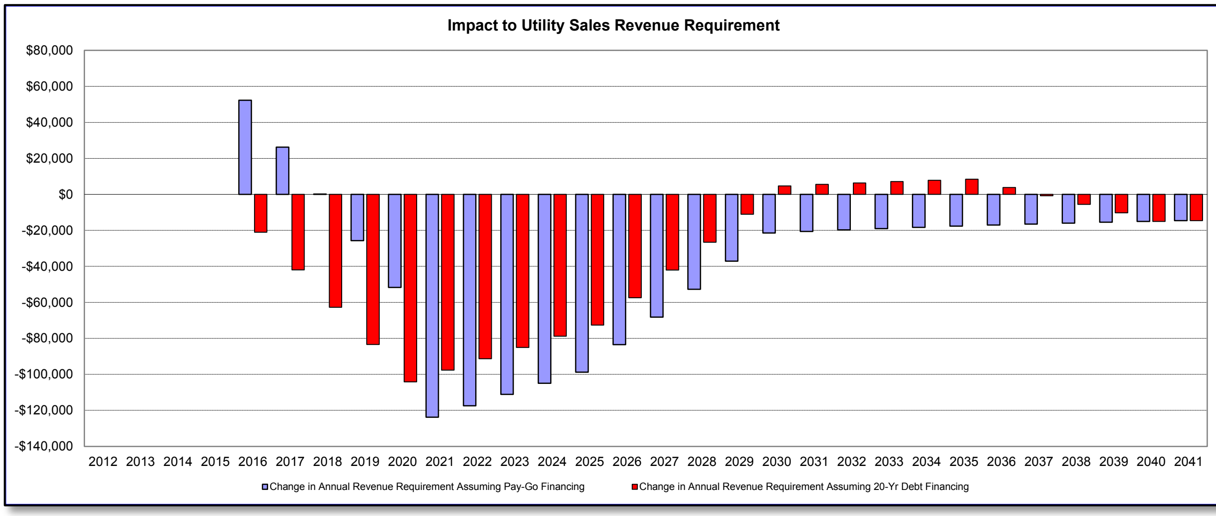
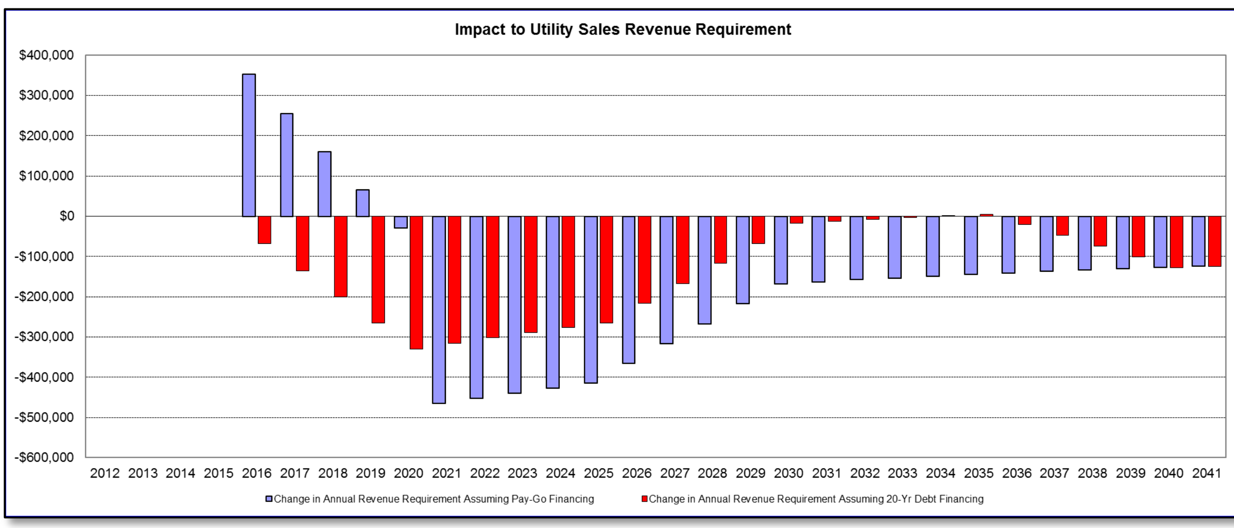


Figure 22



Tables 24 and 25 summarize impacts of the conservation program (all activities) on utility revenue requirements, average customer bill, and the average rate for water at both low and high estimates. Figures 21 and 22 show these impacts annually assuming two alternative program-financing methods.[39]

The first method assumes pay-as-you-go financing, where program costs are paid out of current revenues. The second method assumes debt financing, where program costs are paid by issuing

[39] AWE Water Conservation Tracking Tool User Guide. Page 57.

20-year debt.[40] The TWDB may soon offer debt financing for smaller terms and with lower interest rates than the tool projections assume here.

Customer Benefits and Costs

Tables 25 – 30 summarize conservation activity benefits and costs from the participating customer's perspective.

Tables 25 (low projection) and 26 (high projection) show the unit cost ($/Unit Volume of Savings) and present value cost of conservation activities from the perspective of the participating customer.[41]

Table 25

Participant Conservation Program Costs (2012 Dollars)			
Class	**Activity Name**	**Unit Cost ($/MG)**	**PV Cost**
Single Family	Residential HE Toilets, SF	$ 594	$ 67,509
Single Family	Residential LF Showerhead, SF	$ -	$ -
CII	CII Spray Rinse Valve	$ -	$ -
CII	Large Landscape Water Budgets	$ 489	$ 126,579
CII	CII Cooling Tower	$ 2,242	$ 93,880
CII	CII Tank-Type HE Toilet	$ 510	$ 8,439
Total		**$ 619**	**$ 296,407**

Table 26

Participant Conservation Program Costs (2012 Dollars)			
Class	**Activity Name**	**Unit Cost ($/MG)**	**PV Cost**
Single Family	Residential HE Toilets, SF	$ 594	$ 675,091
Single Family	Residential LF Showerhead, SF	$ -	$ -
CII	CII Spray Rinse Valve	$ -	$ -
CII	Large Landscape Water Budgets	$ 489	$ 379,738
CII	CII Cooling Tower	$ 2,242	$ 93,880
CII	CII Tank-Type HE Toilet	$ 510	$ 33,755
Total		**$ 539**	**$ 1,182,463**

Tables 27 (low) and 28 (high) show the unit benefit ($/Unit Volume of Savings), the present value benefits, and the present value benefit broken down between water, electricity, and sewer benefits for the participating customer.[42]

[40] AWE Water Conservation Tracking Tool User Guide. Page 55.
[41] AWE Water Conservation Tracking Tool User Guide. Page 58.
[42] AWE Water Conservation Tracking Tool User Guide. Page 58.

Table 27

Participant Conservation Program Benefits (2012 Dollars)								
			Present Value of Participant Utility Bill Benefits					
Class	Activity Name	Unit Benefit ($/MG)	Total Benefit	Water	Sewer	Electricity	Gas
Single Family	Residential HE Toilets, SF	$ 8,731	$ 991,993	$ 445,869	$ 546,124	$ -	$ -
Single Family	Residential LF Showerhead, SF	$ 8,176	$ 78,671	$ 35,363	$ 43,308	$ -	$ -
CII	CII Spray Rinse Valve	$ 8,239	$ 313,845	$ 141,063	$ 172,782	$ -	$ -
CII	Large Landscape Water Budgets	$ 3,630	$ 940,048	$ 940,048	$ -	$ -	$ -
CII	CII Cooling Tower	$ 7,946	$ 332,654	$ 149,517	$ 183,137	$ -	$ -
CII	CII Tank-Type HE Toilet	$ 8,731	$ 144,482	$ 64,940	$ 79,542	$ -	$ -
Total		**$ 5,853**	**$ 2,801,694**	**$ 1,776,801**	**$ 1,024,892**	**$ -**	**$ -**

Table 28

Participant Conservation Program Benefits (2012 Dollars)							
			Present Value of Participant Utility Bill Benefits				
Class	Activity Name	Unit Benefit ($/MG)	Total Benefit	Water	Sewer	Electricity	Gas
Single Family	Residential HE Toilets, SF	$ 8,731	$ 9,919,931	$ 4,458,692	$ 5,461,239	$ -	$ -
Single Family	Residential LF Showerhead, SF	$ 8,176	$ 786,708	$ 353,628	$ 433,079	$ -	$ -
CII	CII Spray Rinse Valve	$ 8,239	$ 627,691	$ 282,127	$ 345,564	$ -	$ -
CII	Large Landscape Water Budgets	$ 3,630	$ 2,820,145	$ 2,820,145	$ -	$ -	$ -
CII	CII Cooling Tower	$ 7,946	$ 332,654	$ 149,517	$ 183,137	$ -	$ -
CII	CII Tank-Type HE Toilet	$ 8,731	$ 577,929	$ 259,760	$ 318,168	$ -	$ -
Total		**$ 6,868**	**$ 15,065,058**	**$ 8,323,871**	**$ 6,741,187**	**$ -**	**$ -**

Tables 29 and 30 show the net present value (NPV) and benefit-cost ratio (B/C ratio) for the conservation activities' low and high projections that the customer can expect by participating.[43] These ratios are extremely favorable, largely because the model assumes that the utility will shoulder upfront costs in the form of a rebate or volume discount pricing.

Table 29

Participant Conservation Program NPV and B/C Ratio (2012 Dollars)			
Class	Activity Name	NPV ($)	B/C Ratio
Single Family	Residential HE Toilets, SF	$ 924,484	14.69
Single Family	Residential LF Showerhead, SF	$ 78,671	N/A
CII	CII Spray Rinse Valve	$ 313,845	N/A
CII	Large Landscape Water Budgets	$ 813,469	7.43
CII	CII Cooling Tower	$ 238,774	3.54
CII	CII Tank-Type HE Toilet	$ 136,044	17.12
Total		**$ 2,505,287**	**9.45**

[43] AWE Water Conservation Tracking Tool User Guide. Page 58.

Table 30

Participant Conservation Program NPV and B/C Ratio (2012 Dollars			
Class	Activity Name	NPV ($)	B/C Ratio
Single Family	Residential HE Toilets, SF	$ 9,244,841	14.69
Single Family	Residential LF Showerhead, SF	$ 786,708	N/A
CII	CII Spray Rinse Valve	$ 627,691	N/A
CII	Large Landscape Water Budgets	$ 2,440,407	7.43
CII	CII Cooling Tower	$ 238,774	3.54
CII	CII Tank-Type HE Toilet	$ 544,174	17.12
Total		**$ 13,882,594**	**12.74**

VI. Fort Bend Outlook

This section details the conservation goals that Fort Bend County must meet to stay on pace with the marks set out in the Region H Plan. See Appendix B for a county-by-county look at those goals denominated in acre-feet per decade through 2060. It should be noted that the 2010 goal of 467 ac-ft. will need to be accounted for by the end of the planning period. Our findings indicate that the county did not conserve at that level from 2010 to 2014.

Profile

Goldwater Project Participants in Fort Bend County

Utility	Population
Cinco MUDs (Ft. Bend/Harris)	19,688
Fort Bend County MUD #57	3,282
Fort Bend County MUD #58	2,680
Fort Bend County MUD #69	7,412
Fort Bend County MUD #115	2,480
Fort Bend County MUD #116	2,505
Interstate MUD	3,300
City of Stafford (WCID #2)	18,348
City of Sugar Land	84,511
TOTAL	**144,206**

Fort Bend County Representation and Make-up

23.04% of county population represented

- 1 large city
- 1 large WCID
- 18 small MUDs

Fort Bend County Conservation Goals by Decade

2010: 1435 acre-feet or 467.21 million gallons **(NOT MET as of 2014)**
2020: 7,077 AF/2,304 MG
2030: 10,277 AF/3,346 MG
2040: 12,253 AF/3,989 MG
2050: 14,678 AF/4,779 MG
2060: 17,497 AF/5,697 MG

Figure 24 on page 41 below shows the goals set out by the RHPG for Fort Bend County. Here, goals are referred to as shortages, however, the RHPG prefers that they are thought of as goals because for the remaining 45 years of the planning period other methods besides municipal conservation may account for water savings, as well.

The goals are indicated in red and would require the county to meet the following number in million gallons saved to get on pace annually:

2015: 306.15 MG
2016: 612.29
2017: 918.45
2018: 1,224.60
2019: 1,530.75
2020: 1,836.90

This amounts to 306.15 MG of water saved by utilities throughout Fort Bend County. It's important to note that the county does have 45 years to eventually meet its targets, so some years may be more successful than others, especially in abnormally wet years.

Sugar Land's Role and Outlook

Figure 25 is the Fort Bend County Conservation Matrix. It represents various activities that are being considered by participating utilities throughout the county. Until a given utility formally commits and implements an activity or suite of activities, however, this version of the matrix should only serve as a guide to water planners in the region.

The vertical columns and the totals along the bottom of the matrix represent the activity or activities being considered and the associated savings in million gallons for that utility. The horizontal rows and totals in the rightmost column represent the utilities undertaking a specific measure throughout the county and the associated savings in million gallons resulting from it if each utility implemented it during the year (2016 in this projection). The estimated savings are derived from the water-tracking tool using the utilities' actual data collected thus far in the project and ***represent low-end projections for each utility***.

In the bottom right corner, you can see that the county savings goal of 306.2 MG far exceeds the potential water savings of 22.1 MG if every utility implemented each strategy in its column. It is true that only 23.04% of the county is represented by these utilities, however, 100% representation would still fall short of the goal, which means ***more aggressive implementation rates would need to be undertaken.*** As we are doing in this report, we are also supplying participating utilities with higher water savings projections based on more aggressive implementation rates.

We are recommending that entities such as the Fort Bend Subsidence District, water authorities and cities hold stakeholder sessions to address the clear shortfalls that Fort Bend County faces.

According to Sugar Land's 2013 water conservation plan submitted to the TWDB, the city hopes to save 141 MG from addressing water loss over the next five years. For comparison, the city is projected to save an additional 61.5 MG (low) or 225.9 MG (high) over five years if it adopted all the strategies listed above at the adoption rates described previously.

In terms of GPCD, these conservation activities could lower it by 1.99 GPCD or as much as 7.32 GPCD by the end of the measures' five-year life.

Figures derived from:

Current GPCD –

5,762,000,000 Gallons used in 2013 / 365 Days / 84,511 Population = 187 GPCD

Potential reduction in GPCD due to conservation over 5 years –

Low Estimate: 12,300,000 Gallons saved / 365 Days / 84,511 Population x 5 Years = 1.99 GPCD

High Estimate: 45,200,000 Gallons saved / 365 Days / 84,511 Population x 5 Years = 7.32 GPCD

Bottom Line: Fort Bend Faces Significant Challenges

Fort Bend County has the most challenging water conservation goals of all the top five most populous counties in the region. With the county's largest city already represented (Sugar Land), only 23.04% of the population is accounted for in this projection. The shortages (conservation goals) escalate sharply and even if all measures were implemented at modest adoption rates, the gross water savings would still fall short. Significant planning and coordination among Ft. Bend's utilities must occur to begin to address these deficits.

In the coming months we will be recruiting more utilities in Fort Bend County to participate and will coordinate with the county's regional water planners to relay as much information as possible about ongoing efforts.

Figure 14

Top 5 Counties with Shortages	Municipal Conservation 2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2040	2050	2060
Fort Bend																
Projected Shortage in Acre-feet	**1435**	2,375.33	3,315.66	4,255.99	5,196.32	6,136.65	**7,077.00**	7,397.00	7,717.00	8,037.00	8,357.00	8,677.00	**10,277.00**	**12,253.00**	**14,678.00**	**17,497.00**
In Million Gallons	**467.21**	773.36	1,079.51	1,385.66	1,691.81	1,997.96	2,304.11	2,408.30	2,512.49	2,616.68	2,720.87	2,825.06	**3,346.00**	**3,989.34**	**4,778.88**	**5,696.69**
Shortages per year to be compared with measures below		**306.15**	**612.29**	**918.45**	**1,224.60**	**1,530.75**	**1,836.90**									
Residential HE Toilets, SF		3.45	6.91	10.36	13.82	17.27	17.27	17.27	17.27	17.27	17.27	17.27	17.27	17.27	17.27	17.27
Residential HE Toilets, MF		0.04	0.08	0.13	0.17	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Residential LF Showerheads, SF		0.72	1.45	2.17	2.90	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62
Residential LF Showerhead, MF		0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Residential Irrigation Controller, SF Customer Financed		2.55	5.10	7.66	10.21	12.76	12.76	12.76	12.76	12.76	12.76	10.21	0.00	0.00	0.00	0.00
Residential Meter Installation		13.28	26.56	39.85	53.13	66.41	66.41	66.41	66.41	66.41	66.41	66.41	53.13	0.00	0.00	0.00
CII Tank-Type ULFT Rebate		0.17	0.34	0.50	0.67	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
CII Tank-Type HE Toilet		0.21	0.41	0.62	0.83	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
CII Valve-Type HE Toilet		0.21	0.41	0.62	0.83	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
CII Dishwasher		1.04	2.08	3.12	4.16	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	0.00	0.00	0.00
CII Spray Rinse Valve		0.51	1.02	1.53	2.04	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
CII Food Steamer		1.47	2.93	4.40	5.87	7.34	7.34	7.34	7.34	7.34	7.34	5.87	0.00	0.00	0.00	0.00
CII Cooling Tower		3.78	7.56	11.33	15.11	18.89	15.11	11.33	7.56	3.78	0.00	0.00	0.00	0.00	0.00	0.00
Large Landscape Surveys, SF		15.05	30.09	45.14	60.19	75.24	60.19	45.14	30.09	15.05	0.00	0.00	0.00	0.00	0.00	0.00
Large Landscape Water Budgets, SF		91.22	182.44	273.66	364.89	456.11	456.11	456.11	456.11	456.11	456.11	364.89	0.00	0.00	0.00	0.00
Large Landscape Irrigation Controller, SF		27.72	55.43	83.15	110.86	138.58	138.58	138.58	138.58	138.58	138.58	110.86	0.00	0.00	0.00	0.00
TOTAL GROSS WATER SAVINGS		**161.42**	**322.84**	**484.26**	**645.67**	**807.09**	**788.27**	**769.44**	**750.62**	**731.79**	**712.97**	**590.01**	**84.90**	**26.58**	**26.58**	**26.58**
	Savings with Baseline 2010 Figures Assumed (MG)	628.63	790.05	951.47	1,112.88	1,274.30	1,255.48	**1,236.65**	**1,217.83**	**1,199.00**	**1,180.18**	**1,057.22**	**552.11**	**493.79**	**493.79**	**493.79**

Figure 25

Fort Bend County Utility	Cinco MUDs	FB MUD #57	FB MUD #58	FB MUD #69	FB MUD #115	FB MUD #116	Interstate MUD	City of Stafford (WCID#2)	City of Sugar Land	Estimated Savings (MG)	
Measures											
Residential HE Toilets, SF								X	X	2.1	
Residential HE Toilets, MF											
Residential LF Showerhead, SF				X	X				X	0.6	
Residential LF Showerhead, MF		X	X			X				0.5	
Res. Irr. Controller, SF Customer Financed											
Residential Meter Installation											
CII Tank-Type ULFT Rebate											
CII Tank-Type HE Toilet				X	X	X	X	X	X	2.4	
CII Valve-Type HE Toilet											
CII Dishwasher											
CII Spray Rinse Valve		X	X	X	X		X	X	X	3.2	
CII Food Steamer											
CII Cooling Tower									X	2.1	
Large Landscape Surveys											
Large Landscape Water Budgets	X	X	X			X	X	X	X	11.2	
Large Land. Irrigation Controller											
											County Savings Goal (MG) (2016)
Estimated Savings (MG)	3.0	1.0	0.8	1.2	0.8	0.8	1.0	1.2	12.3	**22.1**	306.2

VII. Implementation successes and pitfalls

Our report recognizes that actual implementation of water conservation to achieve a future goal must be managed in an *adaptive fashion* and that individual utilities may need to make choices on yearly basis about what conservation measures to implement within their local jurisdictions or sub-regionally with other authorities.

Utilities and regional leadership will be most successful in creating and sustaining successful conservation programs when the following factors are understood:

- Actual water demands are different than projected demands
  - Population and employment growth projections and actual growth patterns may increase or decrease over time
  - There may be shifts in the commercial industry or in population demographics

- Water conservation program participation rates may vary:
  - Change in public attitude (for example interest in sustainability and resource conservation, successful marketing campaigns)
  - Increasing water and wastewater rates
  - Availability of supplemental water sources—surface water, reclaimed water, wells, etc.
  - Level of disposable income of conservation program participants
  - Ease of implementation for the customer (availability of the technology and public perceived ease implementation—these can change with time and program design)
  - New technology and water efficient best management practices
  - Data or reports on actual water savings of programs

- External Factors that affect both demand and conservation programs:
  - Economic cycles—recessions or booms
  - Drought or extreme weather event
  - Change in trends of housing development (e.g., from single family to multifamily units that then impacts the customer base)
  - Other unforeseen events or natural disasters (e.g., hurricanes, fires, floods, climate change) that affect the region.

The Goldwater Project recommends the following strategies to help achieve maximum adoption (and water savings) targets:

- Utilities implementing any of the conservation measures presented herein should closely monitor program progress. Use program data to refine estimates of current market penetration if any measures center on fixtures, e.g. high-efficiency toilets. If the savings goals and targets are not being achieved, the utilities and regional points of accountability should consider program modifications. If a program is not successful or cost-effective with the current design, it may be necessary to employ other distribution techniques such as, for high-efficiency toilets:

  - Higher incentives
  - Direct install
  - Voucher or point of sale coupons
  - Give-a-ways at special events
  - Retrofit on resale (for single-family residences)
  - Additional marketing and outreach—point of purchase displays, meeting with large stores in the region, etc.

- Follow the development of new technologies and consider adding new measures when proven to be effective.

- Each year the program should be evaluated for adjustments using the tracking tool to allow participation against water savings goals.

APPENDIX

A: Library of Measures

- Includes measures selected by utility along with several other cost effective measures that may be of interest.

B: Water Savings by County from the Region H Planning Group's 2011 Plan

C: Emails and Other Documents Relied upon for Data in the Tracking Tool

D: Survey and/or Interview Results

E: Addressing Changes to Rates and Revenues Due to Conservation Activities

- Effective conservation programs will inherently garner less revenue for your utility because it will sell less water. This appendix provides an in-depth understanding of how to adjust rates and revenues to ensure that your utility's finances are healthy while also saving water.

- With permission from the authors, we have included information from a helpful study on how these two goals can align.

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Chapter 6 – Impacts of the Regional Water Plan

6.1 IMPACTS OF WATER MANAGEMENT STRATEGIES AND PROJECTS ON KEY WATER QUALITY PARAMETERS IN THE STATE AND IMPACTS OF MOVING WATER FROM AGRICULTURAL AND RURAL AREAS

This planning effort is part of a consensus-based planning effort to include local concerns in the statewide water supply planning effort. This chapter addresses:

- Impacts of Water Management Strategies (WMS) and Projects on Key Parameters of Water Quality, and
- Impacts of Moving Water from Rural and Agricultural Areas.

Since the development of the planning rules and guidance, the concept of a "project" has been used to describe specific infrastructure used to increase or manage water supplies. Projects may be associated with one or more WMS and, similarly, a WMS may consist of one or more projects. References in the discussion below to WMS should be considered inclusive of the associate concept of projects.

6.1.1 Impacts of Water Management Strategies and Projects on Key Parameters of Water Quality

The potential impacts that WMS and associated projects may have on water quality are discussed in this section, including the identified water quality parameters which are deemed important to the use of the water resources within the region. Under the Clean Water Act, Texas must define designated uses for all major water bodies and, consequently, the water quality standards that are appropriate for that designated water body use. The water quality parameters which are listed for Region H below were selected based on the *TCEQ Water Quality Inventory for Designated Water Body Uses* as well as the water quality parameters identified in the Texas Commission on Environmental Quality (TCEQ) 303d list of impaired water bodies. For reference purposes, ***Appendix 6-A*** contains the TCEQ 303d list of impaired waters within the region and the tabular summaries of use support for the water bodies that are part of Region H.

Key surface water parameters identified within Region H fall into two broad categories:

<u>Nutrients and non-conservative substances:</u>

- Bacteria
- pH
- Dissolved Oxygen
- Total Suspended Solids (TSS)
- Temperature
- Nutrients (Nitrogen, Phosphorus)

<u>Minerals and conservative substances:</u>

- Total Dissolved Solids (TDS)
- Chlorides
- Mercury
- Salinity
- Sediment Contaminants

Non-conservative substances are those parameters that undergo rapid degradation or change as the substance flows downstream, such as nutrients which are consumed by plant life. Nutrient and non-conservative loading to surface water originates from a variety of natural and man-made sources. One significant source of these loads is wastewater treatment facilities. As population increases, the number and size of these wastewater discharges will likely increase as well. Stormwater runoff from certain land use types constitutes another significant source of nutrient loading to the region's watercourses, including agricultural areas, golf courses, residential development, or other landscaped areas where fertilizers are applied. Nutrient loads in Region H are typically within the limits deemed acceptable for conventional water treatment facilities, and are therefore not considered a major concern as related to source of supply.

Conservative substances are those that do not undergo rapid degradation or do not change in water as the substance flows downstream, such as metals. Mineral and other conservative substance loading to surface water generally originates from three sources: (1) non-point source runoff or groundwater seepage from mineralized areas, either natural or man-made (2) wastewater discharges, and (3) sea water migration above estuaries. Region H is fortunate in that the first category is not typical of this area except for the Brazos River which has several natural salt-contributing areas; fortunately, flows in the lower basin generally are sufficient to dilute these sources to easily manageable concentrations. Wastewater discharges, and industrial discharges in particular, have improved over the past 30-years due to the requirements of the Clean Water Act. If local concentrations of conservative contaminants are identified, they are remediated by the appropriate agency. Salinity migration above estuaries is controlled in the Trinity River by the Wallisville Saltwater Barrier, and in the San Jacinto River by the Lake Houston Dam. The 2016 Regional Water Plan recommends a saltwater barrier be added above the Brazos estuary to protect water quality in that reach of the Brazos River as well. Sediment contaminants can provide particulate matter that can encourage the growth of blue-green algae (cyanobacteria). Sand mining, in particular, has led to increased nutrient loads in the San Jacinto River which can result in an increase in cyanobacteria levels.

Groundwater in Region H is generally of good quality with no usage limitations. Quality parameters of interest include Total Dissolved Solids (TDS), metals and hardness. Portions of the Carrizo-Wilcox aquifer can contain levels of iron that require sequestering or removal through treatment facilities. The Brazos River Alluvium is directly recharged from the based flow in the Brazos River, and has the potential to reflect any contaminant loading of the Brazos River. Portions of the aquifer currently experience elevated TDS and hardness.

Water quality of the Gulf Coast aquifer is generally good throughout the Region. The Chicot and Evangeline aquifers are capable of yielding moderate to large amounts of fresh water in most of the Region. Fresh water is overlain and underlain by saline water in coastal areas and the coastal deposits are not capable of yielding fresh water. Deeper formations throughout the region are able to supply limited freshwater and slightly saline water in updip areas.

Some localized sites within the Region have the potential to cause contamination of the aquifer under adverse conditions. These sites once generated surface water pollution which, if not properly handled, could cause contamination of local soils or shallow groundwater supplies. Except for the northern areas of the Region, the thickness of the near-surface clay soils located over much of the Region provide an effective barrier to deeper aquifer contamination due to normal infiltration. As a consequence, the primary risk for Gulf Coast aquifer groundwater contamination occurs if there are improperly designed or inadequately sealed wells which are exposed to this surface contamination. Localized shallow alluvial aquifers primarily located along the major streams such as the Brazos River are at greater risk for contamination from these sites as a result of the more direct travel paths for potential contaminated water to reach these areas, especially if they are being pumped by small household or livestock wells. At this time, there are no recorded incidents of contaminated groundwater in the Region as a result of these sites.

The water quality parameters and WMS and projects selected by the Region H Water Planning Group (RHWPG) were evaluated to determine the impacts on water quality as a result of these recommended strategies. This evaluation used the data available to compare current conditions to future conditions with Region H management strategies in place. The key recommended management strategies, as described in ***Chapter 5*** of this report and used in this evaluation, are listed below in *Table 6-1*.

Table 6-1 – Key Recommended Water Management Strategies and Projects

Conservation
Industrial Conservation
Irrigation Conservation
Municipal Conservation
Contractual Transfer
TRA to COH Transfer
Conveyance
CHCRWA Transmission and Distribution Expansion
COH/NHCRWA/CHCRWA Second Source Pipeline
East Texas Transfer
Lake Livingston to SJRA Transfer
Luce Bayou Transfer
NFBWA Distribution Expansion
NHCRWA Distribution Expansion
NHCRWA Transmission Line
Old Galveston Road Transmission Improvements
WHCRWA Distribution Expansion
WHCRWA/NFBWA Transmission Line
Groundwater Development
Brackish Groundwater Supplies
BWA Brackish Groundwater
Conroe Brackish Reverse Osmosis
Expanded Use of Groundwater

Groveton Groundwater Expansion	
SJRA Catahoula Aquifer Supplies	
Groundwater Reduction Plans	
CHCRWA GRP	
City of Houston GRP	
City of Missouri City GRP	
City of Richmond GRP	
City of Rosenberg GRP	
City of Sugar Land GRP	
Fort Bend County MUD 25 GRP	
Fort Bend County WCID 2 GRP	
NFBWA GRP	
NHCRWA GRP	
Panorama Village and Shenandoah GRP	
Porter SUD GRP	
River Plantation MUD GRP	
SJRA GRP	
WHCRWA GRP	
Reuse	
City of Conroe Reuse	
City of Houston Reuse	
City of Pearland Reuse	
GCWA Reclaimed Water from COH	
Grand Lakes Reclaimed Water System	
Montgomery County MUDs #8 and #9 Reuse	
Regional Return Flows	
SJRA Conroe Reuse Project	
Wastewater Reclamation for Municipal Irrigation	
Surface Water Development	
Allens Creek Reservoir	
BRA System Operation Permit	
Dow Expansion to Harris Reservoir	
Freeport Seawater Desalination	
Treatment	
BWA Water Treatment Plant Expansion	
City of Houston Treatment Expansion	
CLCND West Chambers System	
COH Northeast Water Purification Plant Expansion	
Pearland Surface Water Treatment Plant	
Other Infrastructure	
Brazos Saltwater Barrier	

The following paragraphs discuss the impacts of each key project on the chosen water quality parameters.

Water Conservation, including municipal, industrial, and agricultural conservation, can have both positive and negative impacts on water quality. Water that is being processed through a wastewater treatment plant typically has acquired additional dissolved solids prior to discharge to the waters of the state. Conventional wastewater treatment reduces suspended solids, but does not reduce dissolved solids in the effluent. Water conservation measures will reduce the volume of water passing through the wastewater plants without reducing the mass loading rates (a 1.6 gallon flush carries the same waste mass to the plant that a 6-gallon flush once carried). This may result in slightly increased conservative contaminant loads in the stream. However, it should be noted that during low flow conditions, the wastewater effluent in a stream may represent water that helps to augment and maintain the minimum stream flows. Tail water is the term used to describe that water returned to the stream after application to irrigated cropland. Tail water carries nutrients, sediments, salts, and other pollutants from the farmland. This return flow can have a negative impact on water quality, and by implementing conservation measures which reduce tail water losses, the nutrient and sediment loading can be reduced. Once again, however, this return flow tends to be introduced into the receiving stream during normally dry periods so it may have a net beneficial effect in terms of maintaining minimum stream flow conditions. Furthermore, the loss of the return flows could be offset by a reduction in irrigation diversions resulting in no net effect on the stream flow.

TRA to COH and Lake Livingston to SJRA Transfers are not expected to create any new water quality issues. Fully utilizing existing water supplies may amplify some existing concerns, particularly contaminant concentrations due to reduced opportunities for instream dilution. The continued return of flows via wastewater treatment facility discharges will provide some mitigation of that effect. Typical municipal return flows are 60 percent of the total quantity diverted for use.

The East Texas Transfer has the potential to introduce Neches and Sabine River water into the Trinity, San Jacinto, San Jacinto - Brazos, and Brazos basins. This strategy therefore has the potential to result in changes in water chemistry, temperature, nutrients, organic particulates, and sediment in the Neches and Trinity basins. Instream flows in the lower Sabine River will also be reduced by the additional diversion of water from the Sabine River basin. Instream flows in portions of the Neches, Trinity, and San Jacinto Rivers will increase slightly. This strategy is included in the 2011 Plan as an alternative to off-channel reservoirs in Brazoria and Fort Bend Counties. Water transferred from the Sabine to the San Jacinto basin will be used to meet demands primarily in the Brazos and San Jacinto – Brazos basins. This may be accomplished by using the imported water in lieu of Trinity water from Lake Livingston to meet demands in Harris County. Additional infrastructure would be required to convey water from the San Jacinto basin to meet demands in the Brazos and San Jacinto – Brazos basins.

The Luce Bayou Transfer will potentially improve the quality of Lake Houston, due to the blending with water from the Trinity River. However, recent studies performed by the Luce Bayou program have not indicated that this will be the case. Transfers such as this allow an increased opportunity for invasive species migration from the source to receiving waters. Additionally, the transfer will potentially reduce flow in the Trinity River below Dayton, because the Lake Livingston water rights are not fully utilized today. The effects of this reduced flow in the Trinity are mitigated by the existence of the Wallisville Saltwater Barrier at the mouth of the river, which maintains a minimum river level for navigation and prevents the migration of brackish water upstream.

Conveyance and Treatment projects, including those related to Groundwater Reduction Plans (GRPs) and the Old Galveston Road Transmission Improvements are not expected to have any direct impact on the on key water quality parameters. However, they do facilitate the implementation of other projects that may have noteworthy impacts.

Projects such as the BWA Brackish Groundwater, Conroe Brackish Reverse Osmosis, and the general Brackish Groundwater Supplies sometimes utilize dilution and discharge to deal with brine concentrated during treatment processes. This can result in an elevated level of TDS in streams used as receiving waters as well as other quality impacts depending upon the quality of the groundwater source. The SJRA Catahoula Aquifer Supplies project aims to potentially use the bed and banks of Lewis Creek to convey raw groundwater and this may, similarly, impact stream water quality.

The Expanded Use of Groundwater and the Groveton Groundwater Expansion are not expected to have significant environmental effects. Groundwater within the Region is generally of good quality and available at the point of use. Increases in well pumping will also contribute to return flows in all river basins in Region H. The return flows will increase in proportion to increased groundwater use and significantly contribute to flows into Galveston Bay. Increased and interim groundwater pumping in the region will continue to be monitored by groundwater regulatory agencies since excessive pumping can lead to land subsidence and exacerbate flooding and drainage problems.

Wastewater Reuse projects will potentially reduce in-stream flows, thus concentrating any in-stream contaminants. However, the reuse process should remove a portion of the waste load discharged from these facilities, either through the secondary treatment process or simply by the rerouting of effluent. Much of this reuse is not projected to occur until a time when the overall water use of the region has increased. Wastewater return flows will increase proportionally, so that the reuse of this portion will not constitute a significant reduction below current return flows.

Allens Creek Reservoir and the Dow Expansion to Harris Reservoir will modify downstream flow regimes, but potentially have positive impacts on water quality. The impacts will be investigated further once a flow regime is developed for the Brazos River. These off-channel reservoirs will be operated as “scalping reservoirs”. During times of high flow, water quality in the Brazos River is often poor in terms of suspended solids due to increased sediment loads. At the same time, that water is of better quality in terms of dissolved solids concentrations since the salt being introduced into the Brazos in its upper reaches is diluted. The water that is diverted and stored in reservoirs would allow sediments to settle and accordingly water released from the reservoir would potentially have less sediment concentration. However, reduced sediment loads may have negative impacts on habitats relying on sediments downstream of the proposed reservoirs. Nutrients such as nitrogen and phosphorous are often attached to fine sediment particles that settle in reservoirs reducing nutrient loads to downstream aquatic species. Water that is released from the reservoirs during low flow conditions would have a beneficial effect by diluting the low flow salt concentration in the river.

The BRA System Operation Permit strategy potentially impacts the water quality in the lower basin depending on the actual diversion quantities and diversion locations. The BRA will develop a management plan for implementing its System Operations Permit. The management plan will address actual operations under the System Operations Permit, including water quality considerations. Decreased instream flows directly influence saltwater intrusion, which may be mitigated by a saltwater barrier. However, in the “Report in Support of System Operation Permit Application” prepared by Freese and Nichols, Inc. for the BRA, it is stated that system operations would not negatively impact instream flows and may increase the frequency of meeting instream criteria in many locations. Because many of the existing impaired segments within the Brazos Basin are located above system reservoirs, it was also found that the hydrology of these segments will not be significantly impacted by the BRA System Operations.

Although the maximum diversions anticipated under the system operations conditions may pose some slight impact on estuary conditions, the frequency of occurrence for these actual diversions is very low. Additionally, since the Brazos River empties directly into the Gulf of Mexico, operational changes will not affect a large bay system but may impact flows into the Brazos River Estuary and the Columbia Bottomlands. Changes to flow patterns will likely be localized and fall within historical parameters. In conclusion, the BRA's analysis recognized the System Operations Permit to be more environmentally sensitive than other potential strategies including new reservoir construction, groundwater resource development, and importing water supplies from outside the basin.

Freeport Desalination does not affect other WMSs and affects only the salinity levels in the area of discharge. The discharge water will blend with and be diluted by other water before flowing into the Brazos River above the Intracoastal Waterway. The diversion of Brazos River water to supplement seawater supplies to the desalination plant would maximize the operational efficiency, but could increase the salinity of the Brazos River Estuary, depending upon the size and season of the diversion.

The Brazos Saltwater Barrier would help maintain water quality in the lower Brazos basin during low flow periods. Currently, during low flow periods the Dow Chemical and Brazosport Water Authority lower intakes are compromised due to saltwater intrusion. Increased use of Brazos River supplies will extend this seasonal condition upstream unless a barrier or other control measure is implemented.

6.1.2 Impacts of Moving Water from Rural and Agricultural Areas

Currently, the water used in rural and agricultural areas represents approximately 14 percent of the total water used in Region H. From the year 2000 to 2010, agricultural water use declined approximately 6.5 percent and this trend continues as overall production is reduced. Although irrigation and livestock sector demands are held constant throughout the planning period, these trends are retained as a conservative estimate of demand and have not been proven accurate when compared against actual trends. Water management strategies, along with current sources of reliable water supply and interruptible supplies, are available to agricultural users throughout the planning period. However, these projects often come at a price that cannot be borne by agriculture.

The potential impacts of moving water from rural and agricultural areas are mainly associated with socio-economic impacts to third parties. The potential impetus for moving water is expected to occur from two sources: 1) the cost of raw water may become too great for the local irrigator to afford, and the irrigator may elect to voluntarily leave the industry for economic reasons; or 2) the value of the raw water for municipal or industrial purposes may create a market for the wholesale owner to re-direct the sale of the water making it unavailable to the irrigator. In some cases, it may be feasible for a third party to pay for conservation measures and then utilize the saved water for their own needs (through recontracting or other agreements) and allow the irrigator to remain in business; however, there are few contractual and institutional measures in effect to allow this trade-off to occur at this time. The intent of this plan is to provide water or the conservation means to meet all projected water demands throughout the planning period.

In many cases, drought-of-record climate conditions bring about economic conditions where agriculture is left without a reasonable water supply. Throughout the region, irrigation usage is already met almost entirely through interruptible water supplies that do not have the benefit of storage and drought protection as a result of the overall cost of water. Livestock supplies are often sourced from local supplies and stock ponds that do not have reliable supplies under drought conditions. In both of these cases, agricultural users often turn to additional groundwater pumpage to close the gap in need. Often these supplies are outside of the Modeled Available Groundwater (MAG) used for planning and, therefore, are outside of this planning process.

6.2 DESCRIPTIONS OF HOW REGIONAL WATER PLANS ARE CONSISTENT WITH THE LONG-TERM PROTECTION OF THE STATE'S WATER, AGRICULTURAL, AND NATURAL RESOURCES

The Region H Water Planning Group balanced meeting water needs with good stewardship of the water, agricultural, and natural resources within the region. The RHWPG recommended water conservation as the first strategy applied to meet every projected shortage. In the strategy selection process, the yield and environmental impact of projects were given greater consideration than the unit cost of water.

The RHWPG believes that local groundwater conservation districts are best-suited to manage groundwater resources in which the individual districts have the responsibility to regulate. This plan recommends using groundwater up to the local sustainable yield or to the restrictive limit established under subsidence district regulations, to meet local demands, but does not recommend the exportation of groundwater from its county of origin. The effects of the recommended WMS on specific resources are discussed in further detail within this chapter.

6.2.1 Water Resources within Region H

Water resources available by basin within Region H are discussed in further detail below.

6.2.1.1 Neches-Trinity Coastal Basin

The Neches-Trinity Coastal Basin has numerous creeks and bayous which flow into East Bay. Many of these creeks and bayous provide water for irrigation and it is expected that this irrigation use will continue. Additional supplies are transferred into the Neches-Trinity Basin by the Lower Neches Valley Authority (water from the Sam Rayburn Reservoir – B.A. Steinhagen Lake System) and by the Chambers-Liberty Counties Navigation District (CLCND) (water from the Trinity River). This plan recommends increased use from existing sources. Additional supplies from the Trinity are not recommended, which will affect the return flows location within Galveston Bay. No other impacts by these strategies are foreseen.

Groundwater supplies within the Neches-Trinity Basin come from the Gulf Coast Aquifer. The plan reflects using but not exceeding the sustainable yield of the aquifer in this basin.

6.2.1.2 Trinity River Basin

The Trinity River serves both Regions C and H. Within Region H, the Lake Livingston-Wallisville Saltwater Barrier System represents one half of the available surface water supply. This plan recommends allocating additional firm yield from this system in addition to the full use of all water rights below the Lake. Achieving the full yield of Lake Livingston is dependent upon return flows from the upper basin. Region C is recommending wastewater reuse as a WMS in the upper basin, which will limit these flows, but is also recommending the import of new supplies into the upper basin. In combination, the upper basin additional supply and reuse strategies should have a long-term neutral effect on the Lake Livingston supply.

This plan recommends transferring much of the Trinity River supply west into the adjacent coastal basin and the San Jacinto Basin. This will result in decreased flows in the lower Trinity Basin during drought periods. Senior water rights below Lake Livingston are protected by the Lake's operating rules. Return flows from these transfers will still reach Galveston Bay, but will return via the San Jacinto Basin.

Groundwater in the lower Trinity Basin predominantly comes from the Gulf Coast Aquifer as well as from the Carrizo-Wilcox, the Sparta, the Queen City and the Yegua-Jackson Aquifers. The plan reflects using but not exceeding the sustainable yield of the Gulf Coast Aquifer in this area. In addition, the other aquifers are only used to meet local demands. The export of groundwater from its source county is not recommended in this plan.

6.2.1.3 Trinity-San Jacinto Coastal Basin

The Trinity-San Jacinto Coastal Basin is relatively small with Cedar Creek being the most significant stream. There are several surface water rights for irrigation within the basin along with a substantial saline water right for cooling water from Galveston Bay. Both of these uses are expected to continue throughout the planning period. This plan recommends expanded use of existing supply sources, including increasing the transfer of water from the Trinity River to meet the projected demands, which will affect the return flows location within Galveston Bay. No other impacts from the transfers are foreseen.

The groundwater supply source within this basin is the Gulf Coast Aquifer. The plan reflects using but not exceeding the sustainable yield of the aquifer in this basin. In Harris County, the Harris-Galveston Subsidence District regulations further restrict the use of groundwater to address land subsidence. These groundwater pumpage restrictions are reflected in the plan.

6.2.1.4 San Jacinto River Basin

The San Jacinto River Basin contains Lakes Houston and Conroe. These reservoirs make up approximately one tenth of the total surface water available in the region. This plan recommends utilizing the yield of these reservoirs and other surface water rights within the San Jacinto Basin. In addition, the plan calls for the interbasin transfer of supply from the Trinity River to meet projected demands. Full use of the existing water rights will reduce stream flows during drought conditions. However, this will be mitigated by increased return flows and return flows from imported supply.

Wastewater reuse is a recommended WMS in the basin. This includes major indirect reuse projects such as Regional Return Flows and City of Houston Reuse. Other, smaller direct reuse projects are also included. Overall, these projects have the impact of reducing instream flows. However, provisions have been put into place in existing permits to protect flows necessary for stream and bay health.

The groundwater supply source in the San Jacinto Basin is the Gulf Coast Aquifer. The current regional water plan reflects using but not exceeding the sustainable yield of the aquifer in this basin.

In Harris and Fort Bend Counties, the Harris-Galveston and Fort Bend Subsidence District regulations further restrict the use of groundwater to address land subsidence. Groundwater use is also restricted in Montgomery County by the Lone Star Groundwater Conservation District. These groundwater pumpage restrictions are reflected in the plan.

6.2.1.5 San Jacinto-Brazos Coastal Basin

The San Jacinto-Brazos Coastal Basin encompasses all of Galveston County, most of Brazoria County, and portions of Harris and Fort Bend Counties. The coastal basin contains numerous streams and bayous which flow into Galveston Bay and West Bay. Major bayous contributing to Galveston Bay include Clear Creek, Dickinson Bayou and Chocolate Bayou. Bastrop Bayou, located at the western edge of the basin, flows into Christmas Bay. There are numerous surface water rights for irrigation, mining and manufacturing within the basin and these uses are expected to continue throughout the planning period. Water from the Brazos River is transferred into the coastal basin to meet current demands. The Gulf Coast Water Authority (GCWA) maintains and operates canals and off-channel reservoirs within the coastal basin.

This plan recommends increasing the transfer of water from the Brazos to meet the projected growth in demands of Brazoria and Galveston Counties, which will increase the return flows to Galveston Bay. Additionally, this plan recommends the import of Trinity- and San Jacinto-sourced effluent from the San Jacinto River Basin into the San Jacinto-Brazos. The effect is a reduced dependence upon water supplies from the Brazos and a diversification of the basin's water portfolio.

Finally, seawater desalination is included as a recommended strategy to meet manufacturing demands in Brazoria County. This strategy will meet a portion of the demands and will potentially increase stream flows, since the return flows from desalination are not associated with a diversion from the source streams. No other surface water impacts are foreseen.

The groundwater supply source in the San Jacinto-Brazos Basin is the Gulf Coast Aquifer. The plan reflects using, but not exceeding the sustainable yield of the aquifer in this basin. In Fort Bend, Galveston and Harris Counties, regulations enacted by the Fort Bend Subsidence District and the Harris-Galveston Subsidence District further restrict the use of groundwater to address land subsidence. These groundwater pumpage regulations are reflected in the plan.

6.2.1.6 Brazos River Basin

The Brazos River Basin is the second largest basin in the state (after the Rio Grande), primarily serving Regions O, G and H. The Brazos River Authority operates a system of reservoirs within the middle and upper basin, which provide a portion of the lower basin supply. There are also numerous water rights on the Brazos River and its tributaries which provide water for municipal, manufacturing, irrigation, mining and steam electric power uses. This plan increased use of the existing water rights in the lower basin as well as developing new sources of supply.

The Brazos River Authority has identified additional yield that can be realized by operating their reservoirs as a system. This strategy would allow the Brazos River Authority to divert flows to meet customer needs when these flows are available in lieu of releasing water from reservoir storage.

During drought periods, more stored water would then be available, thus increasing the total yield of the Brazos River Authority system. This WMS will reduce the peak flows in the lower Brazos due to the increase in diversions. However, when base flows are below the median value, the BRA would release flows to meet customer demands. This would result in increased flows in the river segments above the customer diversion points, and should have no effect below those diversions.

One new off-channel reservoir is included in the 2016 Plan as a recommended WMS. Allens Creek Reservoir is located in Austin County and will generate firm yield through the diversion and storage of interruptible peak flows. In addition, an expansion to the Dow Harris Reservoir will store water diverted using Dow Chemical’s existing water rights and will be used to meet manufacturing and municipal demands in Brazoria County. This will reduce the net flow within the basin, but the impacts during drought or seasonal low flow periods would be limited.

To protect water quality in the lower Brazos Basin, particularly at the diversion points serving the southwestern portion of Brazoria County, the construction of a saltwater barrier is recommended. The Brazos River is the only river basin in Region H not protected from the seasonal tidal influence of saltwater by a saltwater barrier or other impoundment structure. Basin salinity modeling performed by the TWDB has shown that the saltwater influence will move farther upstream under full use of water rights. This project will mitigate that effect and still allow flows to pass into the small Brazos River estuary.

Groundwater within this basin predominantly comes from the Gulf Coast Aquifer, as well as the Carrizo-Wilcox, the Brazos Alluvium, the Sparta, and the Queen City Aquifers. The plan reflects using but not exceeding the sustainable yield of the Gulf Coast Aquifer in this area. The Carrizo-Wilcox and Sparta Aquifers are only used to meet local demands. The export of groundwater from its source county is not recommended in this plan. In Fort Bend County, regulations enacted by the Fort Bend Subsidence District further restrict the use of groundwater from the Gulf Coast Aquifer to address land subsidence. These regulations are reflected in the plan.

6.2.1.7 Brazos-Colorado Coastal Basin

The Brazos-Colorado Coastal Basin contains the San Bernard River and its tributary streams. There are several surface water rights along the San Bernard River for manufacturing and irrigation uses. Both of these uses are expected to continue. Needs for other sources of water appear early in the planning horizon. It is recommended that the large manufacturing demands in this basin utilize imported supplies from the neighboring Brazos River Basin to meet needs.

The groundwater supply source in the Brazos-Colorado Basin is the Gulf Coast Aquifer. The plan reflects using but not exceeding the sustainable yield of the aquifer in this basin.

6.2.2 Agricultural Resources within Region H

Region H has approximately 4,000,000 acres of land in farms, with about one quarter of that land in production during any given year. Although this has remained relatively constant over the past two decades, the crops and water usage within those farms has changed. Sugar Land is no longer surrounded by its namesake cane fields, and the Imperial Sugar Mill in that city closed its doors in 2004.

Data from the USDA Census of Agriculture is provided in ***Appendix 6-B***. The data shows that since 1992, irrigated acreage within Region H has declined by 48%. This decline is driven by economic factors, but the cost of water is among them. Rural land data obtained from the Texas Cooperative Extension at Texas A&M University is also provided in ***Appendix 6-B***. It indicates that rural land use is increasing in the northern portion of the region, while decreasing in Montgomery and the southern counties due to urbanization. In many counties, native rangeland is being converted to improved, non-irrigated pasture.

This plan holds the projected irrigation demand constant over the planning period at 345,839 acre-feet per year. Region H is able to meet a portion of those demands from a combination of existing supplies and conservation. The need for financial assistance to realize the conservation goal is addressed in **Chapter 8** under legislative recommendations. Providing interruptible water is expected to preserve local agricultural resources by providing irrigators with water at a cheaper rate when surface water supplies are available. Many irrigators in Region H, specifically those in Brazoria County, contract water on a year-to-year basis. The water provided under these contracts is generally less expensive than contracts for firm water supplies. However, guidance for the development of regional water plans precludes the incorporation of such projects. Therefore, many agricultural needs go unmet in the plan as there are years of drought when agriculture does not have access to reliable water supplies and must limit production.

6.2.3 Natural Resources within Region H

Region H contains many natural resources and the WMS recommended in this plan are intended to protect those resources while still meeting the projected water needs of the region. The impacts of recommended strategies on specific resources are discussed below.

6.2.3.1 Threatened and Endangered Species

Region H has abundant habitat areas within the Sam Houston National Forest, the Big Thicket Nature Preserve, several National Wildlife Refuges, and significant undeveloped areas. Numerous native and migratory species live within these habitats, including over ten threatened and endangered aquatic species (listed in ***Appendix 6-C***).

The WMS recommended in this water plan will have some impacts upon wetlands habitats. In the 2016 Region H Water Plan, one new reservoir project is recommended. Allens Creek Reservoir has the potential to impact wetlands habitat. However, the potential impacts at this proposed site is less than on the main stem of a river. At the Allens Creek site in Austin County, habitats for the White-faced Ibis, Wood Stork and Houston Toad may be inundated and require mitigation. It should be pointed out that the Allens Creek project was modified by the project sponsor to avoid impacting Alligator Hole, a wetland segment adjacent to the project site. The current plan includes the Allens Creek Reservoir as a recommended WMS.

The transfer of supply to the San Jacinto Basin from Lake Livingston and beyond is recommended in this plan. While the recommended amount is less than the full yield of the source reservoirs, it will still impact the lake level during dry periods as well as wetlands along the periphery of the reservoir. Habitats for the Wood Stork and Alligator Snapping Turtle may be affected during drought periods, but no permanent impacts to these habitats are foreseen.

The primary recommended conveyance from the Trinity to the San Jacinto Basin is the Luce Bayou Transfer. This project includes a pump station, pipeline, 23.6 miles of canal, and an outfall into Lake Houston. The current alignment will disturb undeveloped forest areas near the Trinity River, farm lands, and more developed areas near Lake Houston. By limiting the use of bed and banks conveyance, the current Luce Bayou strategy attempts to minimize impacts on wetlands and avoid them wherever possible.

The conveyance of water from Toledo Bend in the East Texas Transfer is expected to have similar impacts in some locations. However, significant portions of this route are already developed tot eh point that capacity either already exists or may be made possible through expansion within or adjoining existing right-of-way.

6.2.3.2 Parks and Public Lands

As described in ***Chapter 1***, Region H contains over 325,000 acres of state and national forests, over 107,000 acres of coastal wildlife refuges, and over 12,000 acres of Texas wildlife management areas. The transfer of supply from Lake Livingston into the San Jacinto basin has the potential to reduce flows through the Trinity River National Wildlife Refuge during drought periods. The transfer may also include an interbasin pipeline route potentially impacting lands in the Sam Houston National Forest (SHNF) increasing possible environmental impacts from construction and maintenance activities.

6.2.3.3 Impacts of Water Management Strategies on Unique Stream Segments

Region H recommended eight stream segments for designation as unique in the 2016 Water Plan. The streams recommended were:

- Armand Bayou in Harris County
- Austin Bayou in Brazoria County
- Bastrop Bayou in Brazoria County
- Big Creek in Fort Bend County
- Big Creek in San Jacinto County
- Cedar Lake Creek in Brazoria County
- Menard Creek in Polk and Liberty Counties
- Oyster Bayou in Chambers County

All of these segments occur within riparian conservation areas, and there are no WMSs that divert additional water from or above these streams. Additionally, terrestrial strategies such as brush control or salt cedar removal are not recommended within Region H, so the riparian habitats should not be affected. Finally, there is some concern that overuse of groundwater would impact spring flows within the Sam Houston National Forest. Region H does not recommend the export of groundwater from any county, and encourages the formation of groundwater conservation districts to actively manage these resources. The western portion of the National Forest lies in Walker and Montgomery Counties, which both have active groundwater conservation districts. The southern portion of the National Forest is in San Jacinto and Liberty Counties, which do not currently have a groundwater-managing district in place.

The current unique stream segments and an analysis of all proposed stream segments is provided in ***Chapter 8***.

6.2.3.4 Protection of Galveston Bay

The Galveston Bay estuary is arguably the most significant natural resource within Region H, providing habitat for a rich diversity of permanent and migratory species, recreational and tourism use, employment for fisherman and the tourism industry, and serves as the gateway to the second busiest port in the U.S.

Galveston Bay is affected by the water plans for both Region C (in the Upper Trinity River Basin) and for Region H (in the Lower Trinity and San Jacinto River Basins). The Galveston Bay Freshwater Inflows Group has defined target frequencies for inflows to the estuary, based upon salinity and harvest models developed by the TCEQ and TPWD. These investigations provided a platform for the efforts of the Trinity and San Jacinto Rivers and Galveston Bay Basin and Bay Area Stakeholder Committee (BBASC) and Basin and Bay Expert Science Team (BBEST). The results of the BBASC review of the initial study of the BBEST was transmitted to TCEQ in two recommendations in May 2010. TCRQ used these reports when developing the final, adopted standards for instream flows and bay and estuary inflows for the Trinity and San Jacinto Rivers and Galveston Bay. These standards are illustrated in *Table 6-2* below.

Table 6-2 – Bay and Estuary Freshwater Inflow Standards for Galveston Bay

		Trinity		San Jacinto	
Annual Inflow (Ac-Ft) [Target Frequency]	Winter Inflow (Ac-Ft) [Target Frequency]	2,816,532 [50%]	500,000 [40%]	1,460,424 [50%]	450,000 [40%]
			250,000 [50%]		278,000 [50%]
			160,000 [60%]		123,000 [60%]
	Spring Inflow (Ac-Ft) [Target Frequency]		1,300,000 [40%]		500,000 [40%]
		2,245,644 [60%]	750,000 [50%]	1,164,408 [60%]	290,000 [50%]
			500,000 [60%]		155,000 [60%]
	Summer Inflow (Ac-Ft) [Target Frequency]		245,000 [40%]		220,000 [40%]
			180,000 [50%]		100,000 [50%]
		1,357,133 [75%]	75,000 [60%]	703,699 [75%]	75,000 [60%]
	Fall Inflow (Ac-Ft) [Target Frequency]		N/A		200,000 [40%]
			N/A		150,000 [50%]
			N/A		90,000 [60%]

The standards for bay and estuary inflow demonstrated in *Table 6-2* implies the importance of, not only the overall magnitude of inflows, but also the basin of origin. Over time, the transfer of water from the Trinity River Basin into the San Jacinto basin will relocate return flows from Trinity Bay to Upper Galveston Bay. This may have some impact on the oyster beds located within Trinity Bay. The increase of flows into Upper Galveston Bay should be less of a concern, because that flow will occur in the Houston Ship Channel (a dredged channel that is significantly deeper than the rest of the estuary).

6.2.3.5 Energy Reserves

Oil, gas, and other energy reserves are considered natural resources of the state. While Region H is home to a large portion of the nation's petrochemical industry, the amount of actual oil and gas mining within Region H is small compared to other portions of the state. In this plan, Region H was able to identify reliable supplies to meet all projected mining and manufacturing demands throughout the planning period. No adverse effect on this resource is foreseen

APPENDIX 6-A

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY 303(D) LIST OF IMPAIRED WATERS

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Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1302	1302_03	San Bernard River Above Tidal	26.51	From a point 3.2 km (2.0 miles) upstream of SH 35 in Brazoria County to the county road southeast of New Ulm in Austin County
1301	1301_01	San Bernard River Tidal	33.69	From the confluence with the Intracoastal Waterway in Brazoria County to a point 3.2 km (2.0 miles) upstream of SH 35 in Brazoria County
1302	1302_02	San Bernard River Above Tidal	25.48	From a point 3.2 km (2.0 miles) upstream of SH 35 in Brazoria County to the county road southeast of New Ulm in Austin County
1302	1302_01	San Bernard River Above Tidal	29.62	From a point 3.2 km (2.0 miles) upstream of SH 35 in Brazoria County to the county road southeast of New Ulm in Austin County
1304A	1304A_01	Linnville Bayou	20.61	Intermittent stream with perennial pools from a point 1.1 km above the confluence with Caney Creek in Matagorda County up to a point 0.1 km above SH 35 in Brazoria/Matagorda Counties
1209	1209_03	Navasota River Below Lake Limestone	25.79	From the confluence with the Brazos River in Grimes County to Sterling C. Robertson Dam in Leon/Robertson County
1209	1209_05	Navasota River Below Lake Limestone	34.01	From the confluence with the Brazos River in Grimes County to Sterling C. Robertson Dam in Leon/Robertson County
1245	1245_03	Upper Oyster Creek	36.52	From Steep Bank Creek/Brazos River confluence in Fort Bend County to pumping station on Jones Creek confluence at Brazos River in Fort Bend County (includes portions of Steep Bank Creek, Flat Bank Creek, and Jones Creek)
2423A	2423A_01	Oyster Bayou	21.95	From the East Bay confluence to a point 2.2 km (1.4 mi) upstream from SH 65 in Chambers County
0801C	0801C_01	Cotton Bayou	6.93	From the confluence of Cotton Lake southeast of Mont Belvieu in Chambers County upstream to a point (NHD RC 12040203000496) approximately 1 mile north of IH 10 in Chambers County
1004	1004_02	West Fork San Jacinto River	15.29	From the confluence of Spring Creek in Harris/Montgomery County to Conroe Dam in Montgomery County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1004	1004_01	West Fork San Jacinto River	23.72	From the confluence of Spring Creek in Harris/Montgomery County to Conroe Dam in Montgomery County
1007D	1007D_01	Sims Bayou Above Tidal	2.52	Perennial stream from 11.0 km upstream of confluence with Houston Ship Channel upstream to Hiram Clark Drive
1101B	1101B_01	Chigger Creek	8.77	From the confluence with Clear Creek Tidal to the Brazos River Authority Canal near CR 143 in Galveston County
1101C	1101C_01	Cow Bayou	2.98	From the Clear Creek Tidal confluence to SH 3 in Galveston County
1007	1007_07	Houston Ship Channel/Buffalo Bayou Tidal	3.51	From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
1007	1007_01	Houston Ship Channel/Buffalo Bayou Tidal	10.56	From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
1007	1007_03	Houston Ship Channel/Buffalo Bayou Tidal	4.69	From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
1007	1007_06	Houston Ship Channel/Buffalo Bayou Tidal	2.05	From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
1008H	1008H_01	Willow Creek	18.88	From the Spring Creek confluence to a point 0.48 km (0.3 mi) north of Juergen Rd
1005	1005_01	Houston Ship Channel/San Jacinto River Tidal	7.91	From the confluence with Galveston Bay at Morgan's Point in Harris/Chambers County to a point 100 meters (110 yards) downstream of IH 10 in Harris County
1005	1005_04	Houston Ship Channel/San Jacinto River Tidal	2.98	From the confluence with Galveston Bay at Morgan's Point in Harris/Chambers County to a point 100 meters (110 yards) downstream of IH 10 in Harris County
1103C	1103C_01	Geisler Bayou	3.17	From the Dickinson Bayou Tidal confluence to a point 1.37 km (0.85 mi) upstream of FM 646 in Galveston County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1103D	1103D_01	Gum Bayou	4.36	From the Dickinson Bayou Tidal confluence to State Hwy 96 in Galveston County
1103E	1103E_01	Cedar Creek	1.31	From the Dickinson Bayou Tidal confluence to a point 0.63 km (0.39 mi) upstream FM 517 in Galveston County
1101	1101_04	Clear Creek Tidal	2.15	From the Clear Lake confluence at a point 3.2 km (2.0 miles) downstream of El Camino Real in Galveston/Harris County to a point 100 m (110 yards) upstream of FM528 in Galveston/Harris County
1109	1109_01	Oyster Creek Tidal	24.83	From the Intercoastal Waterway confluence to a point 100 meters (110 yards) upstream of FM 2004 in Brazoria County
1110	1110_03	Oyster Creek Above Tidal	33.26	From a point 100 meters (110 yards) upstream of FM 2004 in Brazoria County to the Brazos River Authority diversion dam 1.8 km (1.1 miles) upstream of SH 6 in Fort Bend County
1101D	1101D_01	Robinson Bayou	2.70	From confluence with Clear Creek 0.33 mile upstream of Webster Street in Galveston County
1007	1007_04	Houston Ship Channel/Buffalo Bayou Tidal	6.85	From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
1007A	1007A_01	Canal C-147 Tributary of Sims Bayou Above Tidal	2.08	From the Sims Bayou confluence upstream to a point 0.71 km (0.44 mi) east of Beltway 8 in Harris County
1007B	1007B_02	Brays Bayou Above Tidal	2.63	From a point 11.5 km (7.1 mi) upstream of confluence with Houston Ship Channel up to SH 6
1102	1102_05	Clear Creek Above Tidal	2.66	From a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County
1016	1016_01	Greens Bayou Above Tidal	10.06	From a point 0.7 km (0.4 miles) above the confluence of Halls Bayou in Harris County to a point 100 meters (110 yards) above FM 1960 in Harris County
1016A	1016A_03	Garners Bayou	1.80	Perennial stream from the confluence with Williams Gully upstream to 1.5 km north Atoscocita Road

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1016A	1016A_02	Garners Bayou	3.45	Perennial stream from the confluence with Williams Gully upstream to 1.5 km north Atoscocita Road
1102B	1102B_01	Mary's Creek/ North Fork Mary's Creek	11.29	Perennial stream from the confl. With Clear Creek to confl. With N. and S. Fork Mary's Creek near FM 1128, approx. 5 km SW Pearland. Includes perennial portion of N. Fork Mary's Creek to confl. with unnamed trib approx. 3.2 km upstrm of FM 1128
1102C	1102C_01	Hickory Slough	2.33	From the Clear Creek Above Tidal confluence to a point 0.69 km (0.43 mi) upstream of Mykawa Road
1102D	1102D_01	Turkey Creek	4.29	From the Clear Creek Above Tidal confluence to a point 0.98 km (0.61 mi) upstream of Scarsdale Blvd
1113	1113_03	Armand Bayou Tidal	4.81	From the Clear Lake confluence (at NASA Road 1 bridge) in Harris County to a point 0.8 km (0.5 miles) downstream of Genoa-Red Bluff Road in Pasadena in Harris County (includes Mud Lake/Pasadena Lake)
1004E	1004E_02	Stewarts Creek	7.34	From headwaters northwest of old Montgomery Rd to confluence with West Fork of the San Jacinto River
1007C	1007C_01	Keegans Bayou Above Tidal	6.64	From the Brays Bayou confluence upstream to Harris County line
1007B	1007B_01	Brays Bayou Above Tidal	21.96	From a point 11.5 km (7.1 mi) upstream of confluence with Houston Ship Channel up to SH 6
1017	1017_04	Whiteoak Bayou Above Tidal	7.66	From a point immediately upstream of the confluence of Little White Oak Bayou in Harris County to a point 3.0 km (1.9 miles) upstream of FM 1960 in Harris County
1017	1017_03	Whiteoak Bayou Above Tidal	1.63	From a point immediately upstream of the confluence of Little White Oak Bayou in Harris County to a point 3.0 km (1.9 miles) upstream of FM 1960 in Harris County
1017	1017_01	Whiteoak Bayou Above Tidal	13.06	From a point immediately upstream of the confluence of Little White Oak Bayou in Harris County to a point 3.0 km (1.9 miles) upstream of FM 1960 in Harris County
1017A	1017A_01	Brickhouse Gully/Bayou	6.42	Perennial stream from the confluence with Whiteoak Bayou up to Gessner Road

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1017B	1017B_02	Cole Creek	4.07	Perennial stream from the confluence with White Oak Bayou up to south of Beltway 8
1016B	1016B_01	Unnamed Tributary of Greens Bayou	5.41	From confluence with Greens Bayou to Hirsch Road in Harris County
1007E	1007E_01	Willow Waterhole Bayou Above Tidal	6.98	From the Brays Bayou confluence upstream to South Garden (in Missouri City)
1007F	1007F_01	Berry Bayou Above Tidal	1.89	From a point 2.4 km (1.5 mi) upstream of the Sims Bayou confluence to the southern city limits of South Houston
1007G	1007G_01	Kuhlman Gully Above Tidal	1.09	From Brays Bayou confluence to Atchison, Topeka and Santa Fe Railroad tracks in Harris County
1006	1006_07	Houston Ship Channel Tidal	2.31	From the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries
1007D	1007D_03	Sims Bayou Above Tidal	4.78	Perennial stream from 11.0 km upstream of confluence with Houston Ship Channel upstream to Hiram Clark Drive
1103	1103_04	Dickinson Bayou Tidal	4.96	From the Dickinson Bay confluence 2.1 km (1.3 miles) downstream of SH 146 in Galveston County to a point 4.0 km (2.5 miles) downstream of FM 517 in Galveston County
1103	1103_01	Dickinson Bayou Tidal	4.82	From the Dickinson Bay confluence 2.1 km (1.3 miles) downstream of SH 146 in Galveston County to a point 4.0 km (2.5 miles) downstream of FM 517 in Galveston County
1016C	1016C_01	Unnamed Tributary of Greens Bayou	5.63	From the confluence with Greens Bayou, east of Aldine Westfield Road, to the Hardy Toll Road in Harris County
1016D	1016D_01	Unnamed Tributary of Greens Bayou	4.49	From the confluence with Greens Bayou, west of El Dorado Country Club to Lee Road, west of US Hwy 59 in Harris County
1017	1017_02	Whiteoak Bayou Above Tidal	1.52	From a point immediately upstream of the confluence of Little White Oak Bayou in Harris County to a point 3.0 km (1.9 miles) upstream of FM 1960 in Harris County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1007D	1007D_02	Sims Bayou Above Tidal	7.86	Perennial stream from 11.0 km upstream of confluence with Houston Ship Channel upstream to Hiram Clark Drive
1006	1006_01	Houston Ship Channel Tidal	3.98	From the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries
1103	1103_02	Dickinson Bayou Tidal	0.94	From the Dickinson Bay confluence 2.1 km (1.3 miles) downstream of SH 146 in Galveston County to a point 4.0 km (2.5 miles) downstream of FM 517 in Galveston County
1103	1103_03	Dickinson Bayou Tidal	3.86	From the Dickinson Bay confluence 2.1 km (1.3 miles) downstream of SH 146 in Galveston County to a point 4.0 km (2.5 miles) downstream of FM 517 in Galveston County
1009	1009_02	Cypress Creek	10.57	From the confluence with Spring Creek in Harris County to the confluence of Snake Creek and Mound Creek in Waller County
1009	1009_04	Cypress Creek	9.55	From the confluence with Spring Creek in Harris County to the confluence of Snake Creek and Mound Creek in Waller County
1103B	1103B_01	Bordens Gully	2.60	From the Dickinson Bayou Tidal confluence to a point 1.4 km (0.87 mi) upstream of FM 646 in Galveston County
1103A	1103A_01	Bensons Bayou	2.38	From the Dickinson Bayou confluence to point 0.6 km (0.37 mi) upstream of FM 646 in Galveston County
1007I	1007I_01	Plum Creek Above Tidal	3.55	From the Sims Bayou confluence to Telephone Road in Harris County
1007K	1007K_01	Country Club Bayou Above Tidal	1.25	From just downstream of South Lockwood Drive to the confluence with Brays Bayou to approximately 0.5 miles upstream of North Wayside Drive in Harris County
1007L	1007L_01	Unnamed Tributary of Brays Bayou	0.23	From the Brays Bayou confluence near Fondren Road to a point 0.97 km (0.60 mi) upstream in Harris County
1007M	1007M_01	Unnamed Tributary of Hunting Bayou	1.11	From the confluence with Hunting Bayou to Mercury Road in Harris County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1007N	1007N_01	Unnamed Tributary of Sims Bayou	2.88	From the confluence with Sims Bayou, south of Airport Road, east of SH 288 in Harris County
1007O	1007O_01	Unnamed Tributary of Buffalo Bayou	0.47	From the confluence with Buffalo Bayou to IH-10 between Hirsch Road and Lockwood in Harris County
1005	1005_03	Houston Ship Channel/San Jacinto River Tidal	2.83	From the confluence with Galveston Bay at Morgan's Point in Harris/Chambers County to a point 100 meters (110 yards) downstream of IH 10 in Harris County
1006	1006_05	Houston Ship Channel Tidal	1.70	From the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries
1006	1006_03	Houston Ship Channel Tidal	12.53	From the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries
1006	1006_04	Houston Ship Channel Tidal	2.53	From the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries
1008E	1008E_01	Bear Branch	8.26	From the Upper Panther Branch confluence to south of FM 1488 in Montgomery County
1102A	1102A_01	Cowart Creek	4.83	From the Clear Creek Above Tidal confluence in Galveston County to SH 35 in Brazoria County
1102A	1102A_02	Cowart Creek	2.14	From the Clear Creek Above Tidal confluence in Galveston County to SH 35 in Brazoria County
1007	1007_02	Houston Ship Channel/Buffalo Bayou Tidal	6.74	From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
1007R	1007R_04	Hunting Bayou Above Tidal	7.68	From the confluence with Hunting Bayou Tidal at IH-10 to Maury Street on the north fork and Bain Street on the south fork
1245C	1245C_01	Bullhead Bayou	11.76	From its confluence with Steep Bank Creek in Fort Colony, upstream to its headwaters in Pecan Grove in Fort Bend County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1245D	1245D_01	Unnamed Tributary of Bullhead Bayou	1.34	Tributary to Bullhead Bayou in Fort Bend County
1245	1245_01	Upper Oyster Creek	13.42	From Steep Bank Creek/Brazos River confluence in Fort Bend County to pumping station on Jones Creek confluence at Brazos River in Fort Bend County (includes portions of Steep Bank Creek, Flat Bank Creek, and Jones Creek)
1245	1245_02	Upper Oyster Creek	5.16	From Steep Bank Creek/Brazos River confluence in Fort Bend County to pumping station on Jones Creek confluence at Brazos River in Fort Bend County (includes portions of Steep Bank Creek, Flat Bank Creek, and Jones Creek)
1007R	1007R_02	Hunting Bayou Above Tidal	1.20	From the confluence with Hunting Bayou Tidal at IH-10 to Maury Street on the north fork and Bain Street on the south fork
1007R	1007R_03	Hunting Bayou Above Tidal	1.45	From the confluence with Hunting Bayou Tidal at IH-10 to Maury Street on the north fork and Bain Street on the south fork
1007R	1007R_01	Hunting Bayou Above Tidal	0.81	From the confluence with Hunting Bayou Tidal at IH-10 to Maury Street on the north fork and Bain Street on the south fork
1007S	1007S_01	Poor Farm Ditch	2.33	From the Brays Bayou confluence upstream 3.6 km (2.3 mi) to the Bissonnet Road bridge crossing
1007T	1007T_01	Bintliff Ditch	3.89	From the Brays Bayou confluence upstream 5.8 km (3.6 mi) to the Fondren Road bridge crossing
1007U	1007U_01	Mimosa Ditch	1.90	From the Brays Bayou confluence upstream 2.9 km (1.8 mi) to the Chimney Rock bridge crossing
1007V	1007V_01	Unnamed Tributary of Hunting Bayou	1.07	From the Hunting Bayou confluence to 1.7 km (1.1 mi) upstream of the confluence (0.3 km west of Collingsworth Street)
2426C	2426C_01	Goose Creek Tidal	3.79	From the Tabbs Bay confluence upstream to the East Fork of Goose Creek confluence
2425B	2425B_02	Jarbo Bayou	0.57	From Clear Lake confluence with Clear Lake to 1.1 km (0.67 mi) upstream of FM 518 in Galveston County
2425B	2425B_01	Jarbo Bayou	1.55	From Clear Lake confluence with Clear Lake to 1.1 km (0.67 mi) upstream of FM 518 in Galveston County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
2425D	2425D_01	Taylor Bayou	4.78	From the Taylor Lake confluence to a point 4.6 km (2.8 mi) upstream of State Hwy 146
1113A	1113A_01	Armand Bayou Above Tidal	4.57	From the upper segment boundary of Armand Bayou Tidal, 0.8 km (0.5 miles) downstream of Genoa-Red Bluff Road), upstream to Beltway 8 in Harris County
1113B	1113B_01	Horsepen Bayou Tidal	6.68	From the Armand Bayou confluence to the SH3
1113C	1113C_01	Unnamed Tributary to Horsepen Bayou	2.00	From the Horsepen Bayou confluence to Reseda Road
1113D	1113D_01	Willow Springs Bayou	2.87	From the Armand Bayou confluence to a point 2.8 km (1.8 mi) upstream to an unnamed tributary
1113E	1113E_01	Big Island Slough	6.46	From the Armand Bayou confluence upstream to a point 2.4 km (1.5 mi) north of Spenser Hwy
1245F	1245F_01	Alcorn Bayou	8.63	From the confluence with Steep Bank Creek upstream to its headwaters 0.5km east of Pecan Grove in Fort Bend county
1245I	1245I_01	Steep Bank Creek	5.11	From confluence with Oyster Creek (Flat Bank Creek portion) upstream to end of water body, 0.2 km east of US 59 in city of First Colony, Fort Bend County.
2432C	2432C_01	Halls Bayou Tidal	20.89	From the Chocolate Bay confluence upstream to a point 31.5 km (19.6 mi) upstream
2422B	2422B_01	Double Bayou West Fork	14.47	From the Trinity Bay confluence to Belton Road in Chambers County
2424A	2424A_03	Highland Bayou	2.83	From Jones Bay confluence to Avenue Q 0.8 km (0.5 mi) north of SH 6 between Arcadia and Alta Loma in Galveston County
2424C	2424C_01	Marchand Bayou	1.83	From Highland Bayou confluence to 0.72 km (0.45 mi) north of IH 45 in Galveston County
1007H	1007H_01	Pine Gully Above Tidal	1.06	From the Sims Bayou confluence to 0.11 km (0.07 mi) east of Broadway Street in Harris County
1102G	1102G_01	Unnamed Tributary of Mary's Creek	2.25	From the Mary's Creek confluence 1.3 km (0.84 mi) west of FM 1128 to a point 1.2 km (0.75 mi) upstream to the confluence of an unnamed tributary
2422D	2422D_01	Double Bayou East Fork	17.01	From the Trinity Bay confluence to a point 2.6 km (1.6 mi) upstream of SH 65

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
2431A	2431A_01	Moses Bayou	4.49	From Moses Lake confluence to 2.2 km (1.4 mi) upstream of SH 3 in Galveston County
1101	1101_03	Clear Creek Tidal	3.42	From the Clear Lake confluence at a point 3.2 km (2.0 miles) downstream of El Camino Real in Galveston/Harris County to a point 100 m (110 yards) upstream of FM528 in Galveston/Harris County
1101	1101_01	Clear Creek Tidal	2.33	From the Clear Lake confluence at a point 3.2 km (2.0 miles) downstream of El Camino Real in Galveston/Harris County to a point 100 m (110 yards) upstream of FM528 in Galveston/Harris County
1007	1007_08	Houston Ship Channel/Buffalo Bayou Tidal	1.25	From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
1008C	1008C_02	Lower Panther Branch	2.12	From the Spring Creek confluence upstream to the dam impounding Lake Woodlands in Montgomery County
2424A	2424A_01	Highland Bayou	3.05	From Jones Bay confluence to Avenue Q 0.8 km (0.5 mi) north of SH 6 between Arcadia and Alta Loma in Galveston County
2424A	2424A_05	Highland Bayou	5.27	From Jones Bay confluence to Avenue Q 0.8 km (0.5 mi) north of SH 6 between Arcadia and Alta Loma in Galveston County
2424A	2424A_02	Highland Bayou	1.56	From Jones Bay confluence to Avenue Q 0.8 km (0.5 mi) north of SH 6 between Arcadia and Alta Loma in Galveston County
2424A	2424A_04	Highland Bayou	1.08	From Jones Bay confluence to Avenue Q 0.8 km (0.5 mi) north of SH 6 between Arcadia and Alta Loma in Galveston County
1113	1113_02	Armand Bayou Tidal	1.76	From the Clear Lake confluence (at NASA Road 1 bridge) in Harris County to a point 0.8 km (0.5 miles) downstream of Genoa-Red Bluff Road in Pasadena in Harris County (includes Mud Lake/Pasadena Lake)
1209J	1209J_01	Shepherd Creek	16.33	From the confluence with the Navasota River in Madison County to a point 0.7 miles upstream of FM 1452 in Madison County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1016	1016_02	Greens Bayou Above Tidal	8.68	From a point 0.7 km (0.4 miles) above the confluence of Halls Bayou in Harris County to a point 100 meters (110 yards) above FM 1960 in Harris County
1016	1016_03	Greens Bayou Above Tidal	10.64	From a point 0.7 km (0.4 miles) above the confluence of Halls Bayou in Harris County to a point 100 meters (110 yards) above FM 1960 in Harris County
1007	1007_05	Houston Ship Channel/Buffalo Bayou Tidal	1.21	From a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portion of tributaries
1005	1005_02	Houston Ship Channel/San Jacinto River Tidal	3.06	From the confluence with Galveston Bay at Morgan's Point in Harris/Chambers County to a point 100 meters (110 yards) downstream of IH 10 in Harris County
0804H	0804H_01	Upper Keechi Creek	28.91	From confluence with segment 0804 Trinity River to the upper end of NHD stream Upper Keechi Creek (NHD RC 12030201001075)
0702	0702_03	Intracoastal Waterway Tidal	23.18	From the confluence with Galveston Bay at Port Bolivar in Galveston County to the confluence with the Sabine-Neches Canal in Jefferson County (including Taylor Bayou Tidal from the confluence with the Intracoastal Waterway up to the saltwater lock 7.7 km
1006F	1006F_01	Big Gulch Above Tidal	8.32	From the confluence with Greens Bayou Tidal to Wallisville Road in Harris County
1202K	1202K_01	Mill Creek	18.05	From confluence of East and West Mill Creeks downstream to confluence with Brazos River
1006H	1006H_01	Spring Gully Above Tidal	3.16	From confluence with Greens Bayou to US 90 in Harris County
1006I	1006I_01	Unnamed Tributary of Halls Bayou	0.94	From the confluence with Halls Bayou to a point 0.13 miles upstream of Richland Drive in Harris County
1014	1014_01	Buffalo Bayou Above Tidal	22.87	From a point 400 meters (440 yards) upstream of Shepherd Drive in Harris County to SH 6 in Harris County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1013C	1013C_01	Unnamed Non-Tidal Tributary of Buffalo Bayou Tidal	0.56	Located approximately 1.8 miles upstream of the Buffalo Bayou/White Oak Bayou confluence between IH-10 and Memorial Drive west of IH-45 in Harris County
1113	1113_01	Armand Bayou Tidal	2.82	From the Clear Lake confluence (at NASA Road 1 bridge) in Harris County to a point 0.8 km (0.5 miles) downstream of Genoa-Red Bluff Road in Pasadena in Harris County (includes Mud Lake/Pasadena Lake)
1013	1013_01	Buffalo Bayou Tidal	5.90	From a point 100 meters (110 yards) upstream of US 59 in Harris County to a point 400 meters (440 yards) upstream of Shepherd Drive in Harris County
1013A	1013A_01	Little White Oak Bayou	3.90	From the White Oak Bayou confluence to Yale Street in Harris County
1008	1008_04	Spring Creek	16.16	From the confluence with the West Fork San Jacinto River in Harris/Montgomery County to the most upstream crossing of FM 1736 in Waller County
1008	1008_02	Spring Creek	24.03	From the confluence with the West Fork San Jacinto River in Harris/Montgomery County to the most upstream crossing of FM 1736 in Waller County
1105A	1105A_01	Flores Bayou	8.32	From a point 2.6 km (1.6 mi) downstream of County Road 171 upstream to SH 35 in Brazoria County
1004D	1004D_01	Crystal Creek	6.65	From the West Fork of the San Jacinto River confluence to the confluence of the east and west forks of Crystal Creek
1006D	1006D_02	Halls Bayou	12.55	From the Greens Bayou confluence upstream to Frick Road in Harris County
1006	1006_06	Houston Ship Channel Tidal	1.66	From the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries
1006	1006_02	Houston Ship Channel Tidal	2.30	From the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1017C	1017C_01	Vogel Creek	3.40	From the White Oak Bayou Above Tidal confluence to a point 3.2 km (2.0 mi) upstream of the White Oak Bayou confluence to just south of State Hwy 249 in Harris County
1017D	1017D_01	Unnamed Tributary of Whiteoak Bayou	1.83	From the confluence with White Oak Bayou downstream of TC Jester, to Hempstead Hwy, north of US Hwy 290 in Harris County
1017E	1017E_01	Unnamed Tributary of White Oak Bayou	1.93	From the confluence with White Oak, near W 11th Street, to just upstream of W 26th Street, south of Loop 610 W in Harris County
1017F	1017F_01	Rolling Fork Creek	2.24	From the White Oak Bayou Above Tidal confluence to a point 3.9 km (2.4 mi) upstream
1105E	1105E_01	Brushy Bayou	5.15	From the confluence with Austin Bayou Above Tidal (1105C) upstream to end of canal approximately 0.4 miles upstream of FM 210 crossing east of the City of Angleton in Brazoria County.
1006J	1006J_01	Unnamed Tributary of Halls Bayou	2.65	From the confluence with Halls Bayou (east of US 59 and south of Langley Road) to Mount Hoston Road in Harris County
1008	1008_03	Spring Creek	23.82	From the confluence with the West Fork San Jacinto River in Harris/Montgomery County to the most upstream crossing of FM 1736 in Waller County
1008B	1008B_02	Upper Panther Branch	4.71	From the normal pool elevation of 125 feet of Lake Woodlands upstream to Old Conroe Road
1008B	1008B_01	Upper Panther Branch	2.21	From the normal pool elevation of 125 feet of Lake Woodlands upstream to Old Conroe Road
1008C	1008C_01	Lower Panther Branch	3.41	From the Spring Creek confluence upstream to the dam impounding Lake Woodlands in Montgomery County
1014H	1014H_02	South Mayde Creek	6.34	From the Buffalo Bayou confluence upstream to an unnamed tributary 1.05 km (0.65 mi) south of Clay Road
1102	1102_02	Clear Creek Above Tidal	8.44	From a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1102	1102_03	Clear Creek Above Tidal	11.11	From a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County
1102	1102_04	Clear Creek Above Tidal	2.94	From a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County
1001	1001_02	San Jacinto River Tidal	10.81	From a point 100 meters (110yards) downstream of IH 10 in Harris County to Lake Houston Dam in Harris County
1001	1001_01	San Jacinto River Tidal	5.34	From a point 100 meters (110yards) downstream of IH 10 in Harris County to Lake Houston Dam in Harris County
1107	1107_01	Chocolate Bayou Tidal	15.61	From the Chocolate Bay confluence 1.4 km (0.9 miles) downstream of FM 2004 to a point 4.2 km (2.6 miles) downstream of SH 35 in Brazoria County
1014E	1014E_01	Langham Creek	9.50	From the Dinner Creek confluence upstream to FM 529
1014L	1014L_01	Mason Creek	5.01	From the Buffalo Bayou confluence upstream to Mason Road upstream to 0.32 km (0.2 mi) east of Katyland Drive
1014M	1014M_01	Newman Branch (Neimans Bayou)	3.04	From the Buffalo Bayou Above Tidal confluence to 0.1 km (0.06 mi) upstream of Hammerly Blvd in Harris County
1014N	1014N_01	Rummel Creek	3.17	From the Buffalo Bayou Above Tidal confluence to 1.2 km (0.75 mi) upstream of IH-10 in Harris County
1009C	1009C_01	Faulkey Gully	6.96	From Cypress Creek confluence with upstream 3.2 km (2.0 mi), which is approximately 1.0 km upstream of Louetta Road
1009D	1009D_01	Spring Gully	4.28	From the Cypress Creek confluence upstream to near Spring Cypress Road
1010	1010_04	Caney Creek	20.71	From the confluence with the East Fork San Jacinto River in Harris County to SH 150 in Walker County
1011	1011_02	Peach Creek	6.57	From the confluence with Caney Creek in Montgomery County to SH 150 in Walker County
1011	1011_01	Peach Creek	35.99	From the confluence with Caney Creek in Montgomery County to SH 150 in Walker County
1010	1010_02	Caney Creek	15.21	From the confluence with the East Fork San Jacinto River in Harris County to SH 150 in Walker County

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1110	1110_01	Oyster Creek Above Tidal	18.86	From a point 100 meters (110 yards) upstream of FM 2004 in Brazoria County to the Brazos River Authority diversion dam 1.8 km (1.1 miles) upstream of SH 6 in Fort Bend County
1006D	1006D_01	Halls Bayou	7.68	From the Greens Bayou confluence upstream to Frick Road in Harris County
1009	1009_03	Cypress Creek	13.06	From the confluence with Spring Creek in Harris County to the confluence of Snake Creek and Mound Creek in Waller County
1009E	1009E_01	Little Cypress Creek	6.80	From the Cypress Creek confluence to a point 11 km (6.8 mi) upstream in Harris County
1202H	1202H_01	Allen's Creek	18.05	From the confluence with the Brazos River, two miles northeast of Wallis, to the headwaters one mile north of IH 10 in Austin County.
0607C	0607C_01	Willow Creek	20.72	From the confluence of Pine Island Bayou north of Nome in Jefferson County to the upstream perennial portion of the stream east of Devers in Liberty County
1009	1009_01	Cypress Creek	19.25	From the confluence with Spring Creek in Harris County to the confluence of Snake Creek and Mound Creek in Waller County
1014A	1014A_01	Bear Creek	17.23	Perennial stream from the confluence with South Mayde Creek upstream to the confluence with an unnamed tributary 1.24 km north of Longenbaugh Road
1014B	1014B_01	Buffalo Bayou/Barker Reservoir	17.26	Perennial stream from SH 6 in Harris County upstream to the confluence with Willow Fork Buffalo Bayou in Fort Bend County
1014H	1014H_01	South Mayde Creek	5.34	From the Buffalo Bayou confluence upstream to an unnamed tributary 1.05 km (0.65 mi) south of Clay Road
0607	0607_04	Pine Island Bayou	30.44	From the confluence with the Neches River in Hardin/Jefferson County to FM 787 in Hardin County
0702	0702_01	Intracoastal Waterway Tidal	37.23	From the confluence with Galveston Bay at Port Bolivar in Galveston County to the confluence with the Sabine-Neches Canal in Jefferson County (including Taylor Bayou Tidal from the confluence with the Intracoastal Waterway up to the saltwater lock 7.7 km

Segment ID	Assessment Unit ID	Segment Name	Size (Miles)	Segment Description
1003	1003_01	East Fork San Jacinto River	23.31	From the confluence of Caney Creek in Harris County to US 190 in Walker County
1003	1003_03	East Fork San Jacinto River	49.39	From the confluence of Caney Creek in Harris County to US 190 in Walker County
1003	1003_02	East Fork San Jacinto River	7.96	From the confluence of Caney Creek in Harris County to US 190 in Walker County
1014K	1014K_01	Turkey Creek	5.70	From the South Mayde Creek confluence upstream to a point 1.1 km (0.68 mi) directly east of FM 529 in Harris County
1014K	1014K_02	Turkey Creek	3.45	From the South Mayde Creek confluence upstream to a point 1.1 km (0.68 mi) directly east of FM 529 in Harris County
0901	0901_01	Cedar Bayou Tidal	19.05	From the confluence with Galveston Bay 1.0 km (0.6 miles) downstream of Tri-City Beach Road in Chambers County to a point 2.2 km (1.4 miles) upstream of IH 10 in Chambers/Harris County
1014O	1014O_01	Spring Branch	4.29	From Buffalo Bayou Above Tidal confluence to 1.4 km (0.87 mi) upstream of Long Point Road in Harris County
1101	1101_02	Clear Creek Tidal	4.32	From the Clear Lake confluence at a point 3.2 km (2.0 miles) downstream of El Camino Real in Galveston/Harris County to a point 100 m (110 yards) upstream of FM528 in Galveston/Harris County
1101A	1101A_01	Magnolia Creek	5.20	From the Clear Creek Tidal confluence upstream to 0.8 km (0.5 mi) upstream of the confluence with the second unnamed tributary
1102	1102_01	Clear Creek Above Tidal	5.98	From a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County
1105	1105_01	Bastrop Bayou Tidal	19.31	From the Bastrop Bay confluence 1.1 km (0.7 miles) downstream of the Intracoastal Waterway in Brazoria County to Old Clute Road at Lake Jackson in Brazoria County

APPENDIX 6-B

AGRICULTURAL CENSUS AND TEXAS LAND TRENDS DATA

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Table 6B-1 – Land in Farms

County	Land In Farms (Acres)					% Change ('92-'12)
	1992	1997	2002	2007	2012	
Austin	337,351	367,432	367,497	333,928	369,960	9.67%
Brazoria	563,993	566,809	613,891	528,957	631,021	11.88%
Chambers	251,249	241,933	274,853	267,343	253,743	0.99%
Fort Bend	422,464	431,582	415,251	382,740	339,295	-19.69%
Galveston	102,229	104,941	127,280	103,387	89,554	-12.40%
Harris	308,344	311,005	304,868	259,039	236,402	-23.33%
Leon	482,165	514,724	562,615	569,101	594,393	23.28%
Liberty	342,213	306,783	304,574	297,855	286,793	-16.19%
Madison	243,989	223,690	244,524	273,109	291,350	19.41%
Montgomery	193,885	193,375	197,892	169,914	155,362	-19.87%
Polk	141,215	135,988	129,956	131,664	139,199	-1.43%
San Jacinto	82,721	84,620	93,497	95,492	111,900	35.27%
Trinity	109,635	98,748	104,724	108,974	111,262	1.48%
Walker	213,923	183,988	206,311	224,050	280,512	31.13%
Waller	242,901	238,110	277,000	271,004	314,981	29.67%
Region H	**4,038,277**	**4,003,728**	**4,224,733**	**4,016,557**	**4,205,727**	**4.15%**

Source: United States Department of Agriculture, Census of Agriculture

Table 6B-2 – Total Cropland

County	Total Cropland (Acres)					% Change ('92-'12)
	1992	1997	2002	2007	2012	
Austin	161,996	161,192	134,793	96,559	71,224	-56.03%
Brazoria	221,812	203,341	224,640	186,201	175,913	-20.69%
Chambers	120,193	118,316	134,492	115,588	92,779	-22.81%
Fort Bend	191,148	193,138	194,001	152,112	135,854	-28.93%
Galveston	38,543	30,285	45,773	21,819	17,562	-54.44%
Harris	142,216	118,827	124,340	91,438	59,879	-57.90%
Leon	175,179	182,633	184,627	121,142	74,011	-57.75%
Liberty	163,630	159,841	156,413	127,704	101,071	-38.23%
Madison	84,345	79,105	91,864	39,646	35,322	-58.12%
Montgomery	49,621	47,711	57,776	33,782	31,559	-36.40%
Polk	37,294	42,208	44,673	23,720	23,208	-37.77%
San Jacinto	24,432	28,355	35,427	21,027	24,262	-0.70%
Trinity	54,531	49,188	42,771	27,340	17,913	-67.15%
Walker	59,530	60,192	61,715	37,146	38,639	-35.09%
Waller	118,632	116,477	124,431	103,518	79,906	-32.64%
Region H	**1,643,102**	**1,590,809**	**1,657,736**	**1,198,742**	**979,102**	**-40.41%**

Source: United States Department of Agriculture, Census of Agriculture

Table 6B-3 – Irrigated Land

County	Irrigated Land (Acres)					% Change
	1992	1997	2002	2007	2012	('92-'12)
Austin	3,781	4,954	3,541	1,559	4,253	12.48%
Brazoria	38,682	29,596	17,138	11,980	20,439	-47.16%
Chambers	32,127	24,894	16,152	11,508	15,184	-52.74%
Fort Bend	16,415	17,039	15,751	8,339	10,309	-37.20%
Galveston	3,120	1,449	1,703	614	424	-86.41%
Harris	15,749	10,454	7,295	7,037	5,945	-62.25%
Leon	485	1,667	1,383	2,831	759	56.49%
Liberty	29,142	14,092	11,828	5,313	5,242	-82.01%
Madison	135	208	243	456	2,256	1571.11%
Montgomery	406	474	1,287	2,262	1,188	192.61%
Polk	36	377	99	1,440	443	1130.56%
San Jacinto	132	104	292	943	538	307.58%
Trinity	14	52	213	310	152	985.71%
Walker	170	325	600	885	522	207.06%
Waller	8,187	8,120	11,908	9,904	10,067	22.96%
Region H	**148,581**	**113,805**	**89,433**	**65,381**	**77,721**	**-47.69%**

Source: United States Department of Agriculture, Census of Agriculture

Table 6B-4 – Rice Production

County	Rice (Hundredweight)					% Change
	1992	1997	2002	2007	2012	('92-'12)
Austin	207,445	175,843	130,601	0	27,900	-86.55%
Brazoria	1,713,898	1,134,188	1,013,213	572,285	1,222,931	-28.65%
Chambers	1,276,063	949,505	713,173	639,692	676,453	-46.99%
Fort Bend	676,342	658,485	803,346	278,716	356,338	-47.31%
Galveston	127,871	51,563	75,527	(D)	(D)	N/A
Harris	584,225	356,432	107,876	62,265	(D)	N/A
Leon	0	0	0	0	0	N/A
Liberty	1,267,760	604,582	464,751	193,188	154,837	-87.79%
Madison	0	0	0	0	0	N/A
Montgomery	0	0	0	0	0	N/A
Polk	0	0	0	0	0	N/A
San Jacinto	0	0	0	0	0	N/A
Trinity	0	0	0	0	0	N/A
Walker	0	0	0	0	0	N/A
Waller	413,337	468,471	679,960	581,785	537,648	30.07%
Region H	**6,266,941**	**4,399,069**	**3,988,447**	**2,327,931**	**2,976,107**	**-52.51%**

Source: United States Department of Agriculture, Census of Agriculture

Table 6B-5 – Land Trends

County	Year	Irrigated Cropland	Dry Cropland	Non-Native Pasture	Native Rangeland	Wildlife Management	Forests	Other	Total
Austin	1997	5,636	35,340	88,033	261,596	775	765	13,006	405,151
	2002	6,804	30,553	101,788	251,373	2,693	606	9,799	403,616
	2007	6,370	27,971	115,022	235,893	7,656	0	7,204	400,116
	Δ	**734**	**-7,369**	**26,989**	**-25,703**	**6,881**	**-765**	**-5,802**	**-5,035**
Brazoria	1997	119,812	23,558	0	333,109	33	554	70,632	547,698
	2002	110,551	17,096	37,937	341,418	4,971	580	22,260	534,813
	2007	86,909	23,923	39,050	334,186	8,590	846	26,994	520,498
	Δ	**-32,903**	**365**	**39,050**	**1,077**	**8,557**	**292**	**-43,638**	**-27,200**
Chambers	1997	107,533	3,070	7,580	113,145	0	12,748	16,815	260,891
	2002	64,274	5,131	13,644	118,850	0	13,296	40,386	255,581
	2007	47,987	3,094	14,464	135,083	0	14,054	40,454	255,136
	Δ	**-59,546**	**24**	**6,884**	**21,938**	**0**	**1,306**	**23,639**	**-5,755**
Fort Bend	1997	29,970	90,117	22,299	203,705	0	78	3,209	349,378
	2002	31,597	83,209	26,133	188,096	0	180	3,425	332,640
	2007	28,848	74,550	26,143	181,057	0	182	3,476	314,256
	Δ	**-1,122**	**-15,567**	**3,844**	**-22,648**	**0**	**104**	**267**	**-35,122**
Galveston	1997	27,594	591	8,039	62,904	272	0	722	100,122
	2002	26,533	580	8,120	64,549	459	0	625	100,866
	2007	26,062	548	8,727	58,726	1,110	0	1,160	96,333
	Δ	**-1,532**	**-43**	**688**	**-4,178**	**838**	**0**	**438**	**-3,789**
Harris	1997	25,566	20,563	33,409	110,383	0	43,521	7,916	241,358
	2002	18,864	12,379	25,277	104,684	1,548	37,469	22,389	222,610
	2007	19,393	6,493	32,495	73,274	3,201	32,283	13,828	180,967
	Δ	**-6,173**	**-14,070**	**-914**	**-37,109**	**3,201**	**-11,238**	**5,912**	**-60,391**
Leon	1997	0	0	0	478,126	348	21,898	181,929	682,301
	2002	0	0	0	534,469	554	25,677	122,017	682,717
	2007	0	6	12,267	645,045	0	30,534	247	688,099
	Δ	**0**	**6**	**12,267**	**166,919**	**-348**	**8,636**	**-181,682**	**5,798**
Liberty	1997	47,494	59,173	52,281	161,304	0	303,236	691	624,179
	2002	30,063	53,677	70,433	146,316	2,138	308,343	857	611,827
	2007	22,233	45,972	88,939	121,687	2,765	320,448	1,278	603,322
	Δ	**-25,261**	**-13,201**	**36,658**	**-39,617**	**2,765**	**17,212**	**587**	**-20,857**
Madison	1997	0	0	0	50,398	0	0	0	50,398
	2002	0	0	7,109	43,135	0	0	0	50,244
	2007	0	0	7,590	41,059	555	0	0	49,204
	Δ	**0**	**0**	**7,590**	**-9,339**	**555**	**0**	**0**	**-1,194**
Montgomery	1997	0	0	9,083	97,045	0	252,075	308	358,511
	2002	0	0	10,187	98,689	0	208,955	201	318,032
	2007	0	0	10,615	101,843	0	196,146	124	308,728
	Δ	**0**	**0**	**1,532**	**4,798**	**0**	**-55,929**	**-184**	**-49,783**

County	Year	Irrigated Cropland	Dry Cropland	Non-Native Pasture	Native Rangeland	Wildlife Management	Forests	Other	Total
Polk	1997	0	0	61,865	33,370	0	446,830	473	542,538
	2002	0	0	85,602	3,439	16	444,979	440	534,476
	2007	0	0	99,430	2,374	0	433,444	405	535,653
	Δ	**0**	**0**	**37,565**	**-30,996**	**0**	**-13,386**	**-68**	**-6,885**
San Jacinto	1997	56	584	29,556	42,782	0	126,192	10	199,180
	2002	25	2,024	38,190	38,337	792	122,158	76	201,602
	2007	28	1,918	42,734	35,878	793	122,791	263	204,405
	Δ	**-28**	**1,334**	**13,178**	**-6,904**	**793**	**-3,401**	**253**	**5,225**
Trinity	1997	0	90	20,121	102,472	692	266,896	32	390,303
	2002	0	79	20,441	100,242	855	269,261	38	390,916
	2007	0	70	22,022	98,747	929	261,132	38	382,938
	Δ	**0**	**-20**	**1,901**	**-3,725**	**237**	**-5,764**	**6**	**-7,365**
Walker	1997	0	0	17,675	159,086	0	142,374	7	319,142
	2002	0	0	53,800	125,435	149	140,983	7	320,374
	2007	0	0	76,578	101,762	1,891	139,722	58	320,011
	Δ	**0**	**0**	**58,903**	**-57,324**	**1,891**	**-2,652**	**51**	**869**
Waller	1997	20,928	62,954	48,483	173,548	811	14,625	1,763	323,112
	2002	17,999	60,810	47,974	178,140	2,119	13,994	1,526	322,562
	2007	14,754	52,903	49,619	177,766	4,452	13,452	3,629	316,575
	Δ	**-6,174**	**-10,051**	**1,136**	**4,218**	**3,641**	**-1,173**	**1,866**	**-6,537**

Source: Texas Land Trends, Texas A&M Institute of Renewable Natural Resources

APPENDIX 6-C

THREATENED AND ENDANGERED SPECIES

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Table 6C-1 – State- and Federally- Listed Threatened and Endangered Species by County

Species	County														
	Austin	Brazoria	Chambers	Fort Bend	Galveston	Harris	Leon	Liberty	Madison	Montgomery	Polk	San Jacinto	Trinity	Walker	Waller
Alligator Snapping Turtle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
American Peregrine Falcon	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic Hawksbill Sea Turtle		X	X		X	X									
Attwater's Greater Prairie Chicken	X			X	X	X									X
Bachman's sparrow							X	X	X		X	X	X	X	
Bald Eagle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black bear								X			X	X	X		
Creek Chubsucker								X		X	X	X	X	X	X
Eskimo curlew		X			X	X									
False spike mussel	X	X		X											X
Green Sea Turtle		X	X		X	X									
Houston Toad	X			X		X	X	X	X						X
Interior Least Tern	X		X	X			X		X						X
Jaguarundi		X													
Kemps Ridley Sea Turtle		X	X		X	X									
Large-fruited sand-verbena							X								
Leatherback Sea Turtle		X	X		X	X									
Loggerhead Sea Turtle		X	X		X	X									
Louisiana black bear	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Louisiana pigtoe			X				X	X	X	X	X	X	X	X	
Louisiana pine snake								X		X	X	X	X	X	
Navasota ladies'-tresses							X		X						
Neches river rose-mallow													X		
Northern scarlet snake			X					X							
Paddlefish								X		X	X	X	X	X	
Peregrine Falcon	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Piping Plover		X	X		X	X		X		X	X	X	X	X	
Rafinesque's big-eared bat								X		X	X	X	X	X	
Red Wolf	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Red-cockaded woodpecker								X		X	X	X	X	X	
Reddish Egret		X	X		X	X									
Sandbank pocketbook							X	X	X	X	X	X	X	X	
Smalltooth sawfish		X	X		X	X									
Smooth green snake	X		X												
Smooth pimpleback	X	X		X			X		X						X
Sooty tern		X													
Southern hickorynut											X		X		
Swallow-tailed Kite			X					X			X	X		X	
Texas fawnsfoot	X	X		X											X
Texas heelsplitter							X	X	X		X	X	X	X	

Species	County														
	Austin	Brazoria	Chambers	Fort Bend	Galveston	Harris	Leon	Liberty	Madison	Montgomery	Polk	San Jacinto	Trinity	Walker	Waller
Texas horned lizard	X	X	X	X	X	X	X	X	X	X				X	X
Texas pigtoe							X	X	X	X	X	X	X	X	
Texas prairie dawn				X									X		
Texas trailing phlox											X				
Timber/Canebrake Rattlesnake	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
West Indian manatee		X			X	X									
White-faced Ibis	X	X	X	X	X	X		X		X			X		X
White-tailed Hawk	X	X		X	X	X									X
Whooping Crane	X	X		X	X	X	X		X	X				X	X
Wood Stork	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Chapter 7 – Drought Response

7.1 INTRODUCTION

Drought is a natural and recurring meteorological phenomenon where precipitation is significantly below "normal" for a period of time. Relatively mild, short-duration droughts are common throughout Texas and typically result in relatively mild impacts. However, extended severe drought conditions can have serious impacts on water supplies, water suppliers, and water users including:

- Reduction in available water supply leading to shortage conditions;
- Increases in water demand, particularly for seasonal demands such as landscape irrigation;
- Stress on water utility infrastructure due to elevated seasonal peak water demands relative to capacity limitations of water supply infrastructure;
- Deterioration of source water quality;
- Lifestyle and financial impacts to water users associated with restrictions on non-essential water uses (e.g., loss of landscaping); and
- Financial impacts on water suppliers due to reduced revenues from water sales during periods of water demand curtailment.

Due to the potentially devastating effects of drought on both individuals and the State's economy, it is important that water suppliers and users consider the potential impacts of drought and develop robust plans to address supply or demand management under drought conditions. This chapter presents information concerning historical droughts in the Region, current drought preparations and responses, recommendations for region-specific drought responses, and region-specific model drought contingency plans.

7.2 DROUGHT OF RECORD IN THE REGIONAL WATER PLANNING AREA

7.2.1 Regional Drought of Record

The Drought of Record (DOR) is typically defined as the worst drought to occur for a particular area during the available period of hydrologic record. Due to the variety of ways in which drought may be characterized (deviation from normal precipitation, temperature trends, economic losses, duration, impacts to reservoirs, etc.), defining which drought is the DOR for an area can be a complex issue. For much of the State, the DOR is generally considered to have occurred from 1950 through 1957. This drought combined severe reductions in rainfall with a multi-year duration, resulting in reduction or cessation of flows for many springs and streams, losses to livestock production and irrigated agriculture, and widespread impacts to vegetation. By the end of the drought in late 1956 or early 1957, nearly all of the counties in the State had been declared disaster areas. The 1950-1957 drought is considered to be the DOR for the 15 counties making up Region H. While subsequent major droughts have occurred in the Region, none have displayed the combination of intensity and duration of the 1950s drought.

7.2.2 Surface Water Drought Indication

The significance of the drought for the Region can be illustrated several in several ways. For reservoir supplies, which make up a large portion of surface water supply for Region H, the DOR corresponds to the period of minimum storage in the reservoir. While many of the major water supply reservoirs serving Region H were not yet constructed during the DOR, their performance under a repeat of historical hydrology including the DOR can be assessed using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM); this assessment is directly associated with the use of the WAM model to determine firm availability of surface water for the RWP. Modeled reservoir data was extracted from the WAM for Lakes Houston and Conroe in the San Jacinto River Basin, and Lake Livingston in the Trinity Basin, which are the major reservoir located within Region H. Storage information was also extracted for the reservoirs owned or operated by the Brazos River Authority (BRA) in the Brazos River Basin which supply water to downstream users in Region H through a number of supply contracts. The results of this analysis are shown in *Figure 7-1*. As shown in the figure, the reservoirs and reservoir systems supplying Region H would experience their lowest storage during a repeat of the DOR, with severe and prolonged decline in stored volume.

7.2.3 Palmer Drought Severity Index

Another indicator commonly used by federal and state agencies to characterize drought severity is the Palmer Drought Severity Index (PDSI). The PDSI is an estimate of soil moisture conditions calculated based on precipitation and temperature. The PDSI classifies soil moisture on a scale ranging from approximately -6.0 to 6.0, with values of approximately -0.49 to 0.49 reflecting normal conditions and -4.0 or lower representing extreme drought The annual PDSI for the upper Texas Gulf Coast area, which includes the majority of the population in Region H, is shown in *Figure 7-2*. As illustrated in the figure, the 1950s drought is among the most severe in terms of PDSI and is also prolonged.

Figure 7-1 – Modeled Reservoir Storage

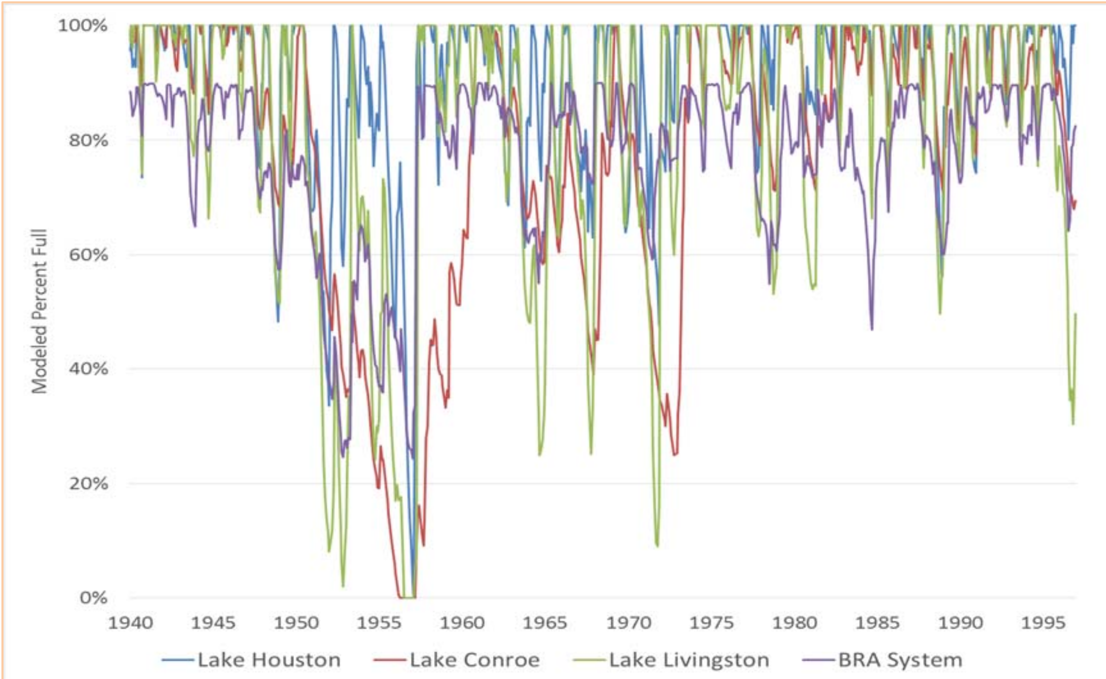
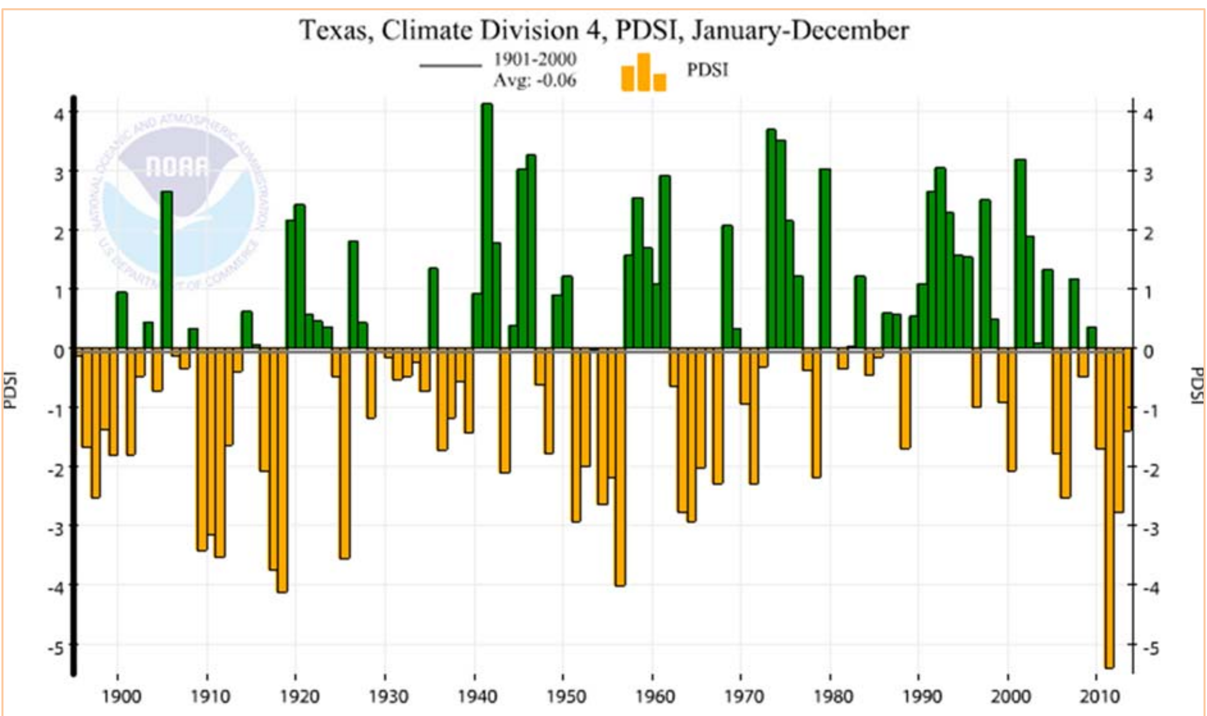


Figure 7-2 – Palmer Drought Severity Index



7.2.4 Other Regional Droughts

The Region H area, like much of Texas, has experienced a number of droughts in addition to the DOR, including several more recent dry periods. The recent drought period which began in approximately year 2010/2011 resulted in extremely low rainfall and soil moisture and high temperatures, and in some locations in the state has persisted, creating a new drought of record. In Region H this drought, while intense, was also of limited duration and, therefore, did not impact water supplies to the extent that would occur in a repeat of the DOR.

7.3 CURRENT PREPARATIONS FOR DROUGHT IN REGION H

7.3.1 Drought Contingency Planning Overview

The TCEQ, in accordance with the Texas Administrative Code (TAC), requires all wholesale public water suppliers, retail public water suppliers, and irrigation districts to prepare and submit drought contingency plans (DCPs) meeting the requirements of 30 TAC §288(b) and to update these plans at least every five years. TCEQ administrative rules define a drought contingency plan as "a strategy or combination of strategies for temporary supply management and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies." TCEQ rules and associated guidance documents for drought contingency planning embody several key principles including:

- Drought and its potential impacts on both water supply and demand, as well as water supply infrastructure, can be anticipated;
- Drought response measures and implementation procedures can be defined in advance of drought;
- Through timely implementation of drought response measures it is possible to avoid, minimize, or mitigate the risks and impacts of water shortages and other drought-related water supply emergencies;
- All water demands are not of equal value or importance. Some can be considered essential to public health and safety or to the economy while others can be considered non-essential or discretionary; and
- Drought contingency plans should be tailored to the unique circumstances of each water supplier (e.g., vulnerability of water supply and/or infrastructure to drought, end-users and demand characteristics, objectives, etc.).

Notwithstanding the aforementioned principle that drought contingency plans should be tailored to each water supplier's unique circumstances, there are a few elements that are found in most drought contingency plans. These include:

- Criteria and procedures for determining when to initiate and when to terminate drought response measures. These are typically referred to as drought triggers. Common examples of drought triggers include indicators of supply availability (e.g., quantity of water supply remaining in a source) and demand indicators (e.g., daily demand relative to infrastructure capacity).
- Successive stages of drought response that require the implementation of increasingly stringent measures in response to increasingly severe drought conditions. A typical drought

contingency plan will have an initial stage of voluntary measures followed by two or three successive stages of increasing stringent mandatory measures.

- Demand reduction goals or targets for each stage.
- Predetermined drought response measures for each stage that may include supply management, such as the temporary use of an alternative water source, and/or demand management, such as restrictions on non-essential water uses.
- Procedures for plan implementation and enforcement.
- Public information (e.g., notification) and education.

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

- Prescriptive restrictions or bans on non-essential water uses and waste. In a municipal setting, such restrictions commonly target landscape irrigation, car washing, ornamental fountains, etc.
- Use of water pricing strategies, such as excess use surcharges, to encourage compliance with water use restrictions or to penalize excessive water use.
- Water rationing, where water is allocated to users on some proportionate or pro rata basis.

7.3.2 Current Drought Preparation

All wholesale public water providers and most municipalities in Region H have made preparation for responding to drought conditions, including the development of individual DCPs to be implemented when necessary. These plans typically identify multiple stages of drought response, each with specific triggers for initiation and termination, responses to be implemented, and quantified targets for use reduction or other impacts for each stage. The plans also include notification procedures, means for enforcement, and in many cases a mechanism for granting variances.

7.3.3 Summary of Existing Triggers and Responses

As part of the effort associated with Task 7 of the RWP, the RHWPG performed an assessment of existing drought triggers and planned responses in the Region based on available DCPs. TCEQ rules and 30 TAC §288(b) require that DCPs include documentation of coordination with the RWPGs to ensure consistency with the regional plans. The Region H Water Planning Group (RHWPG) was able to obtain DCPs for 341 entities in the Region, including Wholesale Water Providers (WWPs), named Water User Groups (WUGs), and retail suppliers within the County-Other WUGs and Regional Water Authorities. Additionally, information regarding drought contingency measures, identified demand reduction, history, and program cost was requested from WUGs and WWPs as part of the Region H survey for the 2016 Regional Water Plan (RWP). Due to the low overall response rate to the survey and questions regarding DCPs in particular, information from the survey beyond that already available from the DCPs was minimal.

A Region H drought contingency plan database was developed to store available information on the available DCPs, including sponsor information, number of stages, and the trigger and response types associated with each stage. Each drought stage was also characterized by the reduction type (percent demand, seasonal percent demand, unit reduction, etc.), and associated reduction quantity value (percentage, MGD, or other). The results of this analysis are summarized in *Table 7-1*, with more detailed data by entity included in ***Appendix 7A***.

Table 7-1 – Summary of Existing DCPs in Region H

Stage	Total Entities	Trigger Type													Response Type												Reduction Type						
		Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A
1	341	2	8	244	9	5	0	9	4	12	1	82	4	72	1	0	73	60	47	9	6	0	0	305	4	21	303	0	1	4	17	22	14
2	339	2	0	258	16	5	2	9	2	16	7	81	3	64	4	2	166	300	123	116	6	2	3	25	1	42	307	5	5	5	12	21	7
3	340	15	0	252	49	0	0	9	0	23	31	80	3	66	2	148	89	232	40	266	1	84	187	0	107	12	306	5	5	5	13	22	8
4	125	26	0	76	32	0	0	4	0	12	5	21	7	32	2	18	30	81	8	74	0	29	28	0	40	15	96	5	5	2	7	19	4
5	36	16	0	5	16	0	0	1	0	12	0	0	3	8	1	1	0	19	16	26	0	1	27	0	1	7	22	0	0	1	10	4	0
6	4	0	0	2	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4	0
Emer.	206	14	0	4	14	0	0	0	0	1	0	0	0	201	9	0	0	6	11	2	0	0	2	0	7	203	3	0	0	0	8	191	4
1	100.0%	0.6%	2.3%	71.6%	2.6%	1.5%	0.0%	2.6%	1.2%	3.5%	0.3%	24.0%	1.2%	21.1%	0.3%	0.0%	21.4%	17.6%	13.8%	2.6%	1.8%	0.0%	0.0%	89.4%	1.2%	6.2%	88.9%	0.0%	0.3%	1.2%	5.0%	6.5%	4.1%
2	99.4%	0.6%	0.0%	75.7%	4.7%	1.5%	0.6%	2.6%	0.6%	4.7%	2.1%	23.8%	0.9%	18.8%	1.2%	0.6%	48.7%	88.0%	36.1%	34.0%	1.8%	0.6%	0.9%	7.3%	0.3%	12.3%	90.0%	1.5%	1.5%	1.5%	3.5%	6.2%	2.1%
3	99.7%	4.4%	0.0%	73.9%	14.4%	0.0%	0.0%	2.6%	0.0%	6.7%	9.1%	23.5%	0.9%	19.4%	0.6%	43.4%	26.1%	68.0%	11.7%	78.0%	0.3%	24.6%	54.8%	0.0%	31.4%	3.5%	89.7%	1.5%	1.5%	1.5%	3.8%	6.5%	2.3%
4	36.7%	7.6%	0.0%	22.3%	9.4%	0.0%	0.0%	1.2%	0.0%	3.5%	1.5%	6.2%	2.1%	9.4%	0.6%	5.3%	8.8%	23.8%	2.3%	21.7%	0.0%	8.5%	8.2%	0.0%	11.7%	4.4%	28.2%	1.5%	1.5%	0.6%	2.1%	5.6%	1.2%
5	10.6%	4.7%	0.0%	1.5%	4.7%	0.0%	0.0%	0.3%	0.0%	3.5%	0.0%	0.0%	0.9%	2.3%	0.3%	0.3%	0.0%	5.6%	4.7%	7.6%	0.0%	0.3%	7.9%	0.0%	0.3%	2.1%	6.5%	0.0%	0.0%	0.3%	2.9%	1.2%	0.0%
6	1.2%	0.0%	0.0%	0.6%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%
Emer.	60.4%	4.1%	0.0%	1.2%	4.1%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	58.9%	2.6%	0.0%	0.0%	1.8%	3.2%	0.6%	0.0%	0.0%	0.6%	0.0%	2.1%	59.5%	0.9%	0.0%	0.0%	0.0%	2.3%	56.0%	1.2%

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As shown in the table, almost all of the DCPs analyzed include at least three drought stages, while slightly over 60 percent also include a distinct emergency response stage; a number of DCPs include some level of emergency response planning within their drought triggers rather than in a separate emergency stage. While a broad range of drought stage trigger types were identified across the Region, two are particularly common. Over 70 percent of the DCPs analyzed include triggering based on demand or system capacity, with just under 25 percent including time-based triggering incorporating well or pump run times. Approximately 20 percent of the DCPs include a broad variety of other measures, often entity-specific, which do not fit standard trigger categories. Because individual DCPs often include multiple responses for each drought stage, a variety of response types were identified. Voluntary water use reductions are commonly specified for the first drought stage but uncommon at other stages. Other frequently-specified measures include notification, mandatory water use reductions, application of irrigation schedules, termination of irrigation, prohibitions on certain water uses, and water allocation. Measures typically increase in number and/or restrictiveness as more severe drought stages are triggered. Reductions are predominantly defined in the DCPs in terms of percent demand, with a limited number of entities setting quantified goals on unit reductions, seasonal percent demand, or other factors.

7.3.4 Effectiveness of Drought Response Measures and Challenges in Quantification

The information available to the RWPG through survey responses and submitted DCP documents does not quantify the historical or potential reductions in water use associated with implementation of the DCPs. However, in the 2011 RWP the RHWPG performed a study of drought response measures which considered the efficacy of drought measure implementation and the challenges associated with quantifying the benefits of implementation. A key observation made in the 2011 RWP was that the demand-centric nature of drought planning makes quantification of benefits difficult in large part to the variability of municipal water use within and among communities; this variability is commonly attributed to differences in climatic, demographic, and socioeconomic characteristics. In particular, since most demand curtailment measures target seasonal water uses, such as lawn watering, the effectiveness of such measures is dependent on and will vary greatly according to the seasonal water use characteristics of different communities. Therefore, a drought response measure applied in one community likely will not produce the same effect when implemented in another community with different seasonal water use characteristics. Isolating the effectiveness of specific drought response measures is also problematic in that most municipal drought contingency plans employ multiple measures, such as water use restrictions, public education, and perhaps pricing policies, that in combination may have synergistic rather than additive effects. This is further complicated by behavioral factors (particularly rate of compliance by water users and stringency of enforcement) that may influence the effectiveness drought response measures, either singly or in combination.

The 2011 RWP drought study found some limited potential benefits to DCP implementation, although most water suppliers in Region H that had implemented DCPs at that time had not thoroughly evaluated the effects. Post-event analyses were found to typically only report gross changes in water demand, most commonly expressed as a percentage reduction. It was also found at that time that most DCPs in Texas were focused on seasonal peaking problems rather than actual water shortage and were generally addressed at peak shaving. The study also included modeling analysis of the impacts of drought contingency planning on reservoir performance. It was found that that DCPs had little near-term efficacy, as water demands at that time were low relative to available supply. It was also noted that efficacy of drought contingency planning would increase as demands on each source approach full permitted authorizations and/or the firm yield of the source. In general, implementation of DCPs could reduce reservoir drawdown and shorten the duration of impacts on lake levels during a repeat of DOR conditions. Thus, while drought planning is not a replacement for development of water management strategies (WMS) to meet growth in demand, it is an important part of the management of water supplies.

7.4 EXISTING AND POTENTIAL EMERGENCY INTERCONNECTS

In accordance with the requirements of Texas Water Development Board (TWDB) and the Texas Administrative Code, the RHWPG performed an analysis of existing water infrastructure that may be used for emergency interconnects. The details of this analysis are to be submitted to the TWDB Executive Administrator as confidential information separately from the Regional Water Plan.

As part of the Region H survey for the 2016 RWP, information was requested from WUGs and WWPs regarding interconnect relationships, facilities, general locations, and supply volumes and sources. While some basic information on interconnect relationships was collected, the quantity of data was limited by the low response rate to the survey. Data on interconnects was also requested from TCEQ, which provided the RWPG with information from the TCEQ Integrated Water Utility Database (iWUD) system. A query was executed on this data to identify entities with interconnects, partnering supplier or recipients, and whether the interconnects are for emergency use or regular supply purposes. Information on existing and potential interconnect supply capacity was not available. Additionally, available DCPs for entities within the Region were reviewed to identify establishment or activation of interconnects as a drought response; such measures were not included in any of the DCPs available to the RWPG.

7.5 EMERGENCY RESPONSES TO LOCAL DROUGHT CONDITIONS OR LOSS OF MUNICIPAL SUPPLY

In addition to regional or statewide droughts, entities may be subject to localized drought conditions or loss of existing water supplies due to infrastructure failure, temporary water quality impairment, or other unforeseen conditions. Loss of existing supplies, while relatively uncommon, is particularly challenging to address as the causes are often difficult to anticipate. Numerous entities within Region H have DCPs which include an emergency response stage and corresponding measures for droughts exceeding the DOR or for other emergency water supply conditions. Some entities, including a number of WWPs, also have emergency action plans which establish procedures for responding rapidly and effectively to emergency conditions.

Because it is not possible for water providers to predict all emergency conditions and because responses or repairs may require an extended period of time, it is important to consider the range of options for emergency water supply sources available under emergency conditions. A high-level analysis of options was performed to assess potential emergency water supply options for WUGs in Region H with estimated Year 2010 population of 7,500 or less, as well as for all County-Other WUGs (see *Figure 7-3*). Consideration of emergency supply options for these entities is particularly important as many smaller WUGs may not have existing access to backup supplies through interconnect facilities with adjacent systems. Applicable WUGs were characterized by projected Year 2020 population, Year 2020 demand, existing supply source type (surface water, groundwater, or blend), and other WUG-specific information. These characteristics were then used to identify potentially feasible emergency supply options and associated infrastructure requirements. The results of this analysis are summarized by primary source type in *Table 7-2*, more detailed data by entity included in ***Appendix 7B***.

Figure 7-3 – Water Systems Analyzed for Emergency Response Measures

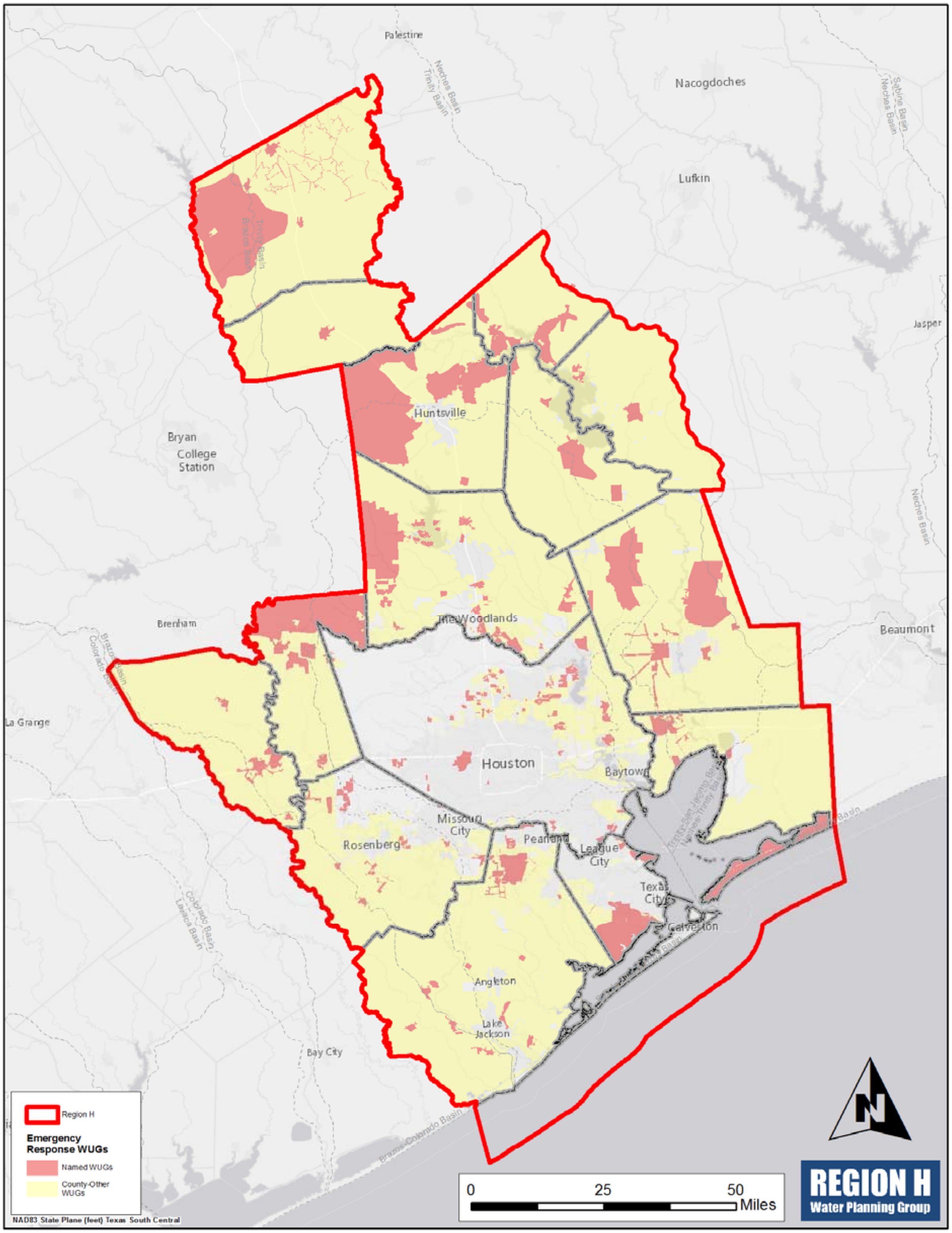

Table 7-2 – Potential Emergency Supply Options

Primary Source of Supply	Count	Potential Emergency Water Supply Source(s)								
		Release from Upstream Reservoir	Curtailment of Junior Water Rights	Local GW Well	Brackish GW	Existing Inter-connect	New Inter-connect	Other Local Supply	Trucked-In Water	Other
Surface Water	16	16	16	0	2	3	10	0	16	0
Groundwater	157	0	0	157	14	49	137	0	157	0
Blend	31	31	31	31	2	8	28	0	31	0

7.6 REGION-SPECIFIC DROUGHT RESPONSE RECOMMENDATIONS

7.6.1 Drought Response Recommendation for Surface Water

The RHWPG acknowledges that the DCPs for surface water suppliers are the best drought management tool for surface supplies and recommends that the DCPs developed by the operators of these supplies serve as the RHWPG triggers for surface water. The RHWPG also recognizes that these triggers are subject to change as providers periodically reassess their needs and encourage both wholesale providers and other entities using surface water to examine their DCPs regularly. In particular, reservoirs are a major source of surface water in Region H, and drought triggers for direct providers and direct users of surface water in Region H are typically tied to reservoir levels or storage volume. The three major reservoir supplies located within Region H are Lakes Conroe, Houston, and Livingston. A summary of the major triggers and responses for these reservoirs as of October 2014 is presented in the following text.

The San Jacinto River Authority (SJRA) adopted a revised DCP on March 27, 2014 related to its four operating divisions including the Lake Conroe Division. Drought triggers were developed through detailed study of hydrologic conditions in the San Jacinto River Basin and also projected demands of SJRA customers on Lake Conroe. The DCP includes four primary stages as well as an emergency stage that may be made utilized in the case of infrastructure failure or the occurrence of a drought more severe than the drought of record. SJRA's triggers and responses for Lake Conroe are summarized in *Table 7-3*. The City of Houston (COH) also owns water rights in Lake Conroe. However, the COH DCP is based on the comprehensive storage in all COH reservoirs and cannot be applied specifically to any one reservoir.

Table 7-3 – Summary of Lake Conroe Drought Triggers and Responses

Drought Stage	Trigger	Action
1	Lake Conroe below 199'	Voluntary 5% reduction.
2	Lake Conroe below 197'	Mandatory 5/10% (Winter/Summer) reduction in non-industrial use.
3	Lake Conroe below 194'	Mandatory 10/20% (Winter/Summer) reduction in non-industrial use. Mandatory 5% reduction in industrial use.
4	Lake Conroe below 190'	Mandatory 15/30% (Winter/Summer) reduction in non-industrial use. Mandatory 30% reduction in industrial use.

As stated above, the SJRA adopted a revised DCP on March 27, 2014 related to its four operating divisions including the Highlands Division which diverts water from Lake Houston. Drought triggers were developed through detailed study of hydrologic conditions in the San Jacinto River Basin and also projected demands of SJRA customers on supplies taken at Lake Houston. The Highlands Division DCP includes four primary stages as well as an emergency stage that may be made utilized in the case of infrastructure failure or the occurrence of a drought more severe than the drought of record. SJRA's triggers and responses for Lake Houston are summarized in *Table 7-4*. The COH also owns water rights in Lake Houston. However, the COH DCP is based on the comprehensive storage in all COH reservoirs and cannot be applied specifically to any one reservoir.

Table 7-4 – Summary of Lake Houston Drought Triggers and Responses

Drought Stage	Trigger	Action
1	Lake Houston below 43'	Voluntary 5% reduction.
2	Lake Houston below 42'	Mandatory 5/10% (Winter/Summer) reduction in non-industrial use.
3	Lake Houston below 40'	Mandatory 10/20% (Winter/Summer) reduction in non-industrial use. Mandatory 5% reduction in industrial use.
4	Lake Houston below 38'	Mandatory 15/30% (Winter/Summer) reduction in non-industrial use. Mandatory 30% reduction in industrial use.

The Trinity River Authority's (TRA) DCP for Lake Livingston includes three primary stages which are as well as an emergency stage that may be made utilized in the case of infrastructure failure. Triggers and responses for these stages are summarized in *Table 7-5*. The COH also owns water rights in Lake Livingston. However, the COH DCP is based on the comprehensive storage in all COH reservoirs and cannot be applied specifically to any one reservoir.

Table 7-5 – Summary of Lake Livingston Drought Triggers and Responses

Drought Stage	Trigger	Action
1	Lake Livingston below 126.50'	Voluntary 5% reduction.
2	Lake Livingston below 124.00'	Mandatory 15% reduction.
3	Lake Livingston below 121.40'	Mandatory 25% reduction.

7.6.2 Drought Response Recommendation for Groundwater and Other Sources

Much of Region H has historically been heavily dependent on groundwater, and although increased demands from a growing population and the risk of subsidence in some areas has necessitated increased regulation of groundwater use, the Gulf Coast Aquifer and several other formations remain important sources of water for many users in the Region. Groundwater production is generally local to points of use and aquifer properties vary spatially. Likewise, the characteristics of other sources such as reuse are specific to the associated supplier. As such, many providers using these sources have developed their DCPs in the context of their individual supply portfolios. The RHWPG acknowledges that the DCPs for groundwater suppliers are the best drought management tool for groundwater supplies and recommends that the DCPs developed by the operators of these supplies serve as the RHWPG triggers for groundwater. The RHWPG also recognizes that these triggers are subject to change as providers periodically reassess their needs and encourage both wholesale providers and other entities to examine their DCPs regularly.

The RHWPG recommends that water providers regularly review the U.S. Drought Monitor as a tool for tracking drought conditions and in drought planning efforts leading up to drought measure implementation. The drought monitor is easily accessible, regularly updated, and does not require entities to directly monitor specific sources to benefit from its information. Its simplicity also facilitates its use in communicating drought conditions to customers and other water users. *Table 7-6* shows the categories of the U.S. Drought Monitor with corresponding PDSI values.

Table 7-6 – Palmer Drought Severity Index

Category	Description	Possible Impacts	Palmer Drought Index
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less

The RHWPG recommends the following actions based on each of the drought classifications listed:

- Abnormally Dry – Entities should begin to review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage is necessary.
- Moderate Drought – Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage is necessary.
- Severe Drought – Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies may not be sufficient to meet reduced demands the entity should begin considering alternative supplies.
- Extreme Drought – Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies may not be sufficient to meet reduced demands the entity should consider alternative supplies.
- Exceptional Drought – Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies are not sufficient to meet reduced demands the entity should implement alternative supplies.

7.6.3 Recommendations for Entities Not Required to Submit a DCP

While wholesale and retail public water suppliers and irrigation districts are required to have a DCP, there are a number of users such as industrial operations and individual irrigators which are not. While some of these users receive water from providers with established drought management procedures, all water users are subject to the impacts of drought. For entities not required to have a DCP, the RHWPG recommends regular monitoring of drought conditions in order to facilitate decision making processes. Several resources are available to water users for monitoring drought. For users which receive water from an outside supplier, communication with their supplier and notifications of anticipated or implemented drought stages is a key resource. The following references are also recommended for consideration when planning for or experiencing drought:

- Palmer Drought Severity Index: http://www.drought.gov/drought/content/products-current-drought-and-monitoring-drought-indicators/palmer-drought-severity-index
- U.S. Drought Monitor (Texas detail): http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?TX
- TCEQ drought information: http://www.tceq.state.tx.us/response/drought/drought.html
- TWDB drought information: http://waterdatafortexas.org/drought/
- Texas Drought Preparedness Council: http://www.txdps.state.tx.us/dem/CouncilsCommittees/droughtCouncil/stateDroughtPrepCouncil.htm

7.6.4 Model Drought Contingency Plans

Model drought contingency plans addressing the requirements of 30 TAC §288(b) were developed for Region H and are available in ***Appendix 7C***. Model plans were developed for wholesale water providers, irrigation districts, and retail public water suppliers. These model plans were largely based on templates provided by the TCEQ, with several modifications made to elaborate on notification procedures, DCP revision, and other components.

7.7 DROUGHT MANAGEMENT WMS

The RHWPG does not support the recommendation of drought management measures as WMS in the Region H RWP. Such measures are not designed to address long-term growth in demands but, rather, are inherently temporary strategies intended to conserve water supplies or reduce adverse impacts during times of drought or emergency and are not active under more hydrologically favorable conditions. Because drought management is only active and beneficial under certain periods of time, its reliable yield is essentially zero when considered in an analogous manner to surface water, groundwater, reuse, or conservation. Also, as discussed previously, the efficacy of individual drought response measures is difficult to quantify and can vary considerably from one entity to another and one drought to another due to hydrologic and human factors. This creates additional uncertainty in the use of drought response as a reliable measure for addressing water needs. While drought management measures are not included as WMS in the Region H RWP, drought management is an important component of water supply management. The RHWPG supports implementation of DCPs under appropriate conditions by water providers in order to prolong supply availability and reduce impacts to water users and local economies.

7.8 OTHER RECOMMENDATIONS

7.8.1 Texas Drought Preparedness Council

The Texas Drought Preparedness Council is composed of representatives from multiple State agencies and plays an important role in monitoring drought condition, advising the governor and other groups on significant drought conditions, and facilitating coordination among local, State, and federal agencies in drought-response planning. The Council meets regularly to discuss drought indicators and conditions across the state and releases Situation Reports summarizing their findings. Additionally, the Council has developed the State Drought Preparedness Plan, which sets forth a framework for approaching drought in an integrated manner in order to minimized impacts to people and resources. The RHWPG supports the ongoing efforts of the Texas Drought Preparedness Council and recommends that water providers and other interested parties regularly review the Situation Reports as part of their drought monitoring procedures.

7.8.2 Development, Content, and Implementation of DCPs

The RHWPG recognizes that the DCPs developed by water providers in the Region are the best available tool for drought management, and makes the following recommendations to providers regarding development, content, and implementation of DCPs:

- In addition to any monitoring procedures included in the DCP, regular monitoring of resources and information from TCEQ, TWDB, the Texas Drought Preparedness Council, and the U.S. Drought Monitor.
- Coordination with wholesale providers regarding drought conditions and potential implementation of drought stages, particularly during times of limited precipitation.
- Review of the DCP by appropriate water provider representatives, particularly during times of limited precipitation.
- Regular consideration of updates the DCP document to accommodate changes in supply source, infrastructure, water demands, or service area.

- Communication with customers during times of decreased supply or precipitation in order to facilitate potential implementation of drought measures and reinforce the importance of compliance with any voluntary measures.
- Designation of appropriate resources to allow for consistent application of enforcement procedures as established in the DCP.

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APPENDIX 7-A

CURRENT DROUGHT PREPARATIONS IN REGION H

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						Trigger Type													Response Type												Reduction Type							Reduction	
WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
BAYTOWN AREA WATER AUTHORITY		Baytown Area Water Authority	HARRIS	SAN JACINTO	1			•					•	•				•										•			•					•		5.00	%
BAYTOWN AREA WATER AUTHORITY		Baytown Area Water Authority	HARRIS	SAN JACINTO	2			•						•							•		•		•			•			•					•		10.00	%
BAYTOWN AREA WATER AUTHORITY		Baytown Area Water Authority	HARRIS	SAN JACINTO	3			•						•							•	•		•							•					•		20.00	%
BAYTOWN AREA WATER AUTHORITY		Baytown Area Water Authority	HARRIS	SAN JACINTO	4			•						•										•			•				•					•		50.00	%
BRAZOS RIVER AUTHORITY		Brazos River Authority		BRAZOS	1			•				•						•	•			•	•		•			•		•	•						•	5.00	%
BRAZOS RIVER AUTHORITY		Brazos River Authority		BRAZOS	2			•				•						•	•			•	•		•			•		•	•							10.00	%
BRAZOS RIVER AUTHORITY		Brazos River Authority		BRAZOS	3							•						•	•		•	•	•	•			•			•	•							20.00	%
BRAZOS RIVER AUTHORITY		Brazos River Authority		BRAZOS	4							•						•				•									•							30.00	%
BRAZOSPORT WATER AUTHORITY		Brazosport Water Authority	BRAZORIA	BRAZOS	1			•						•				•					•											•				120.00	%
BRAZOSPORT WATER AUTHORITY		Brazosport Water Authority	BRAZORIA	BRAZOS	2			•						•				•					•											•				100.00	%
BRAZOSPORT WATER AUTHORITY		Brazosport Water Authority	BRAZORIA	BRAZOS	3			•						•				•					•											•				90.00	%
BRAZOSPORT WATER AUTHORITY		Brazosport Water Authority	BRAZORIA	BRAZOS	4									•				•					•											•				85.00	%
BRAZOSPORT WATER AUTHORITY		Brazosport Water Authority	BRAZORIA	BRAZOS	5									•				•					•											•				80.00	%
BRAZOSPORT WATER AUTHORITY		Brazosport Water Authority	BRAZORIA	BRAZOS	Emergency	•			•										•				•							•						•		0.00	Other
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority GRP	MONTGOMERY	SAN JACINTO	1			•	•									•										•			•							5.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority GRP	MONTGOMERY	SAN JACINTO	2			•	•									•				•	•									•	•					10.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority GRP	MONTGOMERY	SAN JACINTO	3			•	•									•				•	•									•	•					20.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority GRP	MONTGOMERY	SAN JACINTO	4			•	•									•				•	•									•	•					30.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority GRP	MONTGOMERY	SAN JACINTO	Emergency	•		•	•									•	•			•	•							•							•	0.00	0
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Highlands Division	MONTGOMERY	SAN JACINTO	1			•				•	•					•										•			•							5.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Highlands Division	MONTGOMERY	SAN JACINTO	2			•				•	•					•				•	•									•	•					10.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Highlands Division	MONTGOMERY	SAN JACINTO	3			•				•						•				•	•								•	•	•					20.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Highlands Division	MONTGOMERY	SAN JACINTO	4			•				•										•	•								•	•	•					30.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Highlands Division	MONTGOMERY	SAN JACINTO	Emergency	•		•	•									•	•			•	•							•							•	0.00	0
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Lake Conroe Division	MONTGOMERY	SAN JACINTO	1			•				•						•					•					•			•							10.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Lake Conroe Division	MONTGOMERY	SAN JACINTO	2			•				•						•				•	•								•	•	•					15.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Lake Conroe Division	MONTGOMERY	SAN JACINTO	3			•				•						•				•	•								•	•	•					20.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Lake Conroe Division	MONTGOMERY	SAN JACINTO	4	•		•				•							•			•	•							•	•	•	•					30.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Lake Conroe Division	MONTGOMERY	SAN JACINTO	Emergency	•		•	•									•	•			•	•							•							•	0.00	0
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Woodlands Division	MONTGOMERY	SAN JACINTO	1			•	•									•					•					•			•		•					5.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Woodlands Division	MONTGOMERY	SAN JACINTO	2			•	•									•				•	•									•	•					10.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Woodlands Division	MONTGOMERY	SAN JACINTO	3			•	•									•				•	•									•	•					20.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Woodlands Division	MONTGOMERY	SAN JACINTO	4			•	•									•				•	•									•	•					30.00	%
SAN JACINTO RIVER AUTHORITY		San Jacinto River Authority Woodlands Division	MONTGOMERY	SAN JACINTO	Emergency	•		•	•									•	•			•	•							•							•	0.00	0
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas	WALKER	TRINITY	1							•											•								•							5.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas	WALKER	TRINITY	2							•										•	•							•	•							15.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas	WALKER	TRINITY	3							•										•	•							•	•							25.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas	WALKER	TRINITY	Emergency	•			•									•	•				•							•						•		0.00	Other
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas Huntsville	WALKER	TRINITY	1							•											•								•							5.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas Huntsville	WALKER	TRINITY	2							•										•	•							•	•							15.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas Huntsville	WALKER	TRINITY	3							•										•	•							•	•							25.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas Huntsville	WALKER	TRINITY	Emergency	•			•									•	•				•							•						•		0.00	Other
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas RWSS	POLK	TRINITY	1							•											•								•							5.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas RWSS	TRINITY	TRINITY	1							•											•								•							5.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas RWSS	POLK	TRINITY	2							•										•	•							•	•							15.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas RWSS	TRINITY	TRINITY	2							•										•	•							•	•							15.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas RWSS	POLK	TRINITY	3							•										•	•							•	•							25.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas RWSS	TRINITY	TRINITY	3							•										•	•							•	•							25.00	%
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas RWSS	POLK	TRINITY	Emergency	•			•									•	•				•							•						•		0.00	Other
TRINITY RIVER AUTHORITY		Trinity River Authority of Texas RWSS	TRINITY	TRINITY	Emergency	•			•									•	•				•							•						•		0.00	Other
	ALVIN	City of Alvin	BRAZORIA	SAN JACINTO-BRAZOS	1			•														•						•			•							10.00	%
	ALVIN	City of Alvin	BRAZORIA	SAN JACINTO-BRAZOS	2			•							•						•	•		•							•							15.00	%
	ALVIN	City of Alvin	BRAZORIA	SAN JACINTO-BRAZOS	3			•						•	•						•					•	•				•							20.00	%
	ALVIN	City of Alvin	BRAZORIA	SAN JACINTO-BRAZOS	4			•	•					•							•	•		•		•					•							25.00	%
	ALVIN	City of Alvin	BRAZORIA	SAN JACINTO-BRAZOS	5	•			•															•			•				•							30.00	%
	ANGLETON	City of Angleton	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•	•		•				•							•			2.90	MGD
	ANGLETON	City of Angleton	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•													•			3.00	MGD
	ANGLETON	City of Angleton	BRAZORIA	SAN JACINTO-BRAZOS	3			•																•			•								•			3.50	MGD
	ANGLETON	City of Angleton	BRAZORIA	SAN JACINTO-BRAZOS	4	•			•									•						•			•									•		0.00	Other
	BAYOU VISTA	Bayou Vista	GALVESTON	SAN JACINTO-BRAZOS	1			•										•										•			•							5.00	%
	BAYOU VISTA	Bayou Vista	GALVESTON	SAN JACINTO-BRAZOS	2			•										•			•	•		•							•							10.00	%
	BAYOU VISTA	Bayou Vista	GALVESTON	SAN JACINTO-BRAZOS	3			•										•			•					•					•							15.00	%
	BAYOU VISTA	Bayou Vista	GALVESTON	SAN JACINTO-BRAZOS	4	•			•									•						•			•				•							25.00	%
	BAYTOWN	Baytown Area Water Authority	HARRIS	TRINITY-SAN JACINTO	1			•					•	•				•										•			•					•		5.00	%
	BAYTOWN	Baytown Area Water Authority	HARRIS	TRINITY-SAN JACINTO	2			•						•							•		•		•			•			•					•		10.00	%
	BAYTOWN	Baytown Area Water Authority	HARRIS	TRINITY-SAN JACINTO	3			•						•							•	•		•							•					•		20.00	%
	BAYTOWN	Baytown Area Water Authority	HARRIS	TRINITY-SAN JACINTO	4			•						•										•			•				•					•		50.00	%
	BAYTOWN	City of Baytown	HARRIS	SAN JACINTO	1			•						•				•										•			•				•			5.00	%
	BAYTOWN	City of Baytown	HARRIS	SAN JACINTO	2			•	•					•				•			•				•			•			•				•			10.00	%
	BAYTOWN	City of Baytown	HARRIS	SAN JACINTO	3			•	•					•				•			•	•		•							•				•			20.00	%
	BAYTOWN	City of Baytown	HARRIS	SAN JACINTO	4			•						•										•			•				•				•			50.00	%

						Trigger Type													Response Type												Reduction Type							Reduction	
WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	BELLAIRE	City of Bellaire	HARRIS	SAN JACINTO	2			•										•				•						•			•							10.00	%
	BELLAIRE	City of Bellaire	HARRIS	SAN JACINTO	3			•							•			•				•									•							15.00	%
	BELLAIRE	City of Bellaire	HARRIS	SAN JACINTO	4	•		•	•						•			•						•							•							20.00	%
	BOLIVAR PENINSULA SUD	Bolivar Peninsula SUD	GALVESTON	NECHES-TRINITY	1			•														•						•			•							5.00	%
	BOLIVAR PENINSULA SUD	Bolivar Peninsula SUD	GALVESTON	NECHES-TRINITY	2			•													•	•		•							•							10.00	%
	BOLIVAR PENINSULA SUD	Bolivar Peninsula SUD	GALVESTON	NECHES-TRINITY	3			•													•					•	•				•							12.50	%
	BOLIVAR PENINSULA SUD	Bolivar Peninsula SUD	GALVESTON	NECHES-TRINITY	4			•													•	•		•		•					•							15.00	%
	BOLIVAR PENINSULA SUD	Bolivar Peninsula SUD	GALVESTON	NECHES-TRINITY	5	•		•									•							•			•				•							15.00	%
	BRAZORIA COUNTY MUD #21	Brazoria County MUD No. 21	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	BRAZORIA COUNTY MUD #21	Brazoria County MUD No. 21	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	BRAZORIA COUNTY MUD #21	Brazoria County MUD No. 21	BRAZORIA	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	BRAZORIA COUNTY MUD #4	Brazoria County MUD No. 4	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	BRAZORIA COUNTY MUD #4	Brazoria County MUD No. 4	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	BRAZORIA COUNTY MUD #4	Brazoria County MUD No. 4	BRAZORIA	SAN JACINTO-BRAZOS	3			•												•		•		•					•		•							20.00	%
	BRAZORIA COUNTY MUD #4	Brazoria County MUD No. 4	BRAZORIA	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	BUFFALO	City of Buffalo	LEON	TRINITY	1			•										•				•	•					•		•	•							0.00	%
	BUFFALO	City of Buffalo	LEON	TRINITY	2			•								•		•			•	•	•					•		•	•							10.00	%
	BUFFALO	City of Buffalo	LEON	TRINITY	3	•		•	•									•				•	•	•							•							20.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Harris County MUD No. 150	HARRIS	SAN JACINTO	1											•												•			•							15.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Harris County MUD No. 150	HARRIS	SAN JACINTO	2											•					•	•		•							•							25.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Harris County MUD No. 150	HARRIS	SAN JACINTO	3				•							•					•			•		•					•							33.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Harris County MUD No. 200	HARRIS	SAN JACINTO	1											•												•	•		•							5.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Harris County MUD No. 200	HARRIS	SAN JACINTO	2											•					•	•		•							•							10.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Harris County MUD No. 200	HARRIS	SAN JACINTO	3											•								•		•	•				•							9.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Rankin Road West MUD	HARRIS	SAN JACINTO	1			•										•										•			•							5.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Rankin Road West MUD	HARRIS	SAN JACINTO	2			•										•			•	•		•							•							10.00	%
	CENTRAL HARRIS COUNTY REGIONAL WATER AUTHORITY	Rankin Road West MUD	HARRIS	SAN JACINTO	3			•							•			•			•			•		•					•							15.00	%
	CLUTE	City of Clute	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•	•		•				•						•				90.00	%
	CLUTE	City of Clute	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•												•				90.00	%
	CLUTE	City of Clute	BRAZORIA	SAN JACINTO-BRAZOS	3			•																•			•							•				90.00	%
	CLUTE	City of Clute	BRAZORIA	SAN JACINTO-BRAZOS	4	•			•															•			•							•				90.00	%
	COUNTY-OTHER	Brazoria County MUD No. 22	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	COUNTY-OTHER	Brazoria County MUD No. 22	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	COUNTY-OTHER	Brazoria County MUD No. 22	BRAZORIA	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Brazoria County MUD No. 22	BRAZORIA	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Brazoria County MUD No. 25	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	COUNTY-OTHER	Brazoria County MUD No. 25	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	COUNTY-OTHER	Brazoria County MUD No. 25	BRAZORIA	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Brazoria County MUD No. 25	BRAZORIA	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Brazoria County MUD No. 29	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	COUNTY-OTHER	Brazoria County MUD No. 29	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	COUNTY-OTHER	Brazoria County MUD No. 29	BRAZORIA	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Brazoria County MUD No. 29	BRAZORIA	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Brazoria County MUD No. 31	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	COUNTY-OTHER	Brazoria County MUD No. 31	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	COUNTY-OTHER	Brazoria County MUD No. 31	BRAZORIA	SAN JACINTO-BRAZOS	3															•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Brazoria County MUD No. 31	BRAZORIA	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Brazoria County MUD No. 55	BRAZORIA	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	COUNTY-OTHER	Brazoria County MUD No. 55	BRAZORIA	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	COUNTY-OTHER	Brazoria County MUD No. 55	BRAZORIA	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Brazoria County MUD No. 55	BRAZORIA	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Cape Royale Utility District	SAN JACINTO	TRINITY	1			•																				•			•							5.00	%
	COUNTY-OTHER	Cape Royale Utility District	SAN JACINTO	TRINITY	2			•														•									•							10.00	%
	COUNTY-OTHER	Cape Royale Utility District	SAN JACINTO	TRINITY	3			•												•		•		•							•							15.00	%
	COUNTY-OTHER	Cape Royale Utility District	SAN JACINTO	TRINITY	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Chambers County Improvement District No. 1	CHAMBERS	TRINITY-SAN JACINTO	1			•													•							•			•							5.00	%
	COUNTY-OTHER	Chambers County Improvement District No. 1	CHAMBERS	TRINITY-SAN JACINTO	2			•														•									•							10.00	%
	COUNTY-OTHER	Chambers County Improvement District No. 1	CHAMBERS	TRINITY-SAN JACINTO	3			•												•		•		•							•							15.00	%
	COUNTY-OTHER	Chambers County Improvement District No. 1	CHAMBERS	TRINITY-SAN JACINTO	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 1	FORT BEND	BRAZOS	1			•																				•			•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 1	FORT BEND	BRAZOS	2			•														•	•								•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 1	FORT BEND	BRAZOS	3			•												•		•		•					•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 1	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 106	FORT BEND	BRAZOS	1											•												•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 106	FORT BEND	BRAZOS	2											•						•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 106	FORT BEND	BRAZOS	3											•				•		•		•					•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 106	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 108	FORT BEND	BRAZOS	1											•												•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 108	FORT BEND	BRAZOS	2											•						•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 108	FORT BEND	BRAZOS	3											•				•		•		•					•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 108	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type: Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Response Type: Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Reduction Type: Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Reduction: Value	Unit
	COUNTY-OTHER	Fort Bend County MUD No. 109	FORT BEND	BRAZOS	1											•												•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 109	FORT BEND	BRAZOS	2											•						•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 109	FORT BEND	BRAZOS	3											•				•		•		•					•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 109	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 111	FORT BEND	BRAZOS	1			•																				•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 111	FORT BEND	BRAZOS	2			•														•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 111	FORT BEND	BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 111	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 117	FORT BEND	BRAZOS	1											•												•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 117	FORT BEND	BRAZOS	2											•						•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 117	FORT BEND	BRAZOS	3											•				•		•		•					•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 117	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 128	FORT BEND	BRAZOS	1			•														•						•			•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 128	FORT BEND	BRAZOS	2			•													•	•		•							•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 128	FORT BEND	BRAZOS	3			•														•		•					•		•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 128	FORT BEND	BRAZOS	4			•													•	•		•		•					•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 128	FORT BEND	BRAZOS	5			•														•		•			•				•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 141	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 141	FORT BEND	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 141	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 141	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 152	FORT BEND	BRAZOS	1			•																				•			•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 152	FORT BEND	BRAZOS	2			•														•									•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 152	FORT BEND	BRAZOS	3			•												•		•		•			•				•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 152	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 155	FORT BEND	BRAZOS	1			•														•						•							•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 155	FORT BEND	BRAZOS	2			•													•	•		•							•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 155	FORT BEND	BRAZOS	3			•													•			•		•					•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 155	FORT BEND	BRAZOS	4			•													•	•		•		•					•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 155	FORT BEND	BRAZOS	5	•			•															•			•								•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 158	FORT BEND	BRAZOS	1			•														•						•							•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 158	FORT BEND	BRAZOS	2			•													•	•		•							•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 158	FORT BEND	BRAZOS	3			•													•			•		•					•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 158	FORT BEND	BRAZOS	4			•													•			•		•					•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 158	FORT BEND	BRAZOS	5	•			•															•			•								•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 162	FORT BEND	BRAZOS	1			•														•						•							•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 162	FORT BEND	BRAZOS	2			•													•	•		•							•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 162	FORT BEND	BRAZOS	3			•													•			•		•					•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 162	FORT BEND	BRAZOS	4			•													•	•				•					•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 162	FORT BEND	BRAZOS	5	•			•															•			•								•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 187	FORT BEND	BRAZOS	1			•																				•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 187	FORT BEND	BRAZOS	2			•														•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 187	FORT BEND	BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 187	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 19	FORT BEND	BRAZOS	1												•						•								•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 19	FORT BEND	BRAZOS	2												•											•			•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 19	FORT BEND	BRAZOS	3												•				•		•								•							5.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 19	FORT BEND	BRAZOS	4												•				•	•		•		•									•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 19	FORT BEND	BRAZOS	5												•							•			•								•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 19	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 192	FORT BEND	BRAZOS	1											•												•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 192	FORT BEND	BRAZOS	2											•						•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 192	FORT BEND	BRAZOS	3											•				•				•			•		•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 192	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 24	FORT BEND	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 24	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 24	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 24	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 26	FORT BEND	SAN JACINTO-BRAZOS	1			•													•							•							•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 26	FORT BEND	SAN JACINTO-BRAZOS	2			•														•													•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 26	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•								•			0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 26	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 42	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 42	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 42	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 42	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 48	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 48	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 5	FORT BEND	BRAZOS	1			•													•							•			•							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 5	FORT BEND	BRAZOS	2			•														•	•								•							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 5	FORT BEND	BRAZOS	3			•												•		•		•			•		•		•							20.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	COUNTY-OTHER	Fort Bend County MUD No. 5	FORT BEND	BRAZOS	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 67	FORT BEND	BRAZOS	1			●																					●				●							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 67	FORT BEND	BRAZOS	2			●															●	●										●							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 67	FORT BEND	BRAZOS	3			●													●		●		●			●		●			●							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 67	FORT BEND	BRAZOS	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Fort Bend County MUD No. 69	FORT BEND	BRAZOS	1			●																					●				●							10.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 69	FORT BEND	BRAZOS	2			●															●	●										●							15.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 69	FORT BEND	BRAZOS	3			●													●		●		●			●		●			●							20.00	%
	COUNTY-OTHER	Fort Bend County MUD No. 69	FORT BEND	BRAZOS	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Fort Bend County WCID No. 2	FORT BEND	SAN JACINTO-BRAZOS	1											●						●						●				●							10.00	%
	COUNTY-OTHER	Fort Bend County WCID No. 2	FORT BEND	SAN JACINTO-BRAZOS	2											●						●	●									●							15.00	%
	COUNTY-OTHER	Fort Bend County WCID No. 2	FORT BEND	SAN JACINTO-BRAZOS	3											●				●		●		●			●		●			●							20.00	%
	COUNTY-OTHER	Fort Bend County WCID No. 2	FORT BEND	SAN JACINTO-BRAZOS	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Grand Oaks MUD	MONTGOMERY	SAN JACINTO	1			●														●		●	●												●			0.00	Other
	COUNTY-OTHER	Grand Oaks MUD	MONTGOMERY	SAN JACINTO	2			●															●	●													●			0.00	Other
	COUNTY-OTHER	Grand Oaks MUD	MONTGOMERY	SAN JACINTO	3			●															●				●										●			0.00	Other
	COUNTY-OTHER	Greens Parkway MUD	HARRIS	SAN JACINTO	1			●																					●				●							5.00	%
	COUNTY-OTHER	Greens Parkway MUD	HARRIS	SAN JACINTO	2			●														●										●							10.00	%
	COUNTY-OTHER	Greens Parkway MUD	HARRIS	SAN JACINTO	3			●													●		●		●			●					●							15.00	%
	COUNTY-OTHER	Greens Parkway MUD	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Gulf Coast Water Authority	GALVESTON	SAN JACINTO-BRAZOS	1			●										●					●	●						●		●	●							5.00	%
	COUNTY-OTHER	Gulf Coast Water Authority	GALVESTON	SAN JACINTO-BRAZOS	2			●										●	●				●	●				●					●	●							10.00	%
	COUNTY-OTHER	Gulf Coast Water Authority	GALVESTON	SAN JACINTO-BRAZOS	3			●										●	●				●	●										●							20.00	%
	COUNTY-OTHER	Gulf Coast Water Authority	GALVESTON	SAN JACINTO-BRAZOS	Emergency	●			●									●					●	●															●		0.00	Other
	COUNTY-OTHER	Harris County Improvement District No. 74	HARRIS	SAN JACINTO	1		●	●														●						●								●			0.00	Other
	COUNTY-OTHER	Harris County Improvement District No. 74	HARRIS	SAN JACINTO	2			●						●				●			●	●		●						●	●							25.00	%
	COUNTY-OTHER	Harris County Improvement District No. 74	HARRIS	SAN JACINTO	3									●				●			●			●		●						●							50.00	%
	COUNTY-OTHER	Harris County Improvement District No. 74	HARRIS	SAN JACINTO	4									●				●			●	●		●		●						●							50.00	%
	COUNTY-OTHER	Harris County Improvement District No. 74	HARRIS	SAN JACINTO	5	●			●															●			●					●							50.00	%
	COUNTY-OTHER	Harris County MUD No. 155	HARRIS	SAN JACINTO	1											●						●						●				●							5.00	%
	COUNTY-OTHER	Harris County MUD No. 155	HARRIS	SAN JACINTO	2											●						●		●								●							14.00	%
	COUNTY-OTHER	Harris County MUD No. 155	HARRIS	SAN JACINTO	3											●						●		●								●							21.00	%
	COUNTY-OTHER	Harris County MUD No. 155	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 16	HARRIS	SAN JACINTO	1											●												●				●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 16	HARRIS	SAN JACINTO	2											●					●	●		●								●							25.00	%
	COUNTY-OTHER	Harris County MUD No. 16	HARRIS	SAN JACINTO	3				●							●					●			●		●						●							33.00	%
	COUNTY-OTHER	Harris County MUD No. 182	HARRIS	SAN JACINTO	1			●																					●										●	0.00	Other
	COUNTY-OTHER	Harris County MUD No. 182	HARRIS	SAN JACINTO	2			●														●																●	0.00	Other
	COUNTY-OTHER	Harris County MUD No. 182	HARRIS	SAN JACINTO	3			●													●		●		●			●											●	0.00	Other
	COUNTY-OTHER	Harris County MUD No. 182	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 261	HARRIS	SAN JACINTO	1											●					●							●				●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 261	HARRIS	SAN JACINTO	2											●						●										●							16.00	%
	COUNTY-OTHER	Harris County MUD No. 261	HARRIS	SAN JACINTO	3											●				●		●		●			●		●			●							25.00	%
	COUNTY-OTHER	Harris County MUD No. 261	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 32	HARRIS	SAN JACINTO	1			●								●												●				●							5.00	%
	COUNTY-OTHER	Harris County MUD No. 32	HARRIS	SAN JACINTO	2			●	●							●					●	●		●							●	●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 32	HARRIS	SAN JACINTO	3			●	●							●													●			●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 32	HARRIS	SAN JACINTO	4			●	●							●													●			●							20.00	%
	COUNTY-OTHER	Harris County MUD No. 321	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 346	HARRIS	SAN JACINTO	1											●												●				●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 346	HARRIS	SAN JACINTO	2											●					●	●		●								●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 346	HARRIS	SAN JACINTO	3											●					●			●		●						●							20.00	%
	COUNTY-OTHER	Harris County MUD No. 361	HARRIS	SAN JACINTO	1			●																					●				●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 361	HARRIS	SAN JACINTO	2			●															●	●										●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 361	HARRIS	SAN JACINTO	3			●													●		●		●			●		●			●							20.00	%
	COUNTY-OTHER	Harris County MUD No. 361	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 372	HARRIS	SAN JACINTO	1			●																					●				●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 372	HARRIS	SAN JACINTO	2			●															●	●										●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 372	HARRIS	SAN JACINTO	3			●													●		●		●			●		●			●							20.00	%
	COUNTY-OTHER	Harris County MUD No. 372	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 406	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 412	HARRIS	SAN JACINTO	1			●																					●				●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 412	HARRIS	SAN JACINTO	2			●															●	●										●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 412	HARRIS	SAN JACINTO	3			●													●		●		●			●		●			●							20.00	%
	COUNTY-OTHER	Harris County MUD No. 412	HARRIS	SAN JACINTO	4												●														●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 412	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 420	HARRIS	SAN JACINTO	1			●																					●				●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 420	HARRIS	SAN JACINTO	2			●															●	●										●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 420	HARRIS	SAN JACINTO	3			●													●		●		●			●		●			●							20.00	%
	COUNTY-OTHER	Harris County MUD No. 420	HARRIS	SAN JACINTO	4												●														●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 420	HARRIS	SAN JACINTO	Emergency													●													●						●		0.00	Other

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	COUNTY-OTHER	Harris County MUD No. 421	HARRIS	SAN JACINTO	1			●																				●			●							5.00	%
	COUNTY-OTHER	Harris County MUD No. 421	HARRIS	SAN JACINTO	2			●														●									●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 421	HARRIS	SAN JACINTO	3			●												●		●		●			●				●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 421	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 58	HARRIS	SAN JACINTO	1											●		●										●			●							15.00	%
	COUNTY-OTHER	Harris County MUD No. 58	HARRIS	SAN JACINTO	2											●		●				●									●							25.00	%
	COUNTY-OTHER	Harris County MUD No. 58	HARRIS	SAN JACINTO	3											●		●		●		●		●			●				●							33.00	%
	COUNTY-OTHER	Harris County MUD No. 58	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 6	HARRIS	SAN JACINTO	1											●												●			●					●		16.00	Hours
	COUNTY-OTHER	Harris County MUD No. 6	HARRIS	SAN JACINTO	2											●						●	●								●					●		16.00	%
	COUNTY-OTHER	Harris County MUD No. 6	HARRIS	SAN JACINTO	3											●				●		●		●			●		●		●					●		25.00	%
	COUNTY-OTHER	Harris County MUD No. 6	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 63	HARRIS	SAN JACINTO	1			●										●										●			●							2.00	%
	COUNTY-OTHER	Harris County MUD No. 63	HARRIS	SAN JACINTO	2			●										●				●									●							5.00	%
	COUNTY-OTHER	Harris County MUD No. 63	HARRIS	SAN JACINTO	3			●										●		●		●		●			●				●							10.00	%
	COUNTY-OTHER	Harris County MUD No. 63	HARRIS	SAN JACINTO	4			●														●														●		0.00	Other
	COUNTY-OTHER	Harris County MUD No. 63	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Harris County WCID No. 50	HARRIS	SAN JACINTO	1			●										●			●	●									●							10.00	%
	COUNTY-OTHER	Harris County WCID No. 50	HARRIS	SAN JACINTO	2			●										●			●	●		●							●							15.00	%
	COUNTY-OTHER	Harris County WCID No. 50	HARRIS	SAN JACINTO	3			●							●			●			●			●		●					●							20.00	%
	COUNTY-OTHER	Harris County WCID No. 70	HARRIS	SAN JACINTO	1			●																				●			●							5.00	%
	COUNTY-OTHER	Harris County WCID No. 70	HARRIS	SAN JACINTO	2			●														●									●							10.00	%
	COUNTY-OTHER	Harris County WCID No. 70	HARRIS	SAN JACINTO	3			●												●		●		●			●				●							15.00	%
	COUNTY-OTHER	Harris County WCID No. 70	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Interstate MUD	HARRIS	SAN JACINTO	1			●																				●			●							10.00	%
	COUNTY-OTHER	Interstate MUD	HARRIS	SAN JACINTO	2			●														●	●								●							15.00	%
	COUNTY-OTHER	Interstate MUD	HARRIS	SAN JACINTO	3			●												●		●		●			●		●		●							20.00	%
	COUNTY-OTHER	Interstate MUD	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Lazy River ID	HARRIS	SAN JACINTO	1			●																				●			●							5.00	%
	COUNTY-OTHER	Lazy River ID	HARRIS	SAN JACINTO	2			●														●									●							10.00	%
	COUNTY-OTHER	Lazy River ID	HARRIS	SAN JACINTO	3			●												●		●		●			●				●							15.00	%
	COUNTY-OTHER	Lazy River ID	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Monarch Utilities I, L.P.	MONTGOMERY	SAN JACINTO	1		●																					●			●							10.00	%
	COUNTY-OTHER	Monarch Utilities I, L.P.	MONTGOMERY	SAN JACINTO	2			●													●	●		●						●	●							10.00	%
	COUNTY-OTHER	Monarch Utilities I, L.P.	MONTGOMERY	SAN JACINTO	3			●													●	●		●						●	●							20.00	%
	COUNTY-OTHER	Monarch Utilities I, L.P.	MONTGOMERY	SAN JACINTO	4			●													●			●						●	●							30.00	%
	COUNTY-OTHER	Montgomery County MUD No. 105	MONTGOMERY	SAN JACINTO	1			●													●							●			●							10.00	%
	COUNTY-OTHER	Montgomery County MUD No. 105	MONTGOMERY	SAN JACINTO	2			●														●	●								●							15.00	%
	COUNTY-OTHER	Montgomery County MUD No. 105	MONTGOMERY	SAN JACINTO	3			●												●		●		●			●		●		●							20.00	%
	COUNTY-OTHER	Montgomery County MUD No. 105	MONTGOMERY	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 115	MONTGOMERY	SAN JACINTO	1			●														●						●									●	0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 115	MONTGOMERY	SAN JACINTO	2			●														●															●	0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 115	MONTGOMERY	SAN JACINTO	3			●												●		●		●													●	0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 115	MONTGOMERY	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 119	MONTGOMERY	SAN JACINTO	1			●																				●			●							10.00	%
	COUNTY-OTHER	Montgomery County MUD No. 119	MONTGOMERY	SAN JACINTO	2			●													●	●		●							●							16.00	%
	COUNTY-OTHER	Montgomery County MUD No. 119	MONTGOMERY	SAN JACINTO	3			●																●		●	●				●							25.00	%
	COUNTY-OTHER	Montgomery County MUD No. 6 7 36 39 40 46 47 60 67	MONTGOMERY	SAN JACINTO	1			●	●									●					●					●							●			0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 6 7 36 39 40 46 47 60 67	MONTGOMERY	SAN JACINTO	2			●	●									●			●		●												●			0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 6 7 36 39 40 46 47 60 67	MONTGOMERY	SAN JACINTO	3			●	●									●				●	●												●			0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 6 7 36 39 40 46 47 60 67	MONTGOMERY	SAN JACINTO	4			●	●									●				●	●												●			0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 6 7 36 39 40 46 47 60 67	MONTGOMERY	SAN JACINTO	5	●			●									●												●					●			0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 84	MONTGOMERY	SAN JACINTO	1			●																				●			●					●		15.00	%
	COUNTY-OTHER	Montgomery County MUD No. 84	MONTGOMERY	SAN JACINTO	2			●													●	●		●							●					●		18.00	Hours
	COUNTY-OTHER	Montgomery County MUD No. 84	MONTGOMERY	SAN JACINTO	3			●	●						●						●			●		●					●					●		20.00	Hours
	COUNTY-OTHER	Montgomery County MUD No. 88	MONTGOMERY	SAN JACINTO	1											●												●			●							10.00	%
	COUNTY-OTHER	Montgomery County MUD No. 88	MONTGOMERY	SAN JACINTO	2											●						●	●								●							15.00	%
	COUNTY-OTHER	Montgomery County MUD No. 88	MONTGOMERY	SAN JACINTO	3											●				●		●		●			●		●		●							20.00	%
	COUNTY-OTHER	Montgomery County MUD No. 88	MONTGOMERY	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 99	MONTGOMERY	SAN JACINTO	1			●														●						●									●	0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 99	MONTGOMERY	SAN JACINTO	2			●														●															●	0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 99	MONTGOMERY	SAN JACINTO	3			●												●		●		●													●	0.00	Other
	COUNTY-OTHER	Montgomery County MUD No. 99	MONTGOMERY	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Northeast Harris County MUD No. 10	HARRIS	SAN JACINTO	1			●																				●			●							5.00	%
	COUNTY-OTHER	Northeast Harris County MUD No. 10	HARRIS	SAN JACINTO	2			●														●									●							10.00	%
	COUNTY-OTHER	Northeast Harris County MUD No. 10	HARRIS	SAN JACINTO	3			●												●		●		●			●				●							15.00	%
	COUNTY-OTHER	Northeast Harris County MUD No. 10	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	COUNTY-OTHER	Northeast Harris County MUD No. 9	HARRIS	SAN JACINTO	1			●															●					●			●							5.00	%
	COUNTY-OTHER	Northeast Harris County MUD No. 9	HARRIS	SAN JACINTO	2			●													●	●								●	●							10.00	%
	COUNTY-OTHER	Northeast Harris County MUD No. 9	HARRIS	SAN JACINTO	3			●														●					●				●							15.00	%
	COUNTY-OTHER	Northeast Harris County MUD No. 9	HARRIS	SAN JACINTO	4			●														●							●		●							20.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	COUNTY-OTHER	Northeast Harris County MUD No. 9	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Northwest Harris County MUD No. 52	HARRIS	SAN JACINTO	1			•								•												•			•							5.00	%
	COUNTY-OTHER	Northwest Harris County MUD No. 52	HARRIS	SAN JACINTO	2			•	•							•					•	•		•						•	•							10.00	%
	COUNTY-OTHER	Northwest Harris County MUD No. 52	HARRIS	SAN JACINTO	3			•	•							•											•		•		•							15.00	%
	COUNTY-OTHER	Northwest Harris County MUD No. 52	HARRIS	SAN JACINTO	4			•	•							•											•		•		•							20.00	%
	COUNTY-OTHER	Roman Forest Consolidated MUD	MONTGOMERY	SAN JACINTO	1			•	•									•				•						•			•							10.00	%
	COUNTY-OTHER	Roman Forest Consolidated MUD	MONTGOMERY	SAN JACINTO	2			•	•									•			•	•		•							•							15.00	%
	COUNTY-OTHER	Roman Forest Consolidated MUD	MONTGOMERY	SAN JACINTO	3	•		•	•									•			•			•		•					•							25.00	%
	COUNTY-OTHER	Roman Forest Consolidated MUD	MONTGOMERY	SAN JACINTO	4	•		•	•												•	•		•		•					•							35.00	%
	COUNTY-OTHER	Roman Forest Consolidated MUD	MONTGOMERY	SAN JACINTO	5			•	•									•						•		•	•				•							50.00	%
	COUNTY-OTHER	Roman Forest Consolidated MUD	MONTGOMERY	SAN JACINTO	6			•										•												•						•		0.00	Other
	COUNTY-OTHER	Shorewood Forest Water System	WALKER	TRINITY	1		•																					•									•	0.00	0
	COUNTY-OTHER	Shorewood Forest Water System	WALKER	TRINITY	2			•						•							•									•	•							10.00	%
	COUNTY-OTHER	Shorewood Forest Water System	WALKER	TRINITY	3			•						•							•	•		•							•							25.00	%
	COUNTY-OTHER	Shorewood Forest Water System	WALKER	TRINITY	4			•						•										•			•				•							40.00	%
	COUNTY-OTHER	Southwest Harris County MUD No. 1	HARRIS	SAN JACINTO	1			•																				•			•							5.00	%
	COUNTY-OTHER	Southwest Harris County MUD No. 1	HARRIS	SAN JACINTO	2			•														•									•							10.00	%
	COUNTY-OTHER	Southwest Harris County MUD No. 1	HARRIS	SAN JACINTO	3			•												•		•		•			•				•							15.00	%
	COUNTY-OTHER	Southwest Harris County MUD No. 1	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Spanish Cove PUD	HARRIS	SAN JACINTO	1			•																				•			•							5.00	%
	COUNTY-OTHER	Spanish Cove PUD	HARRIS	SAN JACINTO	2			•														•	•								•							10.00	%
	COUNTY-OTHER	Spanish Cove PUD	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							15.00	%
	COUNTY-OTHER	Spanish Cove PUD	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Spring Creek Utility District	HARRIS	SAN JACINTO	1											•						•						•			•							5.00	%
	COUNTY-OTHER	Spring Creek Utility District	HARRIS	SAN JACINTO	2											•					•	•		•							•							10.00	%
	COUNTY-OTHER	Spring Creek Utility District	HARRIS	SAN JACINTO	3											•					•			•			•				•							10.00	%
	COUNTY-OTHER	Spring Creek Utility District	HARRIS	SAN JACINTO	4											•					•			•		•					•							10.00	%
	COUNTY-OTHER	Spring Creek Utility District	HARRIS	SAN JACINTO	Emergency	•			•															•			•				•							15.00	%
	COUNTY-OTHER	Valley Ranch MUD No. 1	MONTGOMERY	SAN JACINTO	1				•									•			•		•					•			•							10.00	%
	COUNTY-OTHER	Valley Ranch MUD No. 1	MONTGOMERY	SAN JACINTO	2			•										•			•	•		•							•							20.00	%
	COUNTY-OTHER	Valley Ranch MUD No. 1	MONTGOMERY	SAN JACINTO	3			•										•				•		•							•							35.00	%
	COUNTY-OTHER	Valley Ranch MUD No. 1	MONTGOMERY	SAN JACINTO	4			•										•				•		•							•							36.00	%
	COUNTY-OTHER	West Harris County MUD No. 16	HARRIS	SAN JACINTO	1													•			•	•	•					•		•	•							10.00	%
	COUNTY-OTHER	West Harris County MUD No. 16	HARRIS	SAN JACINTO	2			•						•	•						•									•	•							10.00	%
	COUNTY-OTHER	West Harris County MUD No. 16	HARRIS	SAN JACINTO	3			•						•	•							•		•							•							15.00	%
	COUNTY-OTHER	West Harris County MUD No. 16	HARRIS	SAN JACINTO	4			•						•	•							•		•							•							20.00	%
	COUNTY-OTHER	West Harris County MUD No. 16	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	West Park MUD	HARRIS	SAN JACINTO	1											•												•			•							15.00	%
	COUNTY-OTHER	West Park MUD	HARRIS	SAN JACINTO	2											•					•	•		•							•							25.00	%
	COUNTY-OTHER	West Park MUD	HARRIS	SAN JACINTO	3										•	•					•			•		•					•							33.00	%
	COUNTY-OTHER	Westwood North	MONTGOMERY	SAN JACINTO	1			•										•				•						•								•		0.00	Other
	COUNTY-OTHER	Westwood North	MONTGOMERY	SAN JACINTO	2			•													•	•	•	•												•		0.00	Other
	COUNTY-OTHER	Westwood North	MONTGOMERY	SAN JACINTO	3	•		•						•	•			•				•					•									•		0.00	Other
	COUNTY-OTHER	Willow Creek Farms MUD	WALLER	SAN JACINTO	1			•																				•			•							10.00	%
	COUNTY-OTHER	Willow Creek Farms MUD	WALLER	SAN JACINTO	2			•														•	•								•							15.00	%
	COUNTY-OTHER	Willow Creek Farms MUD	WALLER	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	COUNTY-OTHER	Willow Creek Farms MUD	WALLER	SAN JACINTO	Emergency													•												•						•		0.00	Other
	COUNTY-OTHER	Wood Trace MUD No. 1	MONTGOMERY	SAN JACINTO	1			•																				•								•		18.00	Hours
	COUNTY-OTHER	Wood Trace MUD No. 1	MONTGOMERY	SAN JACINTO	2			•													•	•		•												•		20.00	Hours
	COUNTY-OTHER	Wood Trace MUD No. 1	MONTGOMERY	SAN JACINTO	3			•	•						•						•			•		•										•		22.00	Hours
	COUNTY-OTHER	Woodridge MUD	MONTGOMERY	SAN JACINTO	1				•									•			•		•					•			•							10.00	%
	COUNTY-OTHER	Woodridge MUD	MONTGOMERY	SAN JACINTO	2			•										•			•	•			•						•							20.00	%
	COUNTY-OTHER	Woodridge MUD	MONTGOMERY	SAN JACINTO	3			•										•				•		•							•							35.00	%
	COUNTY-OTHER	Woodridge MUD	MONTGOMERY	SAN JACINTO	4			•										•				•		•							•							36.00	%
	DAYTON	City of Dayton	LIBERTY	TRINITY	1			•														•						•			•							2.00	%
	DAYTON	City of Dayton	LIBERTY	TRINITY	2			•													•	•		•							•							5.00	%
	DAYTON	City of Dayton	LIBERTY	TRINITY	3			•													•			•		•					•							10.00	%
	DAYTON	City of Dayton	LIBERTY	TRINITY	4			•													•	•		•		•					•							15.00	%
	DAYTON	City of Dayton	LIBERTY	TRINITY	Emergency	•			•															•			•				•							20.00	%
	DEER PARK	City of Deer Park	HARRIS	SAN JACINTO	1			•		•								•				•						•			•							10.00	%
	DEER PARK	City of Deer Park	HARRIS	SAN JACINTO	2			•		•								•			•	•		•							•							15.00	%
	DEER PARK	City of Deer Park	HARRIS	SAN JACINTO	3	•		•	•												•			•		•					•							25.00	%
	DEER PARK	City of Deer Park	HARRIS	SAN JACINTO	4	•		•	•												•	•		•		•					•							35.00	%
	DEER PARK	City of Deerpark	HARRIS	SAN JACINTO	1			•		•								•				•						•			•							10.00	%
	DEER PARK	City of Deerpark	HARRIS	SAN JACINTO	2			•		•								•			•	•		•							•							15.00	%
	DEER PARK	City of Deerpark	HARRIS	SAN JACINTO	3	•		•	•												•			•		•					•							25.00	%
	DEER PARK	City of Deerpark	HARRIS	SAN JACINTO	4	•		•	•												•	•		•		•					•							33.00	%
	FORT BEND COUNTY MUD #116	Fort Bend County MUD No. 116	FORT BEND	BRAZOS	1			•																				•			•							10.00	%
	FORT BEND COUNTY MUD #116	Fort Bend County MUD No. 116	FORT BEND	BRAZOS	2			•														•	•								•							15.00	%
	FORT BEND COUNTY MUD #116	Fort Bend County MUD No. 116	FORT BEND	BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	FORT BEND COUNTY MUD #116	Fort Bend County MUD No. 116	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	FORT BEND COUNTY MUD #121	Fort Bend County MUD No. 121	FORT BEND	BRAZOS	1			●															●					●			●							20.00	%
	FORT BEND COUNTY MUD #121	Fort Bend County MUD No. 121	FORT BEND	BRAZOS	2			●	●		●												●											●				75.00	%
	FORT BEND COUNTY MUD #121	Fort Bend County MUD No. 121	FORT BEND	BRAZOS	3													●					●						●					●				50.00	%
	FORT BEND COUNTY MUD #121	Fort Bend County MUD No. 121	FORT BEND	BRAZOS	4													●			●	●		●		●									●			0.00	0
	FORT BEND COUNTY MUD #121	Fort Bend County MUD No. 121	FORT BEND	BRAZOS	5	●			●													●	●							●					●			0.00	0
	FORT BEND COUNTY MUD #129	Fort Bend County MUD No. 129	FORT BEND	BRAZOS	1			●													●							●							●			0.00	0
	FORT BEND COUNTY MUD #129	Fort Bend County MUD No. 129	FORT BEND	BRAZOS	2			●													●	●	●												●			0.00	0
	FORT BEND COUNTY MUD #129	Fort Bend County MUD No. 129	FORT BEND	BRAZOS	3			●												●				●			●		●								●	0.00	0
	FORT BEND COUNTY MUD #129	Fort Bend County MUD No. 129	FORT BEND	BRAZOS	4			●														●	●														●	0.00	0
	FORT BEND COUNTY MUD #129	Fort Bend County MUD No. 129	FORT BEND	BRAZOS	Emergency													●												●						●		0.00	Other
	FORT BEND COUNTY MUD #23	Fort Bend County MUD No. 23	FORT BEND	SAN JACINTO-BRAZOS	1			●													●							●			●							10.00	%
	FORT BEND COUNTY MUD #23	Fort Bend County MUD No. 23	FORT BEND	SAN JACINTO-BRAZOS	2			●														●	●								●							15.00	%
	FORT BEND COUNTY MUD #23	Fort Bend County MUD No. 23	FORT BEND	SAN JACINTO-BRAZOS	3			●												●		●		●			●		●		●							20.00	%
	FORT BEND COUNTY MUD #23	Fort Bend County MUD No. 23	FORT BEND	SAN JACINTO-BRAZOS	Emergency													●												●						●		0.00	Other
	FORT BEND COUNTY MUD #25	Fort Bend County MUD No. 25	FORT BEND	SAN JACINTO-BRAZOS	1			●																				●			●							10.00	%
	FORT BEND COUNTY MUD #25	Fort Bend County MUD No. 25	FORT BEND	SAN JACINTO-BRAZOS	2			●														●									●							10.00	%
	FORT BEND COUNTY MUD #25	Fort Bend County MUD No. 25	FORT BEND	SAN JACINTO-BRAZOS	3			●													●	●	●								●							10.00	%
	FORT BEND COUNTY MUD #25	Fort Bend County MUD No. 25	FORT BEND	SAN JACINTO-BRAZOS	4			●												●		●		●					●		●							10.00	%
	FORT BEND COUNTY MUD #25	Fort Bend County MUD No. 25	FORT BEND	SAN JACINTO-BRAZOS	Emergency													●												●						●		0.00	Other
	FREEPORT	City of Freeport	BRAZORIA	SAN JACINTO-BRAZOS	1			●										●				●						●			●							10.00	%
	FREEPORT	City of Freeport	BRAZORIA	SAN JACINTO-BRAZOS	2			●										●			●	●		●							●							20.00	%
	FREEPORT	City of Freeport	BRAZORIA	SAN JACINTO-BRAZOS	3			●										●			●					●	●				●							30.00	%
	FREEPORT	City of Freeport	BRAZORIA	SAN JACINTO-BRAZOS	4			●										●			●	●		●		●					●							40.00	%
	FREEPORT	City of Freeport	BRAZORIA	SAN JACINTO-BRAZOS	5	●			●															●			●				●							45.00	%
	FRIENDSWOOD	City of Friendswood	GALVESTON	SAN JACINTO-BRAZOS	1			●														●						●			●							20.00	%
	FRIENDSWOOD	City of Friendswood	GALVESTON	SAN JACINTO-BRAZOS	2			●													●	●		●							●							18.00	%
	FRIENDSWOOD	City of Friendswood	GALVESTON	SAN JACINTO-BRAZOS	3	●		●	●															●			●				●							35.00	%
	GALENA PARK	City of Galena Park	HARRIS	SAN JACINTO	1			●		●								●				●						●			●							10.00	%
	GALENA PARK	City of Galena Park	HARRIS	SAN JACINTO	2			●		●								●			●	●		●							●							15.00	%
	GALENA PARK	City of Galena Park	HARRIS	SAN JACINTO	3	●		●	●												●			●		●					●							25.00	%
	GALENA PARK	City of Galena Park	HARRIS	SAN JACINTO	4	●		●	●												●	●		●		●					●							35.00	%
	GREEN TRAILS MUD	Green Trails MUD	HARRIS	SAN JACINTO	1											●												●			●							5.00	%
	GREEN TRAILS MUD	Green Trails MUD	HARRIS	SAN JACINTO	2			●													●	●		●							●							6.25	%
	GREEN TRAILS MUD	Green Trails MUD	HARRIS	SAN JACINTO	3			●	●					●	●						●			●		●					●							6.25	%
	GREEN TRAILS MUD	Green Trails MUD (Interconnect closed)	HARRIS	SAN JACINTO	1			●																				●			●							5.00	%
	GREEN TRAILS MUD	Green Trails MUD (Interconnect closed)	HARRIS	SAN JACINTO	3			●	●					●	●						●			●		●					●							6.25	%
	GREEN TRAILS MUD	Green Trails MUD (Interconnect operational)	HARRIS	SAN JACINTO	1									●	●													●			●							5.00	%
	GREEN TRAILS MUD	Green Trails MUD (Interconnect operational)	HARRIS	SAN JACINTO	2									●	●						●	●		●							●							6.25	%
	GREEN TRAILS MUD	Green Trails MUD (Interconnect operational)	HARRIS	SAN JACINTO	3				●					●	●						●			●		●					●							6.25	%
	GROVETON	City of Groveton	TRINITY		1			●													●		●								●							10.00	%
	GROVETON	City of Groveton	TRINITY		2			●	●												●	●		●						●	●							20.00	%
	GROVETON	City of Groveton	TRINITY		3				●													●		●						●					●			0.00	Other
	HARRIS COUNTY MUD #106	Harris County MUD No. 106	HARRIS	SAN JACINTO	1			●																				●			●							10.00	%
	HARRIS COUNTY MUD #106	Harris County MUD No. 106	HARRIS	SAN JACINTO	2			●														●	●								●							15.00	%
	HARRIS COUNTY MUD #106	Harris County MUD No. 106	HARRIS	SAN JACINTO	3			●												●		●		●			●		●		●							20.00	%
	HARRIS COUNTY MUD #106	Harris County MUD No. 106	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	HARRIS COUNTY MUD #153	Harris County MUD No. 153	HARRIS	SAN JACINTO	1											●					●		●					●			●							5.00	%
	HARRIS COUNTY MUD #153	Harris County MUD No. 153	HARRIS	SAN JACINTO	2											●					●	●								●	●							10.00	%
	HARRIS COUNTY MUD #153	Harris County MUD No. 153	HARRIS	SAN JACINTO	3											●						●	●								●							16.00	%
	HARRIS COUNTY MUD #153	Harris County MUD No. 153	HARRIS	SAN JACINTO	4											●				●		●		●			●		●		●							25.00	%
	HARRIS COUNTY MUD #153	Harris County MUD No. 153	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	HARRIS COUNTY MUD #158	Harris County MUD No. 158	HARRIS	SAN JACINTO	1												●													●						●		0.00	Other
	HARRIS COUNTY MUD #158	Harris County MUD No. 158	HARRIS	SAN JACINTO	2												●													●						●		0.00	Other
	HARRIS COUNTY MUD #158	Harris County MUD No. 158	HARRIS	SAN JACINTO	3												●													●						●		0.00	Other
	HARRIS COUNTY MUD #158	Harris County MUD No. 158	HARRIS	SAN JACINTO	4												●													●						●		0.00	Other
	HARRIS COUNTY MUD #158	Harris County MUD No. 158	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	HARRIS COUNTY MUD #278	Harris County MUD No. 278	HARRIS	SAN JACINTO	1			●																				●			●							10.00	%
	HARRIS COUNTY MUD #278	Harris County MUD No. 278	HARRIS	SAN JACINTO	2			●													●	●		●							●							20.00	%
	HARRIS COUNTY MUD #278	Harris County MUD No. 278	HARRIS	SAN JACINTO	3			●													●			●		●					●							30.00	%
	HARRIS COUNTY MUD #290	Harris County MUD No. 290	HARRIS	SAN JACINTO	1			●																				●			●							10.00	%
	HARRIS COUNTY MUD #290	Harris County MUD No. 290	HARRIS	SAN JACINTO	2			●														●	●								●							15.00	%
	HARRIS COUNTY MUD #290	Harris County MUD No. 290	HARRIS	SAN JACINTO	3			●												●		●		●			●		●		●							20.00	%
	HARRIS COUNTY MUD #290	Harris County MUD No. 290	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	HARRIS COUNTY MUD #345	Harris County MUD No. 345	HARRIS	SAN JACINTO	1											●												●			●							10.00	%
	HARRIS COUNTY MUD #345	Harris County MUD No. 345	HARRIS	SAN JACINTO	2											●					●	●		●							●							15.00	%
	HARRIS COUNTY MUD #345	Harris County MUD No. 345	HARRIS	SAN JACINTO	3				●							●					●			●		●					●							20.00	%
	HARRIS COUNTY MUD #49	Harris County MUD No. 49	HARRIS	SAN JACINTO	1			●																				●			●							5.00	%
	HARRIS COUNTY MUD #49	Harris County MUD No. 49	HARRIS	SAN JACINTO	2			●														●									●							10.00	%
	HARRIS COUNTY MUD #49	Harris County MUD No. 49	HARRIS	SAN JACINTO	3			●												●		●		●			●				●							15.00	%
	HARRIS COUNTY MUD #49	Harris County MUD No. 49	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	HARRIS COUNTY MUD #50	Harris County MUD No. 50	HARRIS	SAN JACINTO	1			●													●	●		●							●							15.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	HARRIS COUNTY MUD #50	Harris County MUD No. 50	HARRIS	SAN JACINTO	2			•													•	•		•		•					•							25.00	%
	HARRIS COUNTY MUD #50	Harris County MUD No. 50	HARRIS	SAN JACINTO	3	•			•															•			•									•		0.00	Other
	HARRIS COUNTY MUD #96	Harris County MUD No. 96	HARRIS	SAN JACINTO	1			•													•										•							10.00	%
	HARRIS COUNTY MUD #96	Harris County MUD No. 96	HARRIS	SAN JACINTO	2			•													•	•		•							•							10.00	%
	HARRIS COUNTY MUD #96	Harris County MUD No. 96	HARRIS	SAN JACINTO	3			•														•					•				•							10.00	%
	HARRIS COUNTY MUD #96	Harris County MUD No. 96	HARRIS	SAN JACINTO	4			•																					•		•							10.00	%
	HOUSTON	Baybrook MUD No. 1	HARRIS	SAN JACINTO-BRAZOS	1			•																•				•			•							10.00	%
	HOUSTON	Baybrook MUD No. 1	HARRIS	SAN JACINTO-BRAZOS	2			•													•	•									•							20.00	%
	HOUSTON	Baybrook MUD No. 1	HARRIS	SAN JACINTO-BRAZOS	3			•												•		•		•			•				•							30.00	%
	HOUSTON	Baybrook MUD No. 1	HARRIS	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	HOUSTON	City of Houston	HARRIS	SAN JACINTO	1									•							•	•	•					•		•	•							10.00	%
	HOUSTON	City of Houston	HARRIS	SAN JACINTO	2			•						•	•						•	•								•	•							10.00	%
	HOUSTON	City of Houston	HARRIS	SAN JACINTO	3			•						•	•							•		•			•				•							20.00	%
	HOUSTON	City of Houston	HARRIS	SAN JACINTO	4			•						•	•							•		•			•				•							35.00	%
	HOUSTON	City of Houston	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	HOUSTON	Clear Lake City Water Authority	HARRIS	SAN JACINTO-BRAZOS	1			•														•	•		•			•		•	•							10.00	%
	HOUSTON	Clear Lake City Water Authority	HARRIS	SAN JACINTO-BRAZOS	2			•													•	•	•	•						•	•							15.00	%
	HOUSTON	Clear Lake City Water Authority	HARRIS	SAN JACINTO-BRAZOS	3			•														•	•	•						•	•							20.00	%
	HOUSTON	Clear Lake City Water Authority	HARRIS	SAN JACINTO-BRAZOS	4			•	•										•	•		•	•							•						•	•	0.00	Other
	HOUSTON	Clear Lake City Water Authority	HARRIS	SAN JACINTO-BRAZOS	5													•					•						•							•		0.00	Other
	HOUSTON	Harris County MUD No. 344	HARRIS	SAN JACINTO	1			•								•												•	•		•							5.00	%
	HOUSTON	Harris County MUD No. 344	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							5.00	%
	HOUSTON	Harris County MUD No. 344	HARRIS	SAN JACINTO	3			•								•													•		•							10.00	%
	HOUSTON	Harris County MUD No. 344	HARRIS	SAN JACINTO	4			•						•		•								•		•	•				•							15.00	%
	HUMBLE	City of Humble	HARRIS	SAN JACINTO	1			•										•					•												•			0.00	Other
	HUMBLE	City of Humble	HARRIS	SAN JACINTO	2			•						•	•							•	•												•			0.00	Other
	HUMBLE	City of Humble	HARRIS	SAN JACINTO	3			•	•					•				•				•	•	•											•			0.00	Other
	HUNTSVILLE	City of Huntsville	WALKER		1			•									•	•			•													•				80.00	%
	HUNTSVILLE	City of Huntsville	WALKER		2			•						•				•			•			•						•	•			•				80.00	%
	HUNTSVILLE	City of Huntsville	WALKER		3	•		•	•									•				•		•						•				•	•			50.00	%
	JACINTO CITY	Jacinto City	HARRIS	SAN JACINTO	1			•		•								•			•	•						•			•							10.00	%
	JACINTO CITY	Jacinto City	HARRIS	SAN JACINTO	2			•		•								•			•	•		•							•							15.00	%
	JACINTO CITY	Jacinto City	HARRIS	SAN JACINTO	3	•		•	•												•			•		•					•							25.00	%
	JACINTO CITY	Jacinto City	HARRIS	SAN JACINTO	4	•		•	•															•		•	•				•							35.00	%
	JACINTO CITY	Jacinto City	HARRIS	SAN JACINTO	6			•		•								•											•							•		0.00	Other
	JERSEY VILLAGE	Jersey Village City	HARRIS	SAN JACINTO	1			•										•			•	•												•				90.00	%
	JERSEY VILLAGE	Jersey Village City	HARRIS	SAN JACINTO	2			•										•			•	•		•							•							5.00	%
	JERSEY VILLAGE	Jersey Village City	HARRIS	SAN JACINTO	3			•										•			•			•		•					•							10.00	%
	JERSEY VILLAGE	Jersey Village City	HARRIS	SAN JACINTO	4	•		•														•		•		•	•				•							15.00	%
	KATY	Katy DCP	FORT BEND	SAN JACINTO	1	•		•	•														•		•			•		•	•							0.00	%
	KATY	Katy DCP	FORT BEND	SAN JACINTO	2	•		•	•													•			•					•	•							2.00	%
	KATY	Katy DCP	FORT BEND	SAN JACINTO	3	•		•	•												•	•		•							•							5.00	%
	KATY	Katy DCP	FORT BEND	SAN JACINTO	4	•		•	•													•		•							•							10.00	%
	LA MARQUE	City of La Marque	GALVESTON	SAN JACINTO-BRAZOS	1			•		•								•				•						•			•							10.00	%
	LA MARQUE	City of La Marque	GALVESTON	SAN JACINTO-BRAZOS	2			•		•								•			•	•		•							•							15.00	%
	LA MARQUE	City of La Marque	GALVESTON	SAN JACINTO-BRAZOS	3	•		•	•												•			•		•					•							25.00	%
	LA MARQUE	City of La Marque	GALVESTON	SAN JACINTO-BRAZOS	4	•		•	•												•	•		•		•					•							35.00	%
	LA MARQUE	City of La Marque	GALVESTON	SAN JACINTO-BRAZOS	5	•		•	•															•			•				•							45.00	%
	LA PORTE	City of La Porte	HARRIS	SAN JACINTO	1			•															•							•	•							10.00	%
	LA PORTE	City of La Porte	HARRIS	SAN JACINTO	2			•													•	•	•	•							•							15.00	%
	LA PORTE	City of La Porte	HARRIS	SAN JACINTO	3			•														•					•				•							25.00	%
	LA PORTE	City of La Porte	HARRIS	SAN JACINTO	4			•														•								•	•							30.00	%
	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	Lake Livingston Water Supply	POLK	TRINITY	1			•										•				•	•													•		0.00	Other
	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	Lake Livingston Water Supply	POLK	TRINITY	2			•															•				•									•		0.00	Other
	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	Lake Livingston Water Supply	POLK	TRINITY	3			•	•									•		•		•					•									•		0.00	Other
	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	Lake Livingston Water Supply & Sewer Service Corp.	POLK	TRINITY	1			•						•				•				•	•													•		0.00	Other
	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	Lake Livingston Water Supply & Sewer Service Corp.	POLK	TRINITY	2			•															•				•									•		0.00	Other
	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	Lake Livingston Water Supply & Sewer Service Corp.	POLK	TRINITY	3			•	•									•		•		•					•									•		0.00	Other
	LEAGUE CITY	League City	GALVESTON	SAN JACINTO-BRAZOS	1	•		•	•					•							•	•						•			•							10.00	%
	LEAGUE CITY	League City	GALVESTON	SAN JACINTO-BRAZOS	2	•		•	•												•	•		•							•							25.00	%
	LEAGUE CITY	League City	GALVESTON	SAN JACINTO-BRAZOS	3	•		•	•															•			•				•							40.00	%
	LIVINGSTON	City of Livingston	POLK	TRINITY	1			•				•									•	•						•			•							5.00	%
	LIVINGSTON	City of Livingston	POLK	TRINITY	2			•				•									•	•		•							•							15.00	%
	LIVINGSTON	City of Livingston	POLK	TRINITY	3			•				•												•			•				•							25.00	%
	LIVINGSTON	City of Livingston	POLK	TRINITY	4	•		•	•									•			•	•		•			•				•							35.00	%
	LIVINGSTON	City of Livingston	POLK	TRINITY	5	•			•			•								•		•		•			•			•	•							50.00	%
	MISSOURI CITY	Quail Valley Utility District	FORT BEND	SAN JACINTO-BRAZOS	1			•										•				•						•			•							10.00	%
	MISSOURI CITY	Quail Valley Utility District	FORT BEND	SAN JACINTO-BRAZOS	2			•										•			•	•		•							•							15.00	%
	MISSOURI CITY	Quail Valley Utility District	FORT BEND	SAN JACINTO-BRAZOS	3			•										•			•	•		•		•					•							20.00	%
	MISSOURI CITY	Quail Valley Utility District	FORT BEND	SAN JACINTO-BRAZOS	4	•			•															•			•									•		0.00	Other
	MONTGOMERY COUNTY MUD #19	Montgomery County MUD No. 19	MONTGOMERY	SAN JACINTO	1			•														•						•			•							5.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	MONTGOMERY COUNTY MUD #19	Montgomery County MUD No. 19	MONTGOMERY	SAN JACINTO	2			•															•										•							10.00	%
	MONTGOMERY COUNTY MUD #19	Montgomery County MUD No. 19	MONTGOMERY	SAN JACINTO	3			•													•		•		•								•							15.00	%
	MONTGOMERY COUNTY MUD #19	Montgomery County MUD No. 19	MONTGOMERY	SAN JACINTO	4	•			•																					•	•						•		5.00	%
	MONTGOMERY COUNTY MUD #83	Montgomery County MUD No. 83	MONTGOMERY	SAN JACINTO	1			•																					•			•						•		15.00	%
	MONTGOMERY COUNTY MUD #83	Montgomery County MUD No. 83	MONTGOMERY	SAN JACINTO	2			•													•	•		•								•						•		18.00	Hours
	MONTGOMERY COUNTY MUD #83	Montgomery County MUD No. 83	MONTGOMERY	SAN JACINTO	3			•	•						•						•			•		•						•						•		20.00	Hours
	MONTGOMERY COUNTY MUD #89	Montgomery County MUD No. 89	MONTGOMERY	SAN JACINTO	1			•								•					•								•			•							10.00	%
	MONTGOMERY COUNTY MUD #89	Montgomery County MUD No. 89	MONTGOMERY	SAN JACINTO	2			•								•						•	•	•								•							15.00	%
	MONTGOMERY COUNTY MUD #89	Montgomery County MUD No. 89	MONTGOMERY	SAN JACINTO	3			•								•				•		•		•			•		•			•							20.00	%
	MONTGOMERY COUNTY MUD #89	Montgomery County MUD No. 89	MONTGOMERY	SAN JACINTO	4			•																						•							•		0.00	Other
	MONTGOMERY COUNTY MUD #89	Montgomery County MUD No. 89	MONTGOMERY	SAN JACINTO	Emergency													•												•							•		0.00	Other
	MONTGOMERY COUNTY MUD #94	Montgomery County MUD No. 94	MONTGOMERY	SAN JACINTO	1			•																					•			•							5.00	%
	MONTGOMERY COUNTY MUD #94	Montgomery County MUD No. 94	MONTGOMERY	SAN JACINTO	2			•													•	•		•								•							5.00	%
	MONTGOMERY COUNTY MUD #94	Montgomery County MUD No. 94	MONTGOMERY	SAN JACINTO	3			•													•			•		•						•							5.00	%
	MONTGOMERY COUNTY MUD #94	Montgomery County MUD No. 94	MONTGOMERY	SAN JACINTO	4			•	•						•							•		•			•					•							5.00	%
	NASSAU BAY	City of Nassau Bay	HARRIS	SAN JACINTO	1			•																					•			•							5.00	%
	NASSAU BAY	City of Nassau Bay	HARRIS	SAN JACINTO	2			•														•										•							10.00	%
	NASSAU BAY	City of Nassau Bay	HARRIS	SAN JACINTO	3			•												•		•		•			•					•							15.00	%
	NASSAU BAY	City of Nassau Bay	HARRIS	SAN JACINTO	Emergency													•												•							•		0.00	Other
	NEW CANEY MUD	New Caney MUD	MONTGOMERY	SAN JACINTO	1			•						•				•				•							•			•						•	10.00	%
	NEW CANEY MUD	New Caney MUD	MONTGOMERY	SAN JACINTO	2			•	•					•				•			•	•		•								•							15.00	%
	NEW CANEY MUD	New Caney MUD	MONTGOMERY	SAN JACINTO	3	•		•	•												•			•		•						•							25.00	%
	NEW CANEY MUD	New Caney MUD	MONTGOMERY	SAN JACINTO	4	•			•									•			•	•		•		•						•							35.00	%
	NEWPORT MUD	Newport MUD	HARRIS	SAN JACINTO	1			•				•	•									•						•			•							5.00	%
	NEWPORT MUD	Newport MUD	HARRIS	SAN JACINTO	2			•				•	•						•													•	•					10.00	%
	NEWPORT MUD	Newport MUD	HARRIS	SAN JACINTO	3			•				•										•										•	•					20.00	%
	NEWPORT MUD	Newport MUD	HARRIS	SAN JACINTO	4			•				•										•		•								•	•					30.00	%
	NEWPORT MUD	Newport MUD	HARRIS	SAN JACINTO	Emergency	•			•									•												•							•		0.00	Other
	NHCRWA	Bammel Utility District	HARRIS	SAN JACINTO	1											•		•					•						•			•							5.00	%
	NHCRWA	Bammel Utility District	HARRIS	SAN JACINTO	2											•		•			•	•										•							10.00	%
	NHCRWA	Bammel Utility District	HARRIS	SAN JACINTO	3											•		•				•					•					•							15.00	%
	NHCRWA	Bammel Utility District	HARRIS	SAN JACINTO	4											•		•				•							•			•							20.00	%
	NHCRWA	Bammel Utility District	HARRIS	SAN JACINTO	5													•				•								•					•			0.00	Other
	NHCRWA	Bridgestone MUD	HARRIS	SAN JACINTO	1													•			•		•		•			•			•					•			55.00	PSI
	NHCRWA	Bridgestone MUD	HARRIS	SAN JACINTO	2													•			•	•		•						•	•					•			50.00	PSI
	NHCRWA	Bridgestone MUD	HARRIS	SAN JACINTO	3											•		•								•	•				•					•			45.00	PSI
	NHCRWA	Bridgestone MUD	HARRIS	SAN JACINTO	4													•				•									•							20.00	%
	NHCRWA	CNP Utility District	HARRIS	SAN JACINTO	1											•												•			•							15.00	%
	NHCRWA	CNP Utility District	HARRIS	SAN JACINTO	2											•					•	•		•							•							25.00	%
	NHCRWA	CNP Utility District	HARRIS	SAN JACINTO	3				•						•	•					•			•		•						•							33.00	%
	NHCRWA	Cy-Champ Public Utility District	HARRIS	SAN JACINTO	1											•		•					•						•			•							5.00	%
	NHCRWA	Cy-Champ Public Utility District	HARRIS	SAN JACINTO	2											•		•			•	•										•							10.00	%
	NHCRWA	Cy-Champ Public Utility District	HARRIS	SAN JACINTO	3											•		•				•					•					•							15.00	%
	NHCRWA	Cy-Champ Public Utility District	HARRIS	SAN JACINTO	4											•		•				•							•			•							20.00	%
	NHCRWA	Cy-Champ Public Utility District	HARRIS	SAN JACINTO	5													•				•								•					•			0.00	Other
	NHCRWA	Cypress Creek Utility District	HARRIS	SAN JACINTO	1		•															•						•			•							10.00	%
	NHCRWA	Cypress Creek Utility District	HARRIS	SAN JACINTO	2			•													•	•		•								•							18.00	%
	NHCRWA	Cypress Creek Utility District	HARRIS	SAN JACINTO	3			•						•							•	•		•		•						•							25.00	%
	NHCRWA	Cypress Creek Utility District	HARRIS	SAN JACINTO	4	•			•													•		•			•									•			0.00	Other
	NHCRWA	Cypress Forest PUD	HARRIS	SAN JACINTO	1											•					•							•			•							10.00	%
	NHCRWA	Cypress Forest PUD	HARRIS	SAN JACINTO	2			•														•	•								•					•			16.00	Other
	NHCRWA	Cypress Forest PUD	HARRIS	SAN JACINTO	3			•														•		•			•		•		•					•			25.00	%
	NHCRWA	Cypress Forest PUD	HARRIS	SAN JACINTO	Emergency													•												•							•		0.00	Other
	NHCRWA	Cypress Hill MUD No. 1	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	NHCRWA	Cypress Hill MUD No. 1	HARRIS	SAN JACINTO	2											•						•									•							16.00	%
	NHCRWA	Cypress Hill MUD No. 1	HARRIS	SAN JACINTO	3											•						•		•			•					•							25.00	%
	NHCRWA	Cypress Hill MUD No. 1	HARRIS	SAN JACINTO	Emergency													•												•							•		0.00	Other
	NHCRWA	Cypresswood UD	HARRIS	SAN JACINTO	1			•								•					•							•			•							10.00	%
	NHCRWA	Cypresswood UD	HARRIS	SAN JACINTO	2			•								•						•	•								•							15.00	%
	NHCRWA	Cypresswood UD	HARRIS	SAN JACINTO	3			•								•				•		•		•			•		•			•							20.00	%
	NHCRWA	Cypresswood UD	HARRIS	SAN JACINTO	4	•			•													•		•			•									•			0.00	Other
	NHCRWA	Cypresswood UD	HARRIS	SAN JACINTO	Emergency													•												•							•		0.00	Other
	NHCRWA	Dowdell PUD	HARRIS	SAN JACINTO	1		|•|																														0.00	0
	NHCRWA	Dowdell PUD	HARRIS	SAN JACINTO	2		|•|																														0.00	0
	NHCRWA	Dowdell PUD	HARRIS	SAN JACINTO	3		|•|																														0.00	0
	NHCRWA	Emerald Forest Utility District	HARRIS	SAN JACINTO	1			•													•							•			•							10.00	%
	NHCRWA	Emerald Forest Utility District	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	NHCRWA	Emerald Forest Utility District	HARRIS	SAN JACINTO	3			•												•		•		•			•		•			•							20.00	%
	NHCRWA	Emerald Forest Utility District	HARRIS	SAN JACINTO	4			•												•		•		•			•		•			•							25.00	%
	NHCRWA	Emerald Forest Utility District	HARRIS	SAN JACINTO	Emergency													•												•							•		0.00	Other
	NHCRWA	Encanto Real Utility District	HARRIS	SAN JACINTO	1											•												•			•							15.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	NHCRWA	Encanto Real Utility District	HARRIS	SAN JACINTO	2											•					•	•		•							•							25.00	%
	NHCRWA	Encanto Real Utility District	HARRIS	SAN JACINTO	3				•							•					•			•		•					•							33.00	%
	NHCRWA	Harris County FWSD No. 61 (Retail)	HARRIS	SAN JACINTO	1			•														•						•			•							10.00	%
	NHCRWA	Harris County FWSD No. 61 (Retail)	HARRIS	SAN JACINTO	2			•													•	•		•							•							15.00	%
	NHCRWA	Harris County FWSD No. 61 (Retail)	HARRIS	SAN JACINTO	3			•										•			•			•							•							20.00	%
	NHCRWA	Harris County FWSD No. 61 (Retail)	HARRIS	SAN JACINTO	4													•			•	•		•		•					•							40.00	%
	NHCRWA	Harris County FWSD No. 61 (Retail)	HARRIS	SAN JACINTO	5	•			•									•						•			•				•							50.00	%
	NHCRWA	Harris County FWSD No. 61 (Retail)	HARRIS	SAN JACINTO	6													•											•							•		0.00	Other
	NHCRWA	Harris County FWSD No. 61 (Wholesale)	HARRIS	SAN JACINTO	1			•															•								•							10.00	%
	NHCRWA	Harris County FWSD No. 61 (Wholesale)	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	NHCRWA	Harris County FWSD No. 61 (Wholesale)	HARRIS	SAN JACINTO	3			•										•				•	•								•							20.00	%
	NHCRWA	Harris County FWSD No. 61 (Wholesale)	HARRIS	SAN JACINTO	5	•			•										•				•							•						•		0.00	Other
	NHCRWA	Harris County ID No. 18	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	NHCRWA	Harris County ID No. 18	HARRIS	SAN JACINTO	2											•						•	•								•							15.00	%
	NHCRWA	Harris County ID No. 18	HARRIS	SAN JACINTO	3											•				•				•			•		•		•							20.00	%
	NHCRWA	Harris County ID No. 18	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 1	HARRIS	SAN JACINTO	1			•													•		•		•			•			•							5.00	%
	NHCRWA	Harris County MUD No. 1	HARRIS	SAN JACINTO	2			•													•	•								•	•							10.00	%
	NHCRWA	Harris County MUD No. 1	HARRIS	SAN JACINTO	3			•														•		•							•							15.00	%
	NHCRWA	Harris County MUD No. 1	HARRIS	SAN JACINTO	4			•														•							•		•							20.00	%
	NHCRWA	Harris County MUD No. 1	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 104	HARRIS	SAN JACINTO	1			•															•					•			•							5.00	%
	NHCRWA	Harris County MUD No. 104	HARRIS	SAN JACINTO	2			•													•	•								•	•							10.00	%
	NHCRWA	Harris County MUD No. 104	HARRIS	SAN JACINTO	3			•														•					•				•							15.00	%
	NHCRWA	Harris County MUD No. 104	HARRIS	SAN JACINTO	4			•														•							•		•							20.00	%
	NHCRWA	Harris County MUD No. 104	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 168	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	NHCRWA	Harris County MUD No. 168	HARRIS	SAN JACINTO	2											•						•	•								•							15.00	%
	NHCRWA	Harris County MUD No. 168	HARRIS	SAN JACINTO	3											•				•		•		•					•		•							20.00	%
	NHCRWA	Harris County MUD No. 168	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 18	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	NHCRWA	Harris County MUD No. 18	HARRIS	SAN JACINTO	2											•						•	•	•			•				•							16.00	%
	NHCRWA	Harris County MUD No. 18	HARRIS	SAN JACINTO	3											•				•		•		•			•		•		•							25.00	%
	NHCRWA	Harris County MUD No. 18	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 202	HARRIS	SAN JACINTO	1			•										•										•			•							10.00	%
	NHCRWA	Harris County MUD No. 202	HARRIS	SAN JACINTO	2			•										•			•	•		•							•							15.00	%
	NHCRWA	Harris County MUD No. 202	HARRIS	SAN JACINTO	3			•							•						•			•		•					•							20.00	%
	NHCRWA	Harris County MUD No. 202	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 211	HARRIS	SAN JACINTO	1											•												•			•							15.00	%
	NHCRWA	Harris County MUD No. 211	HARRIS	SAN JACINTO	2											•					•	•		•							•							25.00	%
	NHCRWA	Harris County MUD No. 211	HARRIS	SAN JACINTO	3										•	•					•			•		•					•							33.00	%
	NHCRWA	Harris County MUD No. 220	HARRIS	SAN JACINTO	1												•											•			•							8.00	%
	NHCRWA	Harris County MUD No. 220	HARRIS	SAN JACINTO	2												•					•									•							16.00	%
	NHCRWA	Harris County MUD No. 220	HARRIS	SAN JACINTO	3												•					•									•							25.00	%
	NHCRWA	Harris County MUD No. 220	HARRIS	SAN JACINTO	4												•					•									•							33.00	%
	NHCRWA	Harris County MUD No. 220	HARRIS	SAN JACINTO	5												•					•														•		0.00	Other
	NHCRWA	Harris County MUD No. 220	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 222	HARRIS	SAN JACINTO	1			•																				•			•					•		16.00	Hours
	NHCRWA	Harris County MUD No. 222	HARRIS	SAN JACINTO	2			•														•									•					•		16.00	Hours
	NHCRWA	Harris County MUD No. 222	HARRIS	SAN JACINTO	3			•														•	•								•					•		16.00	%
	NHCRWA	Harris County MUD No. 222	HARRIS	SAN JACINTO	4			•												•		•		•			•		•		•					•		25.00	%
	NHCRWA	Harris County MUD No. 222	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 230	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	NHCRWA	Harris County MUD No. 230	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	NHCRWA	Harris County MUD No. 230	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							25.00	%
	NHCRWA	Harris County MUD No. 230	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Harris County MUD No. 233	HARRIS	SAN JACINTO	1											•					•		•					•			•							15.00	%
	NHCRWA	Harris County MUD No. 233	HARRIS	SAN JACINTO	2											•			•		•	•		•							•							25.00	%
	NHCRWA	Harris County MUD No. 233	HARRIS	SAN JACINTO	3											•								•		•	•				•							33.00	%
	NHCRWA	Harris County MUD No. 248	HARRIS	SAN JACINTO	1			•														•						•			•							10.00	%
	NHCRWA	Harris County MUD No. 248	HARRIS	SAN JACINTO	2			•													•	•		•							•							15.00	%
	NHCRWA	Harris County MUD No. 248	HARRIS	SAN JACINTO	3			•													•			•			•				•							20.00	%
	NHCRWA	Harris County MUD No. 248	HARRIS	SAN JACINTO	4													•			•	•		•		•					•							40.00	%
	NHCRWA	Harris County MUD No. 248	HARRIS	SAN JACINTO	5	•			•									•						•			•				•							50.00	%
	NHCRWA	Harris County MUD No. 248	HARRIS	SAN JACINTO	6													•											•							•		0.00	Other
	NHCRWA	Harris County MUD No. 249	HARRIS	SAN JACINTO	1			•																				•			•					•		15.00	%
	NHCRWA	Harris County MUD No. 249	HARRIS	SAN JACINTO	2			•													•	•		•							•					•		25.00	%
	NHCRWA	Harris County MUD No. 249	HARRIS	SAN JACINTO	3			•	•						•						•			•			•				•					•		33.00	%
	NHCRWA	Harris County MUD No. 25	HARRIS	SAN JACINTO	1											•		•			•		•					•			•							5.00	%
	NHCRWA	Harris County MUD No. 25	HARRIS	SAN JACINTO	2											•		•			•									•	•							10.00	%
	NHCRWA	Harris County MUD No. 25	HARRIS	SAN JACINTO	3											•		•				•		•							•							15.00	%

						Trigger Type													Response Type													Reduction Type							Reduction	
WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	NHCRWA	Harris County MUD No. 25	HARRIS	SAN JACINTO	4											•		•			•							•		•						20.00	%
	NHCRWA	Harris County MUD No. 25	HARRIS	SAN JACINTO	Emergency													•			•								•					•		0.00	Other
	NHCRWA	Harris County MUD No. 26	HARRIS	SAN JACINTO	1											•													•			•						5.00	%
	NHCRWA	Harris County MUD No. 26	HARRIS	SAN JACINTO	2											•						•	•		•						•	•						10.00	%
	NHCRWA	Harris County MUD No. 26	HARRIS	SAN JACINTO	3											•														•		•						15.00	%
	NHCRWA	Harris County MUD No. 26	HARRIS	SAN JACINTO	4											•														•		•						20.00	%
	NHCRWA	Harris County MUD No. 275	HARRIS	SAN JACINTO	1			•												•							•			•						5.00	%
	NHCRWA	Harris County MUD No. 275	HARRIS	SAN JACINTO	2			•													•								•						10.00	%
	NHCRWA	Harris County MUD No. 275	HARRIS	SAN JACINTO	3			•											•		•		•			•					•						15.00	%
	NHCRWA	Harris County MUD No. 275	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 280	HARRIS	SAN JACINTO	1											•													•			•						15.00	%
	NHCRWA	Harris County MUD No. 280	HARRIS	SAN JACINTO	2											•						•	•		•						•	•						25.00	%
	NHCRWA	Harris County MUD No. 280	HARRIS	SAN JACINTO	3											•						•			•		•					•						35.00	%
	NHCRWA	Harris County MUD No. 282	HARRIS	SAN JACINTO	1													•										•								•			0.00	0
	NHCRWA	Harris County MUD No. 282	HARRIS	SAN JACINTO	2													•			•	•													•			0.00	0
	NHCRWA	Harris County MUD No. 282	HARRIS	SAN JACINTO	3										•			•			•	•		•											•			0.00	0
	NHCRWA	Harris County MUD No. 316	HARRIS	SAN JACINTO	1			•																			•			•						5.00	%
	NHCRWA	Harris County MUD No. 316	HARRIS	SAN JACINTO	2			•												•	•		•						•						10.00	%
	NHCRWA	Harris County MUD No. 316	HARRIS	SAN JACINTO	3			•						•									•		•	•				•						9.00	%
	NHCRWA	Harris County MUD No. 358	HARRIS	SAN JACINTO	1			•																			•			•						10.00	%
	NHCRWA	Harris County MUD No. 358	HARRIS	SAN JACINTO	2			•													•	•							•						15.00	%
	NHCRWA	Harris County MUD No. 358	HARRIS	SAN JACINTO	3			•											•		•		•			•		•		•						20.00	%
	NHCRWA	Harris County MUD No. 358	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 365	HARRIS	SAN JACINTO	1											•													•			•						10.00	%
	NHCRWA	Harris County MUD No. 365	HARRIS	SAN JACINTO	2											•						•	•							•						15.00	%
	NHCRWA	Harris County MUD No. 365	HARRIS	SAN JACINTO	3											•						•	•	•					•		•						20.00	%
	NHCRWA	Harris County MUD No. 365	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 367	HARRIS	SAN JACINTO	1			•																			•								•	0.00	Other
	NHCRWA	Harris County MUD No. 367	HARRIS	SAN JACINTO	2			•																			•			•						10.00	%
	NHCRWA	Harris County MUD No. 367	HARRIS	SAN JACINTO	3			•													•	•							•						15.00	%
	NHCRWA	Harris County MUD No. 367	HARRIS	SAN JACINTO	4			•											•				•			•		•		•						25.00	%
	NHCRWA	Harris County MUD No. 367	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 383	HARRIS	SAN JACINTO	1			•																			•								•	0.00	pther
	NHCRWA	Harris County MUD No. 383	HARRIS	SAN JACINTO	2			•																			•			•						10.00	%
	NHCRWA	Harris County MUD No. 383	HARRIS	SAN JACINTO	3			•													•	•							•						15.00	%
	NHCRWA	Harris County MUD No. 383	HARRIS	SAN JACINTO	4			•											•				•			•		•		•						25.00	%
	NHCRWA	Harris County MUD No. 383	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 391	HARRIS	SAN JACINTO	1			•																			•			•						10.00	%
	NHCRWA	Harris County MUD No. 391	HARRIS	SAN JACINTO	2			•													•	•							•						15.00	%
	NHCRWA	Harris County MUD No. 391	HARRIS	SAN JACINTO	3			•											•		•		•			•		•		•						20.00	%
	NHCRWA	Harris County MUD No. 391	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 396	HARRIS	SAN JACINTO	1			•																			•			•						10.00	%
	NHCRWA	Harris County MUD No. 396	HARRIS	SAN JACINTO	2			•													•								•						15.00	%
	NHCRWA	Harris County MUD No. 396	HARRIS	SAN JACINTO	3			•											•		•		•			•		•		•						20.00	%
	NHCRWA	Harris County MUD No. 396	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 468	HARRIS	SAN JACINTO	1			•																			•			•						10.00	%
	NHCRWA	Harris County MUD No. 468	HARRIS	SAN JACINTO	2			•													•	•							•						15.00	%
	NHCRWA	Harris County MUD No. 468	HARRIS	SAN JACINTO	3			•											•		•		•			•		•		•						20.00	%
	NHCRWA	Harris County MUD No. 468	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 480	HARRIS	SAN JACINTO	1			•																			•			•						10.00	%
	NHCRWA	Harris County MUD No. 480	HARRIS	SAN JACINTO	2			•													•	•							•						15.00	%
	NHCRWA	Harris County MUD No. 480	HARRIS	SAN JACINTO	3			•											•		•		•			•		•		•						20.00	%
	NHCRWA	Harris County MUD No. 480	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 69	HARRIS	SAN JACINTO	1			•												•							•			•					•		16.00	Hours
	NHCRWA	Harris County MUD No. 69	HARRIS	SAN JACINTO	2			•													•	•							•					•		16.00	Hours
	NHCRWA	Harris County MUD No. 69	HARRIS	SAN JACINTO	3			•											•		•		•			•		•		•					•		25.00	%
	NHCRWA	Harris County MUD No. 69	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County MUD No. 82	HARRIS	SAN JACINTO	1			•																			•			•						10.00	%
	NHCRWA	Harris County MUD No. 82	HARRIS	SAN JACINTO	2			•													•	•							•						15.00	%
	NHCRWA	Harris County MUD No. 82	HARRIS	SAN JACINTO	3			•											•		•		•			•		•		•						20.00	%
	NHCRWA	Harris County MUD No. 82	HARRIS	SAN JACINTO	Emergency													•											•					•		0.00	Other
	NHCRWA	Harris County WCID No. 109	HARRIS	SAN JACINTO	1			•	•							•											•	•		•						5.00	%
	NHCRWA	Harris County WCID No. 109	HARRIS	SAN JACINTO	2			•	•							•						•	•		•						•	•						10.00	%
	NHCRWA	Harris County WCID No. 109	HARRIS	SAN JACINTO	3			•	•							•														•		•						15.00	%
	NHCRWA	Harris County WCID No. 109	HARRIS	SAN JACINTO	4			•	•							•														•		•						20.00	%
	NHCRWA	Harris County WCID No. 113	HARRIS	SAN JACINTO	1											•													•			•						10.00	%
	NHCRWA	Harris County WCID No. 113	HARRIS	SAN JACINTO	2											•					•								•						25.00	%
	NHCRWA	Harris County WCID No. 113	HARRIS	SAN JACINTO	3											•				•		•		•			•					•						35.00	%
	NHCRWA	Harris County WCID No. 114	HARRIS	SAN JACINTO	1											•		•			•									•	•						5.00	%
	NHCRWA	Harris County WCID No. 114	HARRIS	SAN JACINTO	2											•		•			•									•	•						10.00	%
	NHCRWA	Harris County WCID No. 114	HARRIS	SAN JACINTO	3											•		•				•					•				•						15.00	%

						Trigger Type													Response Type												Reduction Type							Reduction	
WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	NHCRWA	Harris County WCID No. 114	HARRIS	SAN JACINTO	4											•		•				•							•		•							20.00	%
	NHCRWA	Harris County WCID No. 114	HARRIS	SAN JACINTO	Emergency													•											•	•					•			0.00	Other
	NHCRWA	Harris County WCID No. 119	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	NHCRWA	Harris County WCID No. 119	HARRIS	SAN JACINTO	2											•												•			•							20.00	%
	NHCRWA	Harris County WCID No. 119	HARRIS	SAN JACINTO	3											•					•	•		•							•							30.00	%
	NHCRWA	Harris County WCID No. 119	HARRIS	SAN JACINTO	4										•	•					•			•		•										•		0.00	Other
	NHCRWA	Lake Forest Utility District	HARRIS	SAN JACINTO	1			•													•							•			•							4.00	%
	NHCRWA	Lake Forest Utility District	HARRIS	SAN JACINTO	2			•														•									•							14.00	%
	NHCRWA	Lake Forest Utility District	HARRIS	SAN JACINTO	3			•												•		•		•			•				•							24.00	%
	NHCRWA	Lake Forest Utility District	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Memorial Hills UD	HARRIS	SAN JACINTO	1													•										•			•							10.00	%
	NHCRWA	Memorial Hills UD	HARRIS	SAN JACINTO	2													•				•									•							15.00	%
	NHCRWA	Memorial Hills UD	HARRIS	SAN JACINTO	3													•		•		•		•							•							20.00	%
	NHCRWA	Memorial Hills UD	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	North Harris County Regional Water Authority	HARRIS	SAN JACINTO	1									•							•									•	•							5.00	%
	NHCRWA	North Harris County Regional Water Authority	HARRIS	SAN JACINTO	2									•							•	•								•	•							10.00	%
	NHCRWA	North Harris County Regional Water Authority	HARRIS	SAN JACINTO	3									•								•	•				•				•							15.00	%
	NHCRWA	North Harris County Regional Water Authority	HARRIS	SAN JACINTO	4									•								•							•		•							20.00	%
	NHCRWA	North Harris County Regional Water Authority	HARRIS	SAN JACINTO	Emergency									•									•							•					•			0.00	Other
	NHCRWA	North Park Utility District	HARRIS	SAN JACINTO	1			•													•							•			•							5.00	%
	NHCRWA	North Park Utility District	HARRIS	SAN JACINTO	2			•														•									•							10.00	%
	NHCRWA	North Park Utility District	HARRIS	SAN JACINTO	3			•												•		•		•			•				•							15.00	%
	NHCRWA	North Park Utility District	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Northwest Freeway MUD	HARRIS	SAN JACINTO	1			•																				•			•							5.00	%
	NHCRWA	Northwest Freeway MUD	HARRIS	SAN JACINTO	2			•													•	•		•							•							20.00	%
	NHCRWA	Northwest Freeway MUD	HARRIS	SAN JACINTO	3			•	•						•						•			•		•					•							30.00	%
	NHCRWA	Northwest Harris County MUD No. 19	HARRIS	SAN JACINTO	1											•		•			•		•							•	•							5.00	%
	NHCRWA	Northwest Harris County MUD No. 19	HARRIS	SAN JACINTO	2											•		•			•	•								•	•							10.00	%
	NHCRWA	Northwest Harris County MUD No. 19	HARRIS	SAN JACINTO	3											•		•				•					•				•							15.00	%
	NHCRWA	Northwest Harris County MUD No. 19	HARRIS	SAN JACINTO	4											•		•				•							•		•							20.00	%
	NHCRWA	Northwest Harris County MUD No. 19	HARRIS	SAN JACINTO	Emergency													•											•	•					•			0.00	Other
	NHCRWA	Northwest Harris County MUD No. 20	HARRIS	SAN JACINTO	1											•		•			•		•							•	•							5.00	%
	NHCRWA	Northwest Harris County MUD No. 20	HARRIS	SAN JACINTO	2											•		•			•	•								•	•							10.00	%
	NHCRWA	Northwest Harris County MUD No. 20	HARRIS	SAN JACINTO	3											•		•				•					•				•							15.00	%
	NHCRWA	Northwest Harris County MUD No. 20	HARRIS	SAN JACINTO	4											•		•				•							•		•							20.00	%
	NHCRWA	Northwest Harris County MUD No. 20	HARRIS	SAN JACINTO	Emergency													•											•	•					•			0.00	Other
	NHCRWA	Northwest Harris County MUD No. 32	HARRIS	SAN JACINTO	1			•																				•			•					•		15.00	%
	NHCRWA	Northwest Harris County MUD No. 32	HARRIS	SAN JACINTO	2			•													•	•		•							•					•		25.00	%
	NHCRWA	Northwest Harris County MUD No. 32	HARRIS	SAN JACINTO	3			•	•						•						•			•		•					•					•		33.00	%
	NHCRWA	Northwest Harris County MUD No. 5	HARRIS	SAN JACINTO	1			•													•		•					•		•	•							5.00	%
	NHCRWA	Northwest Harris County MUD No. 5	HARRIS	SAN JACINTO	2			•													•	•								•	•							10.00	%
	NHCRWA	Northwest Harris County MUD No. 5	HARRIS	SAN JACINTO	3			•												•		•		•			•				•							15.00	%
	NHCRWA	Northwest Harris County MUD No. 5	HARRIS	SAN JACINTO	4			•														•							•		•							20.00	%
	NHCRWA	Northwest Harris County MUD No. 5	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Northwest Harris County MUD No. 6	HARRIS	SAN JACINTO	1			•															•					•		•	•							5.00	%
	NHCRWA	Northwest Harris County MUD No. 6	HARRIS	SAN JACINTO	2			•													•	•								•	•							10.00	%
	NHCRWA	Northwest Harris County MUD No. 6	HARRIS	SAN JACINTO	3			•														•		•							•							15.00	%
	NHCRWA	Northwest Harris County MUD No. 6	HARRIS	SAN JACINTO	4			•														•							•		•							20.00	%
	NHCRWA	Northwest Harris County MUD No. 6	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Northwest Water systems, Inc.	HARRIS	SAN JACINTO	1													•										•							•			0.00	0
	NHCRWA	Northwest Water systems, Inc.	HARRIS	SAN JACINTO	2			•						•														•			•							10.00	%
	NHCRWA	Northwest Water systems, Inc.	HARRIS	SAN JACINTO	3			•						•								•									•							25.00	%
	NHCRWA	Northwest Water systems, Inc.	HARRIS	SAN JACINTO	4			•						•								•									•							50.00	%
	NHCRWA	Prestonwood Forest Utility District	HARRIS	SAN JACINTO	1											•		•			•		•							•	•							5.00	%
	NHCRWA	Prestonwood Forest Utility District	HARRIS	SAN JACINTO	2											•		•			•	•								•	•							10.00	%
	NHCRWA	Prestonwood Forest Utility District	HARRIS	SAN JACINTO	3											•		•				•					•				•							15.00	%
	NHCRWA	Prestonwood Forest Utility District	HARRIS	SAN JACINTO	4											•		•				•							•		•							20.00	%
	NHCRWA	Prestonwood Forest Utility District	HARRIS	SAN JACINTO	Emergency													•											•	•					•			0.00	Other
	NHCRWA	Reid Road MUD No. 1	HARRIS	SAN JACINTO	1			•																				•			•							5.00	%
	NHCRWA	Reid Road MUD No. 1	HARRIS	SAN JACINTO	2			•													•	•		•							•							10.00	%
	NHCRWA	Reid Road MUD No. 1	HARRIS	SAN JACINTO	3			•	•						•						•			•		•					•							15.00	%
	NHCRWA	Reid Road MUD No. 2	HARRIS	SAN JACINTO	1			•																				•			•							5.00	%
	NHCRWA	Reid Road MUD No. 2	HARRIS	SAN JACINTO	2			•													•	•		•							•							10.00	%
	NHCRWA	Reid Road MUD No. 2	HARRIS	SAN JACINTO	3			•	•						•						•			•		•					•							15.00	%
	NHCRWA	Spring Creek Forest Public Utility District	HARRIS	SAN JACINTO	1			•													•							•			•							5.00	%
	NHCRWA	Spring Creek Forest Public Utility District	HARRIS	SAN JACINTO	2			•														•									•							10.00	%
	NHCRWA	Spring Creek Forest Public Utility District	HARRIS	SAN JACINTO	3			•												•		•		•			•				•							15.00	%
	NHCRWA	Spring Creek Forest Public Utility District	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Spring West MUD	HARRIS	SAN JACINTO	1			•																				•								•		18.00	Hours
	NHCRWA	Spring West MUD	HARRIS	SAN JACINTO	2			•													•	•		•												•		20.00	Hours
	NHCRWA	Spring West MUD	HARRIS	SAN JACINTO	3			•	•						•						•			•		•										•		22.00	Hours

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	NHCRWA	SW Utility Company	HARRIS	SAN JACINTO	1		•																					•			•							10.00	%
	NHCRWA	SW Utility Company	HARRIS	SAN JACINTO	2			•													•	•		•							•	•							10.00	%
	NHCRWA	SW Utility Company	HARRIS	SAN JACINTO	3			•													•	•		•							•	•							20.00	%
	NHCRWA	SW Utility Company	HARRIS	SAN JACINTO	4			•													•			•							•	•							30.00	%
	NHCRWA	Tattor Road Municipal District	HARRIS	SAN JACINTO	1											•						•							•			•							8.00	%
	NHCRWA	Tattor Road Municipal District	HARRIS	SAN JACINTO	2											•					•	•		•								•							16.00	%
	NHCRWA	Tattor Road Municipal District	HARRIS	SAN JACINTO	3											•					•			•		•	•					•							25.00	%
	NHCRWA	Tattor Road Municipal District	HARRIS	SAN JACINTO	4											•					•			•								•							33.00	%
	NHCRWA	Timber Lane Utility District	HARRIS	SAN JACINTO	1			•														•							•			•							5.00	%
	NHCRWA	Timber Lane Utility District	HARRIS	SAN JACINTO	2			•													•	•									•	•							10.00	%
	NHCRWA	Timber Lane Utility District	HARRIS	SAN JACINTO	3			•														•					•				•							15.00	%
	NHCRWA	Timber Lane Utility District	HARRIS	SAN JACINTO	4			•														•							•		•							20.00	%
	NHCRWA	Timber Lane Utility District	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NHCRWA	Timberlake Improvement District	HARRIS	SAN JACINTO	1			•										•			•		•							•	•							5.00	%
	NHCRWA	Timberlake Improvement District	HARRIS	SAN JACINTO	2			•										•			•	•								•	•							10.00	%
	NHCRWA	Timberlake Improvement District	HARRIS	SAN JACINTO	3			•										•				•					•				•							15.00	%
	NHCRWA	Timberlake Improvement District	HARRIS	SAN JACINTO	4			•										•				•							•		•							20.00	%
	NHCRWA	Timberlake Improvement District	HARRIS	SAN JACINTO	Emergency													•											•	•					•			0.00	Other
	NHCRWA	West Harris County MUD No. 1	HARRIS	SAN JACINTO	1											•		•			•		•							•	•							5.00	%
	NHCRWA	West Harris County MUD No. 1	HARRIS	SAN JACINTO	2											•		•			•	•								•	•							10.00	%
	NHCRWA	West Harris County MUD No. 1	HARRIS	SAN JACINTO	3											•		•				•					•				•							15.00	%
	NHCRWA	West Harris County MUD No. 1	HARRIS	SAN JACINTO	4											•		•				•							•		•							20.00	%
	NHCRWA	West Harris County MUD No. 1	HARRIS	SAN JACINTO	Emergency													•											•	•					•			0.00	Other
	NHCRWA	West Harris County MUD No. 10	HARRIS	SAN JACINTO	1											•		•			•		•							•	•							5.00	%
	NHCRWA	West Harris County MUD No. 10	HARRIS	SAN JACINTO	2											•		•			•	•								•	•							10.00	%
	NHCRWA	West Harris County MUD No. 10	HARRIS	SAN JACINTO	3											•		•				•					•				•							15.00	%
	NHCRWA	West Harris County MUD No. 10	HARRIS	SAN JACINTO	4											•		•				•							•		•							20.00	%
	NHCRWA	West Harris County MUD No. 10	HARRIS	SAN JACINTO	Emergency													•											•	•					•			0.00	Other
	NORTH CHANNEL WATER AUTHORITY	Harris County FWSD No. 47	HARRIS	SAN JACINTO	1			•																				•			•				•			8.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County FWSD No. 47	HARRIS	SAN JACINTO	2			•														•	•								•				•			18.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County FWSD No. 47	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•				•			27.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County FWSD No. 47	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH CHANNEL WATER AUTHORITY	Harris County FWSD No. 51	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County FWSD No. 51	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County FWSD No. 51	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County FWSD No. 51	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH CHANNEL WATER AUTHORITY	Harris County MUD No. 285	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County MUD No. 285	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County MUD No. 285	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	NORTH CHANNEL WATER AUTHORITY	Harris County MUD No. 285	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH CHANNEL WATER AUTHORITY	Harris County WCID No. 36	HARRIS	SAN JACINTO	1			•										•				•	•		•			•		•						•		0.00	Other
	NORTH CHANNEL WATER AUTHORITY	Harris County WCID No. 36	HARRIS	SAN JACINTO	2			•							•			•		•		•		•						•						•		0.00	Other
	NORTH CHANNEL WATER AUTHORITY	Harris County WCID No. 36	HARRIS	SAN JACINTO	3			•	•									•				•	•		•											•		0.00	Other
	NORTH CHANNEL WATER AUTHORITY	North Channel Water Authority	HARRIS	SAN JACINTO	1													•										•			•							10.00	%
	NORTH CHANNEL WATER AUTHORITY	North Channel Water Authority	HARRIS	SAN JACINTO	2													•				•	•							•	•							15.00	%
	NORTH CHANNEL WATER AUTHORITY	North Channel Water Authority	HARRIS	SAN JACINTO	3													•				•							•		•							20.00	%
	NORTH CHANNEL WATER AUTHORITY	North Channel Water Authority	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH CHANNEL WATER AUTHORITY	Northeast Harris County MUD No. 1	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	NORTH CHANNEL WATER AUTHORITY	Northeast Harris County MUD No. 1	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	NORTH CHANNEL WATER AUTHORITY	Northeast Harris County MUD No. 1	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	NORTH CHANNEL WATER AUTHORITY	Northeast Harris County MUD No. 1	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 1	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 1	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 10	FORT BEND	SAN JACINTO	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 10	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 10	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 10	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 10	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 10	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 12	FORT BEND	SAN JACINTO	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 12	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 12	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 12	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 12	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 12	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 14	FORT BEND	SAN JACINTO	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 14	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 14	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 14	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 14	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 14	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 2	FORT BEND	BRAZOS	1			•													•							•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 2	FORT BEND	BRAZOS	2			•													•	•									•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 2	FORT BEND	BRAZOS	3			•												•		•		•							•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 2	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 3	FORT BEND	SAN JACINTO	1													•										•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 3	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 3	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 3	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 3	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 3	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 5	FORT BEND	SAN JACINTO	1			•													•							•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 5	FORT BEND	SAN JACINTO	2			•													•	•									•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 5	FORT BEND	SAN JACINTO	3			•												•		•		•							•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 5	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 6	FORT BEND	SAN JACINTO	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 6	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 6	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 6	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 6	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 6	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 7	FORT BEND	SAN JACINTO	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 7	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 7	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 7	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 7	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 7	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 9	FORT BEND	SAN JACINTO	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 9	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 9	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 9	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 9	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco MUD No. 9	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 1	FORT BEND	BRAZOS	1		•																					•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 1	FORT BEND	BRAZOS	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 1	FORT BEND	BRAZOS	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 1	FORT BEND	BRAZOS	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 1	FORT BEND	BRAZOS	5			•														•					•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 1	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 2	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 2	FORT BEND	SAN JACINTO-BRAZOS	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 2	FORT BEND	SAN JACINTO-BRAZOS	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 2	FORT BEND	SAN JACINTO-BRAZOS	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 2	FORT BEND	SAN JACINTO-BRAZOS	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 2	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 3	FORT BEND	SAN JACINTO	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 3	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 3	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 3	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 3	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 3	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 4	FORT BEND	SAN JACINTO	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 4	FORT BEND	SAN JACINTO	2			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 4	FORT BEND	SAN JACINTO	3			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 4	FORT BEND	SAN JACINTO	4			•												•		•		•					•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 4	FORT BEND	SAN JACINTO	5									•								•	•	•			•				•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Cinco Southwest MUD No. 4	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 118	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 118	FORT BEND	SAN JACINTO-BRAZOS	2			•														•									•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 118	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•				•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 118	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 119	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 119	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 119	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 119	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 122	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 122	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 122	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 122	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 123	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 123	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 123	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 123	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 124	FORT BEND	SAN JACINTO	1											•												•			•					•		16.00	Hours
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 124	FORT BEND	SAN JACINTO	2											•						•	•								•					•		16.00	Hours
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 124	FORT BEND	SAN JACINTO	3											•				•		•		•			•		•		•					•		25.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 124	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 130	FORT BEND	SAN JACINTO	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 130	FORT BEND	SAN JACINTO	2			•														•	•								•							16.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 130	FORT BEND	SAN JACINTO	3			•												•		•		•			•		•		•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 130	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 133	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 133	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 133	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 133	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 143	FORT BEND	SAN JACINTO-BRAZOS	1											•												•			•					•		15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 143	FORT BEND	SAN JACINTO-BRAZOS	2											•					•	•		•							•					•		25.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 143	FORT BEND	SAN JACINTO-BRAZOS	3											•						•		•		•	•				•					•		33.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 146	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•									•	0.00	0
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 146	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•														•	0.00	0
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 146	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•								•	0.00	0
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 146	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 151	FORT BEND	SAN JACINTO	1			•																				•									•	0.00	0
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 151	FORT BEND	SAN JACINTO	2			•														•	•														•	0.00	0
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 151	FORT BEND	SAN JACINTO	3			•												•		•		•			•		•								•	0.00	0
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 151	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 156	FORT BEND	BRAZOS	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 156	FORT BEND	BRAZOS	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 156	FORT BEND	BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 156	FORT BEND	BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 165	FORT BEND	SAN JACINTO-BRAZOS	1											•												•			•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 165	FORT BEND	SAN JACINTO-BRAZOS	2											•					•	•		•							•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 165	FORT BEND	SAN JACINTO-BRAZOS	3											•						•		•		•	•				•							33.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 165	FORT BEND	SAN JACINTO-BRAZOS	4												•													•							•	0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 190	FORT BEND	SAN JACINTO-BRAZOS	1			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 190	FORT BEND	SAN JACINTO-BRAZOS	2			•													•	•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 190	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 190	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 194	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•									•	0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 194	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•														•	0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 194	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•								•	0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 194	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 2	FORT BEND	SAN JACINTO	1			•													•							•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 2	FORT BEND	SAN JACINTO	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 2	FORT BEND	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 2	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 30	FORT BEND	SAN JACINTO	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 30	FORT BEND	SAN JACINTO	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 30	FORT BEND	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 30	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 34	FORT BEND	SAN JACINTO	1											•												•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 34	FORT BEND	SAN JACINTO	2											•					•	•		•							•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 34	FORT BEND	SAN JACINTO	3											•								•		•	•				•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 35	FORT BEND	SAN JACINTO	1											•												•			•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 35	FORT BEND	SAN JACINTO	2											•					•	•		•							•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 35	FORT BEND	SAN JACINTO	3											•								•		•	•				•							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 50	FORT BEND	SAN JACINTO-BRAZOS	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 50	FORT BEND	SAN JACINTO-BRAZOS	2			•														•	•								•							16.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 50	FORT BEND	SAN JACINTO-BRAZOS	3			•												•		•		•			•		•		•							25.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 50	FORT BEND	SAN JACINTO-BRAZOS	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 57	FORT BEND	SAN JACINTO	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 57	FORT BEND	SAN JACINTO	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 57	FORT BEND	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 57	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 58	FORT BEND	SAN JACINTO	1			•																				•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 58	FORT BEND	SAN JACINTO	2			•														•	•								•							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 58	FORT BEND	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Fort Bend County MUD No. 58	FORT BEND	SAN JACINTO	Emergency													•												•						•		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 1	FORT BEND	SAN JACINTO	1											•					•										•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 1	FORT BEND	SAN JACINTO	2											•					•	•		•							•							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 1	FORT BEND	SAN JACINTO	3										•	•					•			•		•					•							30.00	%
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 2	FORT BEND	SAN JACINTO	1											•												•			•							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 2	FORT BEND	SAN JACINTO	2											•					•	•		•							•							20.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 2	FORT BEND	SAN JACINTO	3										●	●					●			●		●					●							30.00	%
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 4	FORT BEND	SAN JACINTO	1											●												●			●							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 4	FORT BEND	SAN JACINTO	2											●					●	●		●							●							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Grand Lakes MUD No. 4	FORT BEND	SAN JACINTO	3										●	●					●			●		●					●							30.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris County MUD No. 118	FORT BEND	SAN JACINTO-BRAZOS	1		●															●						●			●							5.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris County MUD No. 118	FORT BEND	SAN JACINTO-BRAZOS	2			●													●	●		●							●							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris County MUD No. 118	FORT BEND	SAN JACINTO-BRAZOS	3			●						●							●	●		●		●					●							15.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris County MUD No. 118	FORT BEND	SAN JACINTO-BRAZOS	4	●			●													●		●			●				●							20.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris County MUD No. 172	FORT BEND	SAN JACINTO-BRAZOS	1			●													●							●			●							4.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris County MUD No. 172	FORT BEND	SAN JACINTO-BRAZOS	2			●														●									●							14.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris County MUD No. 172	FORT BEND	SAN JACINTO-BRAZOS	3			●												●		●		●							●							24.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris County MUD No. 172	FORT BEND	SAN JACINTO-BRAZOS	Emergency													●												●						●		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Harris-Fort Bend Counties MUD No. 1	FORT BEND	SAN JACINTO	1											●												●			●							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris-Fort Bend Counties MUD No. 1	FORT BEND	SAN JACINTO	2											●												●			●							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris-Fort Bend Counties MUD No. 1	FORT BEND	SAN JACINTO	3											●					●	●		●							●							17.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris-Fort Bend Counties MUD No. 1	FORT BEND	SAN JACINTO	4											●					●			●		●										●		0.00	Other
	NORTH FORT BEND WATER AUTHORITY	Harris-Fort Bend Counties MUD No. 5	FORT BEND	SAN JACINTO	1											●												●	●		●							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris-Fort Bend Counties MUD No. 5	FORT BEND	SAN JACINTO	2											●												●	●		●							10.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris-Fort Bend Counties MUD No. 5	FORT BEND	SAN JACINTO	3											●					●	●		●							●							17.00	%
	NORTH FORT BEND WATER AUTHORITY	Harris-Fort Bend Counties MUD No. 5	FORT BEND	SAN JACINTO	4											●					●			●		●					●							25.00	%
	NORTH FORT BEND WATER AUTHORITY	North Fort Bend Water Authority	FORT BEND	BRAZOS	1													●				●						●			●							10.00	%
	NORTH FORT BEND WATER AUTHORITY	North Fort Bend Water Authority	FORT BEND	BRAZOS	2													●				●	●								●							15.00	%
	NORTH FORT BEND WATER AUTHORITY	North Fort Bend Water Authority	FORT BEND	BRAZOS	3													●				●							●		●							20.00	%
	NORTH FORT BEND WATER AUTHORITY	North Fort Bend Water Authority	FORT BEND	BRAZOS	Emergency													●												●						●		0.00	Other
	NORTHWEST PARK MUD	Northwest Park MUD	HARRIS	SAN JACINTO	1			●																				●			●							15.00	%
	NORTHWEST PARK MUD	Northwest Park MUD	HARRIS	SAN JACINTO	2			●														●									●							25.00	%
	NORTHWEST PARK MUD	Northwest Park MUD	HARRIS	SAN JACINTO	3			●												●		●		●			●				●							35.00	%
	NORTHWEST PARK MUD	Northwest Park MUD	HARRIS	SAN JACINTO	4													●												●						●		0.00	Other
	PECAN GROVE MUD #1	Pecan Grove MUD	FORT BEND	BRAZOS	1													●										●			●							5.00	%
	PECAN GROVE MUD #1	Pecan Grove MUD	FORT BEND	BRAZOS	2			●	●									●				●	●								●							10.00	%
	PECAN GROVE MUD #1	Pecan Grove MUD	FORT BEND	BRAZOS	3			●	●									●		●		●		●			●		●		●							20.00	%
	PECAN GROVE MUD #1	Pecan Grove MUD	FORT BEND	BRAZOS	Emergency													●												●						●		0.00	Other
	POINT AQUARIUS MUD	Point Aquarius MUD	MONTGOMERY	SAN JACINTO	1			●										●					●												●			0.00	Other
	POINT AQUARIUS MUD	Point Aquarius MUD	MONTGOMERY	SAN JACINTO	2			●							●							●													●			0.00	Other
	POINT AQUARIUS MUD	Point Aquarius MUD	MONTGOMERY	SAN JACINTO	3			●	●					●									●												●			0.00	Other
	RAYFORD ROAD MUD	Rayford Road MUD	MONTGOMERY	SAN JACINTO	1			●													●	●						●			●							5.00	%
	RAYFORD ROAD MUD	Rayford Road MUD	MONTGOMERY	SAN JACINTO	2			●													●	●		●							●							10.00	%
	RAYFORD ROAD MUD	Rayford Road MUD	MONTGOMERY	SAN JACINTO	3			●												●				●			●				●							15.00	%
	RAYFORD ROAD MUD	Rayford Road MUD	MONTGOMERY	SAN JACINTO	Emergency													●												●						●		0.00	Other
	RICHMOND	City of Richmond	FORT BEND	BRAZOS	1			●															●					●			●							20.00	%
	RICHMOND	City of Richmond	FORT BEND	BRAZOS	2			●	●		●												●											●				75.00	%
	RICHMOND	City of Richmond	FORT BEND	BRAZOS	3													●					●						●					●				50.00	%
	RICHMOND	City of Richmond	FORT BEND	BRAZOS	4													●			●	●		●		●									●			0.00	Other
	RICHMOND	City of Richmond	FORT BEND	BRAZOS	5	●			●													●	●							●					●			0.00	Other
	ROSENBERG	City of Rosenberg	FORT BEND	BRAZOS	1			●														●						●							●	●	●	0.00	Other
	ROSENBERG	City of Rosenberg	FORT BEND	BRAZOS	2			●													●	●		●							●							10.00	%
	ROSENBERG	City of Rosenberg	FORT BEND	BRAZOS	3			●													●			●		●	●				●							15.00	%
	ROSENBERG	City of Rosenberg	FORT BEND	BRAZOS	4			●													●	●		●		●					●							20.00	%
	ROSENBERG	City of Rosenberg	FORT BEND	BRAZOS	5	●			●															●			●								●	●		0.00	Other
	SEABROOK	City of Seabrook	HARRIS	SAN JACINTO-BRAZOS	1			●													●	●		●							●							10.00	%
	SEABROOK	City of Seabrook	HARRIS	SAN JACINTO-BRAZOS	2			●													●	●		●							●							15.00	%
	SEABROOK	City of Seabrook	HARRIS	SAN JACINTO-BRAZOS	3			●																●			●				●							25.00	%
	SEABROOK	City of Seabrook	HARRIS	SAN JACINTO-BRAZOS	4			●																●			●				●							30.00	%
	SIENNA PLANTATION	Sienna Plantation Management District	FORT BEND	SAN JACINTO-BRAZOS	Emergency													●												●						●		0.00	Other
	SIENNA PLANTATION	Sienna Plantation MUD No. 1	FORT BEND	SAN JACINTO-BRAZOS	Emergency													●												●						●		0.00	Other
	SIENNA PLANTATION	Sienna Plantation MUD No. 2	FORT BEND	SAN JACINTO-BRAZOS	Emergency													●												●						●		0.00	Other
	SIENNA PLANTATION	Sienna Plantation MUD No. 3	FORT BEND	SAN JACINTO-BRAZOS	Emergency													●												●						●		0.00	Other
	SOUTH HOUSTON	City of South Houston	HARRIS	SAN JACINTO	1			●														●						●			●							10.00	%
	SOUTH HOUSTON	City of South Houston	HARRIS	SAN JACINTO	2			●													●	●									●							10.00	%
	SOUTH HOUSTON	City of South Houston	HARRIS	SAN JACINTO	3	●		●	●												●	●									●							10.00	%
	SOUTHERN MONTGOMERY COUNTY MUD	Southern Montgomery County MUD	MONTGOMERY	SAN JACINTO	1			●													●			●							●							5.00	%
	SOUTHERN MONTGOMERY COUNTY MUD	Southern Montgomery County MUD	MONTGOMERY	SAN JACINTO	2			●													●			●							●							10.00	%
	SOUTHERN MONTGOMERY COUNTY MUD	Southern Montgomery County MUD	MONTGOMERY	SAN JACINTO	3			●												●	●			●							●							20.00	%
	SOUTHERN MONTGOMERY COUNTY MUD	Southern Montgomery County MUD	MONTGOMERY	SAN JACINTO	4	●			●													●														●		0.00	Other
	SOUTHERN MONTGOMERY COUNTY MUD	Southern Montgomery County MUD	MONTGOMERY	SAN JACINTO	Emergency													●												●						●		0.00	Other
	SUGAR LAND	City of Sugarland	FORT BEND	BRAZOS	1			●													●										●							5.00	%
	SUGAR LAND	City of Sugarland	FORT BEND	BRAZOS	2			●													●										●							5.00	%
	SUGAR LAND	City of Sugarland	FORT BEND	BRAZOS	3			●										●				●		●		●	●			●	●							5.00	%
	SUGAR LAND	Oyster Creek Estates P.O.A.	BRAZORIA	SAN JACINTO-BRAZOS	1		●																					●									●	0.00	0
	SUGAR LAND	Oyster Creek Estates P.O.A.	BRAZORIA	SAN JACINTO-BRAZOS	2			●														●						●			●							5.00	%
	SUGAR LAND	Oyster Creek Estates P.O.A.	BRAZORIA	SAN JACINTO-BRAZOS	3			●													●	●									●							10.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type													Response Type												Reduction Type							Reduction	
						Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	SUGAR LAND	Oyster Creek Estates P.O.A.	BRAZORIA	SAN JACINTO-BRAZOS	4	•		•																•			•				•							15.00	%
	TEXAS CITY	City of Texas City	GALVESTON	SAN JACINTO-BRAZOS	1			•													•	•		•				•			•							5.00	%
	TEXAS CITY	City of Texas City	GALVESTON	SAN JACINTO-BRAZOS	2			•													•	•		•							•							10.00	%
	TEXAS CITY	City of Texas City	GALVESTON	SAN JACINTO-BRAZOS	3			•												•	•			•		•	•				•							20.00	%
	TEXAS CITY	City of Texas City	GALVESTON	SAN JACINTO-BRAZOS	4	•			•															•			•				•							10.00	%
	TEXAS CITY	City of Texas City	GALVESTON	SAN JACINTO-BRAZOS	Emergency	•			•																					•						•		0.00	Other
	TRINITY	City of Trinity	TRINITY	TRINITY	1			•										•										•			•							10.00	%
	TRINITY	City of Trinity	TRINITY	TRINITY	2			•										•			•	•		•							•							20.00	%
	TRINITY	City of Trinity	TRINITY	TRINITY	3			•										•				•		•			•				•							25.00	%
	TRINITY	City of Trinity	TRINITY	TRINITY	4	•		•														•									•							25.00	%
	WHCRWA	Addicks Utility District	HARRIS	SAN JACINTO	1			•								•												•			•							10.00	%
	WHCRWA	Addicks Utility District	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							15.00	%
	WHCRWA	Addicks Utility District	HARRIS	SAN JACINTO	3			•								•								•		•	•				•							15.00	%
	WHCRWA	Baker Road MUD (Interconnect closed)	HARRIS	SAN JACINTO	1											•												•			•							5.00	%
	WHCRWA	Baker Road MUD (Interconnect closed)	HARRIS	SAN JACINTO	2											•					•	•		•							•							6.25	%
	WHCRWA	Baker Road MUD (Interconnect closed)	HARRIS	SAN JACINTO	3				•							•					•			•		•					•							6.25	%
	WHCRWA	Baker Road MUD (Interconnect operational)	HARRIS	SAN JACINTO	1									•		•												•			•							5.00	%
	WHCRWA	Baker Road MUD (Interconnect operational)	HARRIS	SAN JACINTO	2									•		•					•	•		•							•							6.25	%
	WHCRWA	Baker Road MUD (Interconnect operational)	HARRIS	SAN JACINTO	3				•					•	•	•					•			•		•					•							6.25	%
	WHCRWA	Barker Cypress MUD	HARRIS	SAN JACINTO	1			•								•												•			•							10.00	%
	WHCRWA	Barker Cypress MUD	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							15.00	%
	WHCRWA	Barker Cypress MUD	HARRIS	SAN JACINTO	3			•								•								•			•				•							20.00	%
	WHCRWA	Beechnut MUD	HARRIS	SAN JACINTO	1			•													•										•							10.00	%
	WHCRWA	Beechnut MUD	HARRIS	SAN JACINTO	2			•													•	•		•							•							16.00	%
	WHCRWA	Beechnut MUD	HARRIS	SAN JACINTO	3			•													•			•		•	•				•							25.00	%
	WHCRWA	Beechnut MUD	HARRIS	SAN JACINTO	4	•			•															•			•				•							25.00	%
	WHCRWA	Camfield MUD	HARRIS	SAN JACINTO	1			•														•	•							•	•							10.00	%
	WHCRWA	Camfield MUD	HARRIS	SAN JACINTO	2			•														•		•							•							15.00	%
	WHCRWA	Camfield MUD	HARRIS	SAN JACINTO	3			•													•			•		•					•							20.00	%
	WHCRWA	Chelford One MUD	HARRIS	SAN JACINTO	1			•													•							•			•							10.00	%
	WHCRWA	Chelford One MUD	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Chelford One MUD	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Chelford One MUD	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Cimarron MUD	HARRIS	SAN JACINTO	1			•													•							•			•							10.00	%
	WHCRWA	Cimarron MUD	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Clay Road MUD	HARRIS	SAN JACINTO	1			•													•							•			•							10.00	%
	WHCRWA	Clay Road MUD	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Clay Road MUD	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Clay Road MUD	HARRIS	SAN JACINTO	4													•												•							•	0.00	0
	WHCRWA	Fry Road MUD	HARRIS	SAN JACINTO	1			•										•										•			•							10.00	%
	WHCRWA	Fry Road MUD	HARRIS	SAN JACINTO	2			•										•				•									•							15.00	%
	WHCRWA	Fry Road MUD	HARRIS	SAN JACINTO	3			•										•		•		•		•			•				•							20.00	%
	WHCRWA	Fry Road MUD	HARRIS	SAN JACINTO	4													•										•								•		0.00	Other
	WHCRWA	Fry Road MUD	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 102	HARRIS	SAN JACINTO	1			•														•						•			•							16.00	%
	WHCRWA	Harris County MUD No. 102	HARRIS	SAN JACINTO	2			•														•									•							25.00	%
	WHCRWA	Harris County MUD No. 102	HARRIS	SAN JACINTO	3			•												•		•		•			•				•							30.00	%
	WHCRWA	Harris County MUD No. 105	HARRIS	SAN JACINTO	1			•													•							•			•					•		16.00	Hours
	WHCRWA	Harris County MUD No. 105	HARRIS	SAN JACINTO	2			•														•									•					•		16.00	%
	WHCRWA	Harris County MUD No. 105	HARRIS	SAN JACINTO	3			•												•		•		•			•				•					•		25.00	%
	WHCRWA	Harris County MUD No. 105	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 120	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Harris County MUD No. 120	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 120	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 120	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 147	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Harris County MUD No. 147	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 147	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 147	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 149	HARRIS	SAN JACINTO	1			•								•												•			•							10.00	%
	WHCRWA	Harris County MUD No. 149	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							15.00	%
	WHCRWA	Harris County MUD No. 149	HARRIS	SAN JACINTO	3			•								•								•		•	•				•							20.00	%
	WHCRWA	Harris County MUD No. 156	HARRIS	SAN JACINTO	1													•				•						•			•							10.00	%
	WHCRWA	Harris County MUD No. 156	HARRIS	SAN JACINTO	2													•				•									•							15.00	%
	WHCRWA	Harris County MUD No. 156	HARRIS	SAN JACINTO	3													•				•		•							•							20.00	%
	WHCRWA	Harris County MUD No. 156	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 157	HARRIS	SAN JACINTO	1			•																				•			•							5.00	%
	WHCRWA	Harris County MUD No. 157	HARRIS	SAN JACINTO	2			•														•									•							10.00	%
	WHCRWA	Harris County MUD No. 157	HARRIS	SAN JACINTO	3			•												•		•		•			•				•							15.00	%
	WHCRWA	Harris County MUD No. 157	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 165	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type: Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Response Type: Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Reduction Type: Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Reduction: Value	Unit
	WHCRWA	Harris County MUD No. 165	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 165	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 165	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 166	HARRIS	SAN JACINTO	1			•								•												•			•							10.00	%
	WHCRWA	Harris County MUD No. 166	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							15.00	%
	WHCRWA	Harris County MUD No. 166	HARRIS	SAN JACINTO	3			•								•					•			•		•					•							20.00	%
	WHCRWA	Harris County MUD No. 167	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Harris County MUD No. 167	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 167	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 167	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 173	HARRIS	SAN JACINTO	1													•										•			•							10.00	%
	WHCRWA	Harris County MUD No. 173	HARRIS	SAN JACINTO	2													•				•									•							15.00	%
	WHCRWA	Harris County MUD No. 173	HARRIS	SAN JACINTO	3													•		•		•		•			•				•							20.00	%
	WHCRWA	Harris County MUD No. 173	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 185	HARRIS	SAN JACINTO	1													•										•			•							10.00	%
	WHCRWA	Harris County MUD No. 185	HARRIS	SAN JACINTO	2													•				•									•							15.00	%
	WHCRWA	Harris County MUD No. 185	HARRIS	SAN JACINTO	3													•		•		•		•			•				•							20.00	%
	WHCRWA	Harris County MUD No. 185	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 188	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Harris County MUD No. 188	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 188	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 188	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 196	HARRIS	SAN JACINTO	1													•				•						•			•							10.00	%
	WHCRWA	Harris County MUD No. 196	HARRIS	SAN JACINTO	2													•				•		•							•							15.00	%
	WHCRWA	Harris County MUD No. 196	HARRIS	SAN JACINTO	3													•				•					•				•							20.00	%
	WHCRWA	Harris County MUD No. 196	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 216	HARRIS	SAN JACINTO	1			•																				•			•							5.00	%
	WHCRWA	Harris County MUD No. 216	HARRIS	SAN JACINTO	2			•														•									•							10.00	%
	WHCRWA	Harris County MUD No. 216	HARRIS	SAN JACINTO	3			•												•		•		•			•				•							15.00	%
	WHCRWA	Harris County MUD No. 216	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 239	HARRIS	SAN JACINTO	1			•								•												•			•							10.00	%
	WHCRWA	Harris County MUD No. 239	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							15.00	%
	WHCRWA	Harris County MUD No. 239	HARRIS	SAN JACINTO	3			•							•						•			•		•					•							20.00	%
	WHCRWA	Harris County MUD No. 257	HARRIS	SAN JACINTO	1			•						•														•			•							10.00	%
	WHCRWA	Harris County MUD No. 257	HARRIS	SAN JACINTO	2			•						•							•	•		•							•							10.00	%
	WHCRWA	Harris County MUD No. 257	HARRIS	SAN JACINTO	3			•						•							•			•		•					•							15.00	%
	WHCRWA	Harris County MUD No. 257	HARRIS	SAN JACINTO	4			•													•			•		•					•							20.00	%
	WHCRWA	Harris County MUD No. 264	HARRIS	SAN JACINTO	1			•										•										•			•							10.00	%
	WHCRWA	Harris County MUD No. 264	HARRIS	SAN JACINTO	2			•										•				•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 264	HARRIS	SAN JACINTO	3			•										•		•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 264	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 276	HARRIS	SAN JACINTO	1			•								•												•			•							10.00	%
	WHCRWA	Harris County MUD No. 276	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							15.00	%
	WHCRWA	Harris County MUD No. 276	HARRIS	SAN JACINTO	3			•								•					•			•		•					•							20.00	%
	WHCRWA	Harris County MUD No. 284	HARRIS	SAN JACINTO	1											•												•								•		16.00	Hours
	WHCRWA	Harris County MUD No. 284	HARRIS	SAN JACINTO	2											•					•	•		•												•		16.00	Hours
	WHCRWA	Harris County MUD No. 284	HARRIS	SAN JACINTO	3										•	•					•			•		•										•		16.00	Hours
	WHCRWA	Harris County MUD No. 287	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	WHCRWA	Harris County MUD No. 287	HARRIS	SAN JACINTO	2											•						•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 287	HARRIS	SAN JACINTO	3											•				•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 287	HARRIS	SAN JACINTO	4												•													•						•		0.00	Other
	WHCRWA	Harris County MUD No. 287	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 341	HARRIS	SAN JACINTO	1			•								•												•			•							15.00	%
	WHCRWA	Harris County MUD No. 341	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							25.00	%
	WHCRWA	Harris County MUD No. 341	HARRIS	SAN JACINTO	3			•								•								•		•	•				•							33.00	%
	WHCRWA	Harris County MUD No. 370	HARRIS	SAN JACINTO	1			•								•												•			•							15.00	%
	WHCRWA	Harris County MUD No. 370	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							25.00	%
	WHCRWA	Harris County MUD No. 370	HARRIS	SAN JACINTO	3			•								•								•		•	•				•							33.00	%
	WHCRWA	Harris County MUD No. 371	HARRIS	SAN JACINTO	1			•													•							•			•							10.00	%
	WHCRWA	Harris County MUD No. 371	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 371	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 371	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 374	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Harris County MUD No. 374	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 374	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 374	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 419	HARRIS	SAN JACINTO	1			•								•												•			•							15.00	%
	WHCRWA	Harris County MUD No. 419	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							25.00	%
	WHCRWA	Harris County MUD No. 419	HARRIS	SAN JACINTO	3			•								•								•		•	•				•							33.00	%
	WHCRWA	Harris County MUD No. 432	HARRIS	SAN JACINTO	1			•										•										•			•							10.00	%
	WHCRWA	Harris County MUD No. 432	HARRIS	SAN JACINTO	2			•										•				•									•							15.00	%

WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Trigger Type: Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Response Type: Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Reduction Type: Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Reduction: Value	Unit
	WHCRWA	Harris County MUD No. 432	HARRIS	SAN JACINTO	3			•										•		•		•		•			•				•							20.00	%
	WHCRWA	Harris County MUD No. 432	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 434	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	WHCRWA	Harris County MUD No. 434	HARRIS	SAN JACINTO	2											•					•	•		•							•							15.00	%
	WHCRWA	Harris County MUD No. 434	HARRIS	SAN JACINTO	3											•					•			•		•					•							18.00	%
	WHCRWA	Harris County MUD No. 500	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Harris County MUD No. 500	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 500	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 500	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 501	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Harris County MUD No. 501	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 501	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 501	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 61	HARRIS	SAN JACINTO	1											•												•			•							15.00	%
	WHCRWA	Harris County MUD No. 61	HARRIS	SAN JACINTO	2											•					•	•		•							•							25.00	%
	WHCRWA	Harris County MUD No. 61	HARRIS	SAN JACINTO	3											•					•			•		•					•							30.00	%
	WHCRWA	Harris County MUD No. 61	HARRIS	SAN JACINTO	4				•							•						•		•												•		0.00	Other
	WHCRWA	Harris County MUD No. 64	HARRIS	SAN JACINTO	1													•										•			•							10.00	%
	WHCRWA	Harris County MUD No. 64	HARRIS	SAN JACINTO	2													•				•									•							15.00	%
	WHCRWA	Harris County MUD No. 64	HARRIS	SAN JACINTO	3													•		•		•		•			•				•							20.00	%
	WHCRWA	Harris County MUD No. 64	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 65	HARRIS	SAN JACINTO	1			•										•										•			•							10.00	%
	WHCRWA	Harris County MUD No. 65	HARRIS	SAN JACINTO	2			•										•				•									•							15.00	%
	WHCRWA	Harris County MUD No. 65	HARRIS	SAN JACINTO	3			•										•		•		•		•			•				•							20.00	%
	WHCRWA	Harris County MUD No. 65	HARRIS	SAN JACINTO	Emergency													•												•	•							20.00	%
	WHCRWA	Harris County MUD No. 70	HARRIS	SAN JACINTO	1			•								•												•			•							10.00	%
	WHCRWA	Harris County MUD No. 70	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							15.00	%
	WHCRWA	Harris County MUD No. 70	HARRIS	SAN JACINTO	3			•								•					•			•		•					•							20.00	%
	WHCRWA	Harris County MUD No. 71	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	WHCRWA	Harris County MUD No. 71	HARRIS	SAN JACINTO	2											•						•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 71	HARRIS	SAN JACINTO	3											•				•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 71	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County MUD No. 81	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Harris County MUD No. 81	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Harris County MUD No. 81	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Harris County MUD No. 81	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Harris County UD No. 6	HARRIS	SAN JACINTO	1			•																				•			•							5.00	%
	WHCRWA	Harris County UD No. 6	HARRIS	SAN JACINTO	2			•														•	•								•							10.00	%
	WHCRWA	Harris County UD No. 6	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							15.00	%
	WHCRWA	Harris County UD No. 6	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Horsepen Bayou MUD	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Horsepen Bayou MUD	HARRIS	SAN JACINTO	2			•												•		•	•								•							15.00	%
	WHCRWA	Horsepen Bayou MUD	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Horsepen Bayou MUD	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Jackrabbit Road Public Utility District	HARRIS	SAN JACINTO	1			•								•												•			•							5.00	%
	WHCRWA	Jackrabbit Road Public Utility District	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							10.00	%
	WHCRWA	Jackrabbit Road Public Utility District	HARRIS	SAN JACINTO	3			•							•	•					•			•		•					•							18.00	%
	WHCRWA	Langham Creek Utility District	HARRIS	SAN JACINTO	1			•								•												•			•							10.00	%
	WHCRWA	Langham Creek Utility District	HARRIS	SAN JACINTO	2			•								•					•	•		•							•							15.00	%
	WHCRWA	Langham Creek Utility District	HARRIS	SAN JACINTO	3			•						•		•								•		•	•				•							20.00	%
	WHCRWA	Mayde Creek MUD	HARRIS	SAN JACINTO	1			•													•	•		•							•							10.00	%
	WHCRWA	Mayde Creek MUD	HARRIS	SAN JACINTO	2			•													•			•							•							15.00	%
	WHCRWA	Mayde Creek MUD	HARRIS	SAN JACINTO	3			•												•	•			•		•					•							10.00	%
	WHCRWA	Mayde Creek MUD	HARRIS	SAN JACINTO	4	•			•															•			•				•							15.00	%
	WHCRWA	Mission Bend MUD No. 1	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Mission Bend MUD No. 1	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Mission Bend MUD No. 1	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Mission Bend MUD No. 1	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Mission Bend MUD No. 2	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Mission Bend MUD No. 2	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%
	WHCRWA	Mission Bend MUD No. 2	HARRIS	SAN JACINTO	3			•												•		•		•			•		•		•							20.00	%
	WHCRWA	Mission Bend MUD No. 2	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Morton Road MUD	HARRIS	SAN JACINTO	1											•												•			•							10.00	%
	WHCRWA	Morton Road MUD	HARRIS	SAN JACINTO	2											•					•	•		•							•							15.00	%
	WHCRWA	Morton Road MUD	HARRIS	SAN JACINTO	3											•					•			•		•					•							20.00	%
	WHCRWA	Northwest Harris County MUD No. 12	HARRIS	SAN JACINTO	1			•													•							•			•					•		16.00	Hours
	WHCRWA	Northwest Harris County MUD No. 12	HARRIS	SAN JACINTO	2			•														•									•					•		16.00	%
	WHCRWA	Northwest Harris County MUD No. 12	HARRIS	SAN JACINTO	3			•												•		•		•			•				•					•		25.00	%
	WHCRWA	Northwest Harris County MUD No. 12	HARRIS	SAN JACINTO	Emergency													•												•						•		0.00	Other
	WHCRWA	Nottingham Country MUD	HARRIS	SAN JACINTO	1			•																				•			•							10.00	%
	WHCRWA	Nottingham Country MUD	HARRIS	SAN JACINTO	2			•														•	•								•							15.00	%

						Trigger Type													Response Type												Reduction Type							Reduction	
WWP Name	WUG Name	Entity Name	Primary County	Primary Basin	Stage Number	Contamination	Customer Awareness	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Stream Flow Rate	Supply Based	System Pressure	Time	Wholesale Provider	Other	Assessment and Identification	Emergency Rate	Irrigation Schedule	Mandatory Reduction	Notification	Prohibited Use	Public Information	Terminate Contracts	Terminate Irrigation	Voluntary Reduction	Water Allocation	Other	Percent Demand	Percent Demand (April through September)	Percent Demand (October through March)	Percent Limit	Unit Reduction	Other	N/A	Value	Unit
	WHCRWA	Nottingham Country MUD	HARRIS	SAN JACINTO	3			●												●		●		●			●		●		●							20.00	%
	WHCRWA	Nottingham Country MUD	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	WHCRWA	Remington MUD No. 1	HARRIS	SAN JACINTO	1			●								●												●			●							11.00	%
	WHCRWA	Remington MUD No. 1	HARRIS	SAN JACINTO	2			●	●							●					●	●		●							●							20.00	%
	WHCRWA	Remington MUD No. 1	HARRIS	SAN JACINTO	3			●	●							●					●			●		●					●							27.00	%
	WHCRWA	Renn Road MUD	HARRIS	SAN JACINTO	1			●																				●			●							10.00	%
	WHCRWA	Renn Road MUD	HARRIS	SAN JACINTO	2			●														●	●								●							15.00	%
	WHCRWA	Renn Road MUD	HARRIS	SAN JACINTO	3			●												●		●		●			●		●		●							20.00	%
	WHCRWA	Renn Road MUD	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	WHCRWA	Ricewood MUD	HARRIS	SAN JACINTO	1			●								●												●			●							5.00	%
	WHCRWA	Ricewood MUD	HARRIS	SAN JACINTO	2			●								●					●	●		●							●							10.00	%
	WHCRWA	Ricewood MUD	HARRIS	SAN JACINTO	3			●	●							●					●			●		●					●							18.00	%
	WHCRWA	West Harris County MUD No. 14	HARRIS	SAN JACINTO	1			●										●										●			●							10.00	%
	WHCRWA	West Harris County MUD No. 14	HARRIS	SAN JACINTO	2			●										●				●									●							15.00	%
	WHCRWA	West Harris County MUD No. 14	HARRIS	SAN JACINTO	3			●										●		●		●		●			●				●							20.00	%
	WHCRWA	West Harris County MUD No. 14	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	WHCRWA	West Harris County MUD No. 15	HARRIS	SAN JACINTO	1			●										●										●			●							10.00	%
	WHCRWA	West Harris County MUD No. 15	HARRIS	SAN JACINTO	2			●										●				●									●							15.00	%
	WHCRWA	West Harris County MUD No. 15	HARRIS	SAN JACINTO	3			●										●		●		●		●			●				●							20.00	%
	WHCRWA	West Harris County MUD No. 15	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	WHCRWA	West Harris County MUD No. 17	HARRIS	SAN JACINTO	1			●										●										●			●							2.00	%
	WHCRWA	West Harris County MUD No. 17	HARRIS	SAN JACINTO	2			●										●				●									●							5.00	%
	WHCRWA	West Harris County MUD No. 17	HARRIS	SAN JACINTO	3			●										●		●		●		●			●				●							10.00	%
	WHCRWA	West Harris County MUD No. 17	HARRIS	SAN JACINTO	4			●																						●	●							25.00	%
	WHCRWA	West Harris County MUD No. 17	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	WHCRWA	West Harris County MUD No. 5	HARRIS	SAN JACINTO	1			●										●										●									●	0.00	0
	WHCRWA	West Harris County MUD No. 5	HARRIS	SAN JACINTO	2			●										●				●															●	0.00	0
	WHCRWA	West Harris County MUD No. 5	HARRIS	SAN JACINTO	3			●										●		●		●		●			●										●	0.00	0
	WHCRWA	West Harris County MUD No. 5	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	WHCRWA	West Harris County MUD No. 7	HARRIS	SAN JACINTO	1													●										●			●							10.00	%
	WHCRWA	West Harris County MUD No. 7	HARRIS	SAN JACINTO	2													●				●									●							15.00	%
	WHCRWA	West Harris County MUD No. 7	HARRIS	SAN JACINTO	3													●		●		●		●			●				●							20.00	%
	WHCRWA	West Harris County MUD No. 7	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	WHCRWA	West Harris County Regional Water Authority	HARRIS	SAN JACINTO	1													●				●						●			●							10.00	%
	WHCRWA	West Harris County Regional Water Authority	HARRIS	SAN JACINTO	2													●				●	●								●							15.00	%
	WHCRWA	West Harris County Regional Water Authority	HARRIS	SAN JACINTO	3													●				●							●		●							20.00	%
	WHCRWA	West Harris County Regional Water Authority	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other
	WINDFERN FOREST UD	Windfern Forest Utility District	HARRIS	SAN JACINTO	1			●																				●			●							5.00	%
	WINDFERN FOREST UD	Windfern Forest Utility District	HARRIS	SAN JACINTO	2			●													●	●	●								●							10.00	%
	WINDFERN FOREST UD	Windfern Forest Utility District	HARRIS	SAN JACINTO	3			●												●		●		●			●		●		●							15.00	%
	WINDFERN FOREST UD	Windfern Forest Utility District	HARRIS	SAN JACINTO	4			●														●									●							20.00	%
	WINDFERN FOREST UD	Windfern Forest Utility District	HARRIS	SAN JACINTO	Emergency													●												●						●		0.00	Other

APPENDIX 7-B

POTENTIAL EMERGENCY RESPONSES

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WUG Name	County	2020 Population	2020 Demand (Ac-Ft/yr)	Primary Source of Supply	Potential Emergency Water Supply Source(s)									Implementation Requirements	
					Release from Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Development	Existing Interconnect	New Interconnect	Other Local Supply	Trucked-In Water	Other	Type of Infrastructure	Entities Providing Supply
AMES	LIBERTY	1,145	100	Groundwater			●		●	●		●		Well , Pipeline, Transportation	City Of Liberty
ANAHUAC	CHAMBERS	2,269	267	Surface Water	●	●				●		●		Pipeline , Transportation	
ARCOLA	FORT BEND	1,874	226	Groundwater			●			●		●		Well , Pipeline, Transportation	
BACLIFF MUD	GALVESTON	7,310	539	Surface Water	●	●			●	●		●		Pipeline , Transportation	San Leon MUD, UNKNOWN
BAILEY'S PRAIRIE	BRAZORIA	748	89	Groundwater			●			●		●		Well , Pipeline, Transportation	
BAYOU VISTA	GALVESTON	1,538	276	Surface Water	●	●				●		●		Pipeline , Transportation	
BEACH CITY	CHAMBERS	2,630	315	Groundwater			●			●		●		Well , Pipeline, Transportation	
BEASLEY	FORT BEND	666	78	Groundwater			●			●		●		Well , Pipeline, Transportation	
BELLVILLE	AUSTIN	4,386	1,217	Groundwater			●					●		Well , Transportation	
BENDERS LANDING WATER SYSTEM	MONTGOMERY	5,094	2,188	Groundwater			●			●		●		Well , Pipeline, Transportation	
BLUE BELL MANOR UTILITY COMPANY	HARRIS	2,879	646	Groundwater			●			●		●		Well , Pipeline, Transportation	
BOLIVAR PENINSULA SUD	GALVESTON	2,943	198	Surface Water	●	●						●		Transportation	
BRAZORIA	BRAZORIA	3,121	318	Blend	●	●	●					●		Well , Transportation	
BRAZORIA COUNTY MUD #2	BRAZORIA	5,348	2,199	Groundwater			●			●		●		Well , Pipeline, Transportation	
BRAZORIA COUNTY MUD #21	BRAZORIA	3,707	549	Groundwater			●			●		●		Well , Pipeline, Transportation	
BRAZORIA COUNTY MUD #3	BRAZORIA	3,653	566	Groundwater			●		●	●		●		Well , Pipeline, Transportation	City of Pearland
BRAZORIA COUNTY MUD #4	BRAZORIA	-	-	Groundwater			●			●		●		Well , Pipeline, Transportation	

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BRAZORIA COUNTY MUD #6	BRAZORIA	3,158	681	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Brazoria County MUD 25
BROOKSHIRE	WALLER	5,811	663	Groundwater			•					•		Well , Transportation	
BROOKSIDE VILLAGE	BRAZORIA	1,691	198	Groundwater			•			•		•		Well , Pipeline, Transportation	
BUFFALO	LEON	1,907	374	Groundwater			•					•		Well , Transportation	
BUNKER HILL VILLAGE	HARRIS	3,803	1,626	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
CENTERVILLE	LEON	967	180	Groundwater			•					•		Well , Transportation	
CHIMNEY HILL MUD	HARRIS	5,504	583	Blend	•	•	•		•	•		•		Well , Pipeline, Transportation	Spencer Rd Pud
CLEAR LAKE SHORES	GALVESTON	1,525	562	Surface Water	•	•				•		•		Pipeline , Transportation	
COLDSPRING	SAN JACINTO	958	118	Groundwater			•			•		•		Well , Pipeline, Transportation	
CONCORD-ROBBINS WSC	LEON	2,832	213	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Marquez
COUNTY-OTHER	AUSTIN	19,677	2,332	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Settlers Estate
COUNTY-OTHER	BRAZORIA	109,994	16,734	Groundwater			•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	CHAMBERS	12,504	1,422	Groundwater			•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	FORT BEND	184,306	25,842	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	GALVESTON	20,602	2,559	Surface Water	•	•				•		•		Pipeline , Transportation	
COUNTY-OTHER	HARRIS	245,944	34,106	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	LEON	5,991	681	Groundwater			•			•		•		Well , Pipeline, Transportation	

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COUNTY-OTHER	LIBERTY	36,449	4,437	Groundwater			•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	MADISON	9,923	1,808	Groundwater			•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	MONTGOMERY	293,282	35,816	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	POLK	18,673	1,942	Groundwater			•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	SAN JACINTO	18,148	2,075	Groundwater			•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	TRINITY	2,974	214	Groundwater			•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	WALKER	15,412	3,232	Groundwater			•			•		•		Well , Pipeline, Transportation	
COUNTY-OTHER	WALLER	24,898	3,045	Groundwater			•			•		•		Well , Pipeline, Transportation	
COVE	CHAMBERS	656	79	Groundwater			•			•		•		Well , Pipeline, Transportation	
CROSBY MUD	HARRIS	2,603	313	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
CUT AND SHOOT	MONTGOMERY	1,311	116	Groundwater			•			•		•		Well , Pipeline, Transportation	
DAISETTA	LIBERTY	1,103	128	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Liberty Co FWSD 1 - Hull
DANBURY	BRAZORIA	1,722	176	Groundwater			•			•		•		Well , Pipeline, Transportation	
DAYTON	LIBERTY	10,220	2,273	Groundwater			•			•		•		Well , Pipeline, Transportation	
DOBBIN-PLANTERSVILLE WSC	MONTGOMERY	8,335	642	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
EAST PLANTATION UD	MONTGOMERY	1,074	212	Groundwater			•			•		•		Well , Pipeline, Transportation	

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					Release from Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Development	Existing Interconnect	New Interconnect	Other Local Supply	Trucked-In Water	Other	Type of Infrastructure	Entities Providing Supply
EL DORADO UD	HARRIS	2,807	260	Groundwater			•			•		•		Well , Pipeline, Transportation	
EL LAGO	HARRIS	2,733	322	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
FAIRCHILDS	FORT BEND	783	94	Groundwater			•					•		Well , Transportation	
FLO COMMUNITY WSC	LEON	3,916	297	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Se Wsc System 1
FORT BEND COUNTY MUD #116	FORT BEND	2,505	580	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Fort Bend MUD 106
FORT BEND COUNTY MUD #121	FORT BEND	3,188	394	Groundwater			•			•		•		Well , Pipeline, Transportation	
FORT BEND COUNTY MUD #129	FORT BEND	2,680	664	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Fort Bend Co MUD 115, Fort Bend Co MUD 149, Fort Bend MUD 128, Fort Bend MUD 46
FOUNTAINVIEW SUBDIVISION	HARRIS	1,929	176	Groundwater			•			•		•		Well , Pipeline, Transportation	
FULSHEAR	FORT BEND	12,106	1,378	Groundwater			•			•		•		Well , Pipeline, Transportation	
G & W WSC	WALLER	3,878	450	Groundwater			•	•	•	•		•		Well , Pipeline, Transportation	UNKNOWN
GREEN TRAILS MUD	HARRIS	1,820	555	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County MUD #345, Mason Creek UD, UNKNOWN
GREENWOOD UD	HARRIS	4,741	359	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
GROVETON	TRINITY	655	70	Surface Water	•	•						•		Transportation	
HARDIN	LIBERTY	944	122	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARDIN WSC	LIBERTY	4,407	440	Groundwater			•			•		•		Well , Pipeline, Transportation	

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					Release from Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Development	Existing Interconnect	New Interconnect	Other Local Supply	Trucked-In Water	Other	Type of Infrastructure	Entities Providing Supply
HARRIS COUNTY MUD #106	HARRIS	4,655	1,301	Groundwater			•		•	•		•		Well , Pipeline, Transportation	UNKNOWN, UNKNOWN
HARRIS COUNTY MUD #11	HARRIS	3,203	332	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Forest Hills, Harris County MUD 33, UNKNOWN, West Harris Co
HARRIS COUNTY MUD #119	HARRIS	5,927	504	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY MUD #132	HARRIS	5,006	898	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County MUD, Hco MUD 109, UNKNOWN, UNKNOWN
HARRIS COUNTY MUD #148 - KINGSLAKE	HARRIS	3,615	269	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY MUD #151	HARRIS	5,990	1,012	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County MUD, Hco MUD 109, Hco MUD 132
HARRIS COUNTY MUD #153	HARRIS	7,027	1,200	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY MUD #154	HARRIS	5,851	746	Groundwater			•		•	•		•		Well , Pipeline, Transportation	UNKNOWN
HARRIS COUNTY MUD #158	HARRIS	4,992	534	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY MUD #180	HARRIS	5,788	514	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County UD 1, Hco MUD 202
HARRIS COUNTY MUD #189	HARRIS	3,982	357	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris Co MUD 200 Cranbrook, North Forest MUD
HARRIS COUNTY MUD #221	HARRIS	4,043	399	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Hco MUD

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HARRIS COUNTY MUD #278	HARRIS	9,718	967	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County MUD 106, The City Of Houston, Trail Of The Lake MUD, Trail of the Lakes
HARRIS COUNTY MUD #290	HARRIS	4,944	609	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY MUD #345	HARRIS	3,476	786	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY MUD #400 - WEST	HARRIS	4,817	785	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County WCID 96, The City Of Houston
HARRIS COUNTY MUD #46	HARRIS	4,017	664	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Hco MUD 109
HARRIS COUNTY MUD #49	HARRIS	4,676	456	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY MUD #5	HARRIS	6,280	508	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Hc MUD 5, Hco MUD 150, Hco MUD 217, Hco MUD 33
HARRIS COUNTY MUD #50	HARRIS	2,177	273	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY MUD #8	HARRIS	4,595	485	Blend	•	•	•		•	•		•		Well , Pipeline, Transportation	Rolling Fork Pud
HARRIS COUNTY MUD #96	HARRIS	6,782	582	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY UD #14	HARRIS	3,025	204	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County MUD 33, North West Harris Cou
HARRIS COUNTY UD #15	HARRIS	3,603	521	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY WCID #1	HARRIS	5,916	597	Blend	•	•	•			•		•		Well , Pipeline, Transportation	

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HARRIS COUNTY WCID #133	HARRIS	5,324	658	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY WCID #74	HARRIS	5,045	785	Groundwater			•			•		•		Well , Pipeline, Transportation	
HARRIS COUNTY WCID #96	HARRIS	10,500	1,942	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
HEDWIG VILLAGE	HARRIS	2,580	1,477	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
HEMPSTEAD	WALLER	6,726	1,304	Groundwater			•					•		Well , Transportation	
HILLCREST	BRAZORIA	730	118	Groundwater			•		•	•		•		Well , Pipeline, Transportation	City Of Alvin
HILSHIRE VILLAGE	HARRIS	749	196	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
HITCHCOCK	GALVESTON	8,604	949	Surface Water	•	•				•		•		Pipeline , Transportation	
HOLIDAY LAKES	BRAZORIA	1,109	75	Groundwater			•			•		•		Well , Pipeline, Transportation	
HUNTERS CREEK VILLAGE	HARRIS	4,461	2,353	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
INDIGO LAKE WATER SYSTEM	MONTGOMERY	2,934	1,133	Groundwater			•			•		•		Well , Pipeline, Transportation	
IOWA COLONY	BRAZORIA	2,312	292	Groundwater			•			•		•		Well , Pipeline, Transportation	
JAMAICA BEACH	GALVESTON	989	261	Surface Water	•	•				•		•		Pipeline , Transportation	
JEWETT	LEON	1,462	238	Groundwater			•					•		Well , Transportation	
JONES CREEK	BRAZORIA	2,042	207	Groundwater			•			•		•		Well , Pipeline, Transportation	
KEMAH	GALVESTON	4,685	1,181	Surface Water	•	•			•	•		•		Pipeline , Transportation	Bacliff MUD
KENEFICK	LIBERTY	643	76	Groundwater			•			•		•		Well , Pipeline, Transportation	

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KINGS MANOR MUD	HARRIS	2,804	329	Groundwater			•		•	•		•		Well , Pipeline, Transportation	City Of Houston UD 5
KINGS MANOR MUD	MONTGOMERY	2,804	329	Groundwater			•		•	•		•		Well , Pipeline, Transportation	City Of Houston UD 5
KIRKMONT MUD	HARRIS	2,323	378	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Sagemeadow UD
LAKE WINDCREST WATER SYSTEM	MONTGOMERY	2,544	916	Groundwater			•			•		•		Well , Pipeline, Transportation	
LIVINGSTON	POLK	6,093	2,557	Surface Water	•	•		•				•		Well, Transportation	
LONGHORN TOWN UD	HARRIS	1,273	287	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County MUD, Harris County MUD
MADISONVILLE	MADISON	4,747	870	Groundwater			•					•		Well , Transportation	
MAGNOLIA	MONTGOMERY	3,105	694	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Grand Oaks MUD
MANVEL	BRAZORIA	11,619	1,658	Groundwater			•			•		•		Well , Pipeline, Transportation	
MASON CREEK UD	HARRIS	6,610	1,268	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Green Trails MUD, Harris Co MUD 81, Interstate MUD
MEADOWS PLACE	FORT BEND	4,669	773	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
MONT BELVIEU	CHAMBERS	5,013	2,185	Groundwater			•					•		Well , Transportation	
MONTGOMERY	MONTGOMERY	2,676	631	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
MONTGOMERY COUNTY MUD #15	MONTGOMERY	3,792	497	Groundwater			•			•		•		Well , Pipeline, Transportation	
MONTGOMERY COUNTY MUD #18	MONTGOMERY	4,676	1,285	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
MONTGOMERY COUNTY MUD #19	MONTGOMERY	1,996	261	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Southern Montgomery Coun
MONTGOMERY COUNTY MUD #8	MONTGOMERY	2,963	445	Groundwater			•	•		•		•		Well , Pipeline, Transportation	

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MONTGOMERY COUNTY MUD #83	MONTGOMERY	1,494	281	Groundwater			•		•	•		•		Well , Pipeline, Transportation	City Of Houston UD 5
MONTGOMERY COUNTY MUD #89	MONTGOMERY	4,254	335	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Montgomery Co MUD 88, Spring Creek UD
MONTGOMERY COUNTY MUD #9	MONTGOMERY	3,240	507	Groundwater			•	•	•	•		•		Well , Pipeline, Transportation	Montgomery Co MUD 8
MONTGOMERY COUNTY MUD #94	MONTGOMERY	3,441	592	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Hco WCID 92 - Tx1010124, Mont Co MUD 119 - Tx1700773
MONTGOMERY COUNTY UD #2	MONTGOMERY	1,391	172	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
MONTGOMERY COUNTY UD #3	MONTGOMERY	1,825	267	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
MONTGOMERY COUNTY UD #4	MONTGOMERY	3,069	509	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
MONTGOMERY COUNTY WCID #1	MONTGOMERY	2,989	255	Groundwater			•			•		•		Well , Pipeline, Transportation	
MOUNT HOUSTON ROAD MUD	HARRIS	5,017	496	Groundwater			•			•		•		Well , Pipeline, Transportation	
NASSAU BAY	HARRIS	4,091	1,065	Blend	•	•	•		•	•		•		Well , Pipeline, Transportation	Clear Lake City Water Authority
NEEDVILLE	FORT BEND	2,836	300	Groundwater			•					•		Well , Transportation	
NEW WAVERLY	WALKER	1,085	181	Groundwater			•					•		Well , Transportation	
NORMANGEE	LEON	744	122	Groundwater			•					•		Well , Transportation	
NORMANGEE	MADISON	744	122	Groundwater			•					•		Well , Transportation	
NORTH BELT UD	HARRIS	1,788	341	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Greens Parkway MUD
NORTH GREEN MUD	HARRIS	4,072	476	Groundwater			•			•		•		Well , Pipeline, Transportation	

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OAK RIDGE NORTH	MONTGOMERY	3,121	559	Groundwater			•		•	•		•		Well , Pipeline, Transportation	UNKNOWN
OAKWOOD	LEON	475	74	Groundwater			•					•		Well , Transportation	
OLD RIVER-WINFREE	CHAMBERS	1,488	146	Groundwater			•			•		•		Well , Pipeline, Transportation	
OLD RIVER-WINFREE	LIBERTY	1,488	146	Groundwater			•			•		•		Well , Pipeline, Transportation	
ONALASKA	POLK	2,468	316	Groundwater			•					•		Well , Transportation	
OYSTER CREEK	BRAZORIA	1,131	250	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
PANORAMA VILLAGE	MONTGOMERY	2,557	585	Groundwater			•			•		•		Well , Pipeline, Transportation	
PARKWAY UD	HARRIS	5,970	520	Blend	•	•	•		•	•		•		Well , Pipeline, Transportation	Greenwood UD - Tx1010554
PATTON VILLAGE	MONTGOMERY	2,175	151	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Patton Village West W
PINE ISLAND	WALLER	1,112	152	Groundwater			•					•		Well , Transportation	
PINEY POINT VILLAGE	HARRIS	3,178	1,743	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
PLANTATION MUD	FORT BEND	3,948	417	Groundwater			•			•		•		Well , Pipeline, Transportation	
PLEAK	FORT BEND	1,350	158	Groundwater			•					•		Well , Transportation	
PLUM GROVE	LIBERTY	685	81	Groundwater			•			•		•		Well , Pipeline, Transportation	
POINT AQUARIUS MUD	MONTGOMERY	1,655	339	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
POINT BLANK	SAN JACINTO	773	89	Groundwater			•			•		•		Well , Pipeline, Transportation	
PRAIRIE VIEW	WALLER	6,609	1,567	Groundwater			•					•		Well , Transportation	
RICHWOOD	BRAZORIA	3,647	377	Blend	•	•	•		•	•		•		Well , Pipeline, Transportation	City Of Clute

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					Release from Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Development	Existing Interconnect	New Interconnect	Other Local Supply	Trucked-In Water	Other	Type of Infrastructure	Entities Providing Supply
RIVER PLANTATION MUD	MONTGOMERY	2,107	511	Groundwater			•			•		•		Well , Pipeline, Transportation	
RIVERSIDE	WALKER	565	55	Groundwater			•			•		•		Well , Pipeline, Transportation	
RIVERSIDE WSC	SAN JACINTO	5,773	389	Blend	•	•	•		•	•		•		Well , Pipeline, Transportation	Walker County SUD D
RIVERSIDE WSC	WALKER	5,773	389	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Walker County SUD D
ROMAN FOREST	MONTGOMERY	1,553	320	Groundwater			•		•	•		•		Well , Pipeline, Transportation	City Of Wood Branch
SAGEMEADOW UD	HARRIS	6,352	727	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
SAN FELIPE	AUSTIN	868	231	Groundwater			•			•		•		Well , Pipeline, Transportation	
SAN JACINTO SUD	SAN JACINTO	2,588	237	Blend	•	•	•	•				•		Well , Transportation	
SAN LEON MUD	GALVESTON	5,547	373	Surface Water	•	•			•	•		•		Pipeline , Transportation	Bacliff MUD
SEALY	AUSTIN	6,754	1,380	Groundwater			•			•		•		Well , Pipeline, Transportation	
SHENANDOAH	MONTGOMERY	2,959	1,292	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Sjra Woodland
SHEPHERD	SAN JACINTO	2,603	314	Groundwater			•			•		•		Well , Pipeline, Transportation	
SHOREACRES	HARRIS	1,493	332	Blend	•	•	•		•	•		•		Well , Pipeline, Transportation	City of La Porte
SIMONTON	FORT BEND	884	105	Groundwater			•			•		•		Well , Pipeline, Transportation	
SOUTHERN MONTGOMERY COUNTY MUD	MONTGOMERY	7,488	861	Groundwater			•		•	•		•		Well , Pipeline, Transportation	1700319, Rayford Rd1700334, Spring P
SOUTHSIDE PLACE	HARRIS	1,734	263	Blend	•	•	•			•		•		Well , Pipeline, Transportation	

WUG Name	County	2020 Population	2020 Demand (Ac-Ft/yr)	Primary Source of Supply	Potential Emergency Water Supply Source(s)									Implementation Requirements	
					Release from Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Development	Existing Interconnect	New Interconnect	Other Local Supply	Trucked-In Water	Other	Type of Infrastructure	Entities Providing Supply
SPLENDORA	MONTGOMERY	1,821	180	Groundwater			•			•		•		Well , Pipeline, Transportation	
SPRING CREEK UD	MONTGOMERY	7,307	645	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Montgomery County, Rayford Road MUD
SPRING VALLEY	HARRIS	3,870	1,048	Groundwater			•			•		•		Well , Pipeline, Transportation	
STAGECOACH	MONTGOMERY	541	37	Groundwater			•			•		•		Well , Pipeline, Transportation	
STANLEY LAKE MUD	MONTGOMERY	2,586	569	Groundwater			•			•		•		Well , Pipeline, Transportation	
SWEENY	BRAZORIA	3,704	540	Groundwater			•			•		•		Well , Pipeline, Transportation	
TARKINGTON SUD	LIBERTY	3,910	416	Groundwater			•	•		•		•		Well , Pipeline, Transportation	
TAYLOR LAKE VILLAGE	HARRIS	3,557	657	Blend	•	•	•			•		•		Well , Pipeline, Transportation	
THE COMMONS WATER SUPPLY INC	HARRIS	2,981	359	Groundwater			•			•		•		Well , Pipeline, Transportation	
THE CONSOLIDATED WSC	WALKER	142	17	Surface Water	•	•						•		Transportation	
TIKI ISLAND	GALVESTON	972	243	Surface Water	•	•				•		•		Pipeline , Transportation	
TRAIL OF THE LAKES MUD	HARRIS	9,058	1,043	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Harris County MUD 278
TRINITY	TRINITY	3,051	337	Surface Water	•	•						•		Transportation	
TRINITY RURAL WSC	TRINITY	4,798	569	Blend	•	•	•	•				•		Well , Transportation	
TRINITY RURAL WSC	WALKER	4,798	569	Surface Water	•	•		•				•		Well, Transportation	
VARNER CREEK UD	BRAZORIA	1,529	213	Groundwater			•			•		•		Well , Pipeline, Transportation	

WUG Name	County	2020 Population	2020 Demand (Ac-Ft/yr)	Primary Source of Supply	Potential Emergency Water Supply Source(s)									Implementation Requirements	
					Release from Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Development	Existing Interconnect	New Interconnect	Other Local Supply	Trucked-In Water	Other	Type of Infrastructure	Entities Providing Supply
WALKER COUNTY SUD	WALKER	7,872	1,043	Groundwater			•	•	•	•		•		Well , Pipeline, Transportation	Walker Co SUD, Walker Co SUD, Walker County SUD B, Walker County SUD F
WALLER	HARRIS	2,514	440	Groundwater			•			•		•		Well , Pipeline, Transportation	
WALLER	WALLER	2,514	440	Groundwater			•			•		•		Well , Pipeline, Transportation	
WALLIS	AUSTIN	1,329	161	Groundwater			•					•		Well , Transportation	
WEST COLUMBIA	BRAZORIA	3,923	437	Groundwater			•			•		•		Well , Pipeline, Transportation	
WEST HARDIN WSC	LIBERTY	357	24	Groundwater			•					•		Well , Transportation	
WEST HARRIS COUNTY MUD #6	HARRIS	2,428	327	Groundwater			•			•		•		Well , Pipeline, Transportation	
WESTON LAKES	FORT BEND	2,621	1,657	Groundwater			•			•		•		Well , Pipeline, Transportation	
WESTWOOD NORTH WSC	MONTGOMERY	1,967	351	Groundwater			•			•		•		Well , Pipeline, Transportation	
WILLIS	MONTGOMERY	6,533	817	Groundwater			•	•	•	•		•		Well , Pipeline, Transportation	Conroe
WINDFERN FOREST UD	HARRIS	4,288	843	Blend	•	•	•		•	•		•		Well , Pipeline, Transportation	City Of Houston, Rolling Fork Pud, West Harris County Mu
WOODBRANCH	MONTGOMERY	1,369	105	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Roman Forest 1700071
WOODCREEK MUD	HARRIS	2,340	288	Groundwater			•		•	•		•		Well , Pipeline, Transportation	Memorial Hills, Richey Rd MUD
WOODLAND HILLS WATER COMPANY	LIBERTY	6,507	500	Groundwater			•			•		•		Well , Pipeline, Transportation	

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APPENDIX 7-C

MODEL DROUGHT CONTINGENCY PLANS

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MODEL DROUGHT CONTINGENCY PLAN FOR WHOLESALE PUBLIC WATER PROVIDERS

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SECTION I: DECLARATION OF POLICY, PURPOSE, AND INTENT

In order to conserve the available water supply and/or to protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ___________________ *(name of your water supplier)* adopts the following Drought Contingency Plan (the Plan).

SECTION II: PUBLIC INVOLVEMENT

Opportunity for the public and wholesale water customers to provide input into the preparation of the Plan was provided by _____________ *(name of your water supplier)* by means of ______________ *(describe methods used to inform the public and wholesale customers about the preparation of the plan and opportunities for input; for example, scheduling and proving public notice of a public meeting to accept input on the Plan).*

SECTION III: WHOLESALE WATER CUSTOMER EDUCATION

The ____________ *(name of your water supplier)* will periodically provide wholesale water customers with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of __________________ *(e.g., describe methods to be used to provide customers with information about the Plan; for example, providing a copy of the Plan or periodically including information about the Plan with invoices for water sales).*

SECTION IV: COORDINATION WITH REGIONAL WATER PLANNING GROUPS

The water service area of the ______________ *(name of your water supplier)* is located within the _______________ *(name of regional water planning area or areas)* and the _____________ *(name of your water supplier)* has provided a copy of the Plan to the ____________ *(name of your regional water planning group or groups).*

SECTION V: AUTHORIZATION

The ___________________ *(designated official; for example, the general manager or executive director)*, or his/her designee, is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _______________, or his/her designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

SECTION VI: APPLICATION

The provisions of this Plan shall apply to all customers utilizing water provided by the __________________ *(name of your water supplier)*. The terms “person” and “customer” as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

SECTION VII: DEFINITIONS

For the purposes of this Plan, the following definitions shall apply:

- Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.
- Customer: any person, company, or organization using water supplied by ______________ (name of your water supplier).
- Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.
- Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;
(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or Jacuzzi-type pools;
(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
(i) use of water from hydrants for construction purposes or any other purposes other than firefighting.

SECTION VIII: CRITERIA FOR INITIATION AND TERMINATION OF DROUGHT RESPONSE STAGES

The ____________ *(designated official)*, or his/her designee, shall monitor water supply and/or demand conditions on a *(e.g., weekly, monthly)* basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Customer notification of the initiation or termination of drought response stages will be made by mail or telephone. The news media will also be informed. The triggering criteria described below are based on _________________________

(Provide a brief description of the rationale for the triggering criteria; for example, triggering criteria / trigger levels based on a statistical analysis of the vulnerability of the water source under drought of record conditions, or based on known system capacity limits).

<u>Stage 1 Triggers -- MILD Water Shortage Conditions</u>

<u>Requirements for initiation</u>

The _____________ *(name of your water supplier)* will recognize that a mild water shortage condition exists when______________

(Describe triggering criteria / trigger levels; see examples below).

Below are examples of the types of triggering criteria that might be used in a wholesale water supplier's drought contingency plan. One or a combination of such criteria maybe defined for each drought response stage:

Example 1: Water in storage in the _________ (name of reservoir) is equal to or less than _______ (acre-feet and/or percentage of storage capacity).
Example 2: When the combined storage in the __________ (name of reservoirs) is equal to or less than ______ (acre-feet and/or percentage of storage capacity).
Example 3: Flows as measured by the U.S. Geological Survey gage on the ________ (name of river) near ________, Texas reaches ___ cubic feet per second (cfs).
Example 4: When total daily water demand equals or exceeds ______ million gallons for ___consecutive days or ____ million gallons on a single day.
Example 5: When total daily water demand equals or exceeds ___ percent of the safe operating capacity of ____________ million gallons per day for ___consecutive days or ___ percent on a single day.

The wholesale supplier may devise other triggering criteria which are tailored to its system.

<u>Requirements for termination</u>

Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(e.g., 30)* consecutive days. The _________ *(name of water supplier)* will notify its wholesale customers and the media of the termination of Stage 1.

<u>Stage 2 Triggers -- MODERATE Water Shortage Conditions</u>

<u>Requirements for initiation</u>

Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(e.g., 30)* consecutive days. Upon termination of Stage 2, Stage 1 becomes operative. The _________ *(name of your water supplier)* will notify its wholesale customers and the media of the termination of Stage 2.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation

The ______________ *(name of your water supplier)* will recognize that a severe water shortage condition exists when_______________ *(describe triggering criteria; see examples in Stage 1).*

Requirements for termination

Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(e.g., 30)* consecutive days. Upon termination of Stage 3, Stage 2 becomes operative. The _________ *(name of your water supplier)* will notify its wholesale customers and the media of the termination of Stage 3.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation

Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(e.g., 30)* consecutive days. Upon termination of Stage 4, Stage 3 becomes operative. The _________ *(name of your water supplier)* will notify its wholesale customers and the media of the termination of Stage 4.

Stage 5 Triggers -- EMERGENCY Water Shortage Conditions

Requirements for initiation

The ______________ *(name of your water supplier)* will recognize that an emergency water shortage condition exists when_______________ *(describe triggering criteria; see examples below).*

Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or

Natural or man-made contamination of the water supply source(s).

Requirements for termination

Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. The _________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 5.

SECTION IX: DROUGHT RESPONSE STAGES

The _________ *(designated official)*, or his/her designee, shall monitor water supply and/or demand conditions and, in accordance with the triggering criteria set forth in Section VII, shall determine that mild, moderate, or severe water shortage conditions exist or that an emergency condition exists and shall implement the following actions:

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary ___ percent reduction in __________ *(example: total water use, daily water demand, etc.).*

- The ________________ *(designated official)*, or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate voluntary measures to reduce water use *(e.g., implement Stage 1 or appropriate stage of the customer's drought contingency plan).*
- The _________________ *(designated official)*, or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.
- *Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for nonpotable purposes.*

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

- The ________________ (designated official), or his/her designee(s), will request wholesale water customers to initiate mandatory measures to reduce non-essential water use (e.g., implement Stage 2 or appropriate stage of the customer's drought contingency plan).
- The ________________ (designated official), or his/her designee(s), will initiate weekly contact with wholesale water customers to discuss water supply and/or demand conditions and the possibility of pro rata curtailment of water diversions and/or deliveries.
- The _________________ (designated official), or his/her designee(s), will further prepare for the implementation of pro rata curtailment of water diversions and/or deliveries by preparing a monthly water usage allocation baseline for each wholesale customer.
- The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.
- The _________________ (designated official), or his/her designee(s), will notify the Executive Director of the TCEQ within five days of implementation of Stage 2.

- Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

<u>Stage 3 Response -- SEVERE Water Shortage Conditions</u>

Target: Achieve a ___ percent reduction in __________ *(example: total water use, daily water demand, etc.).*

- The ________________ *(designated official)*, or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate additional mandatory measures to reduce non-essential water use *(e.g., implement Stage 3 or appropriate stage of the customer's drought contingency plan).*
- The _________________ (*designated official),* or his/her designee(s), will initiate pro rata curtailment of water diversions and/or deliveries for each wholesale customer.
- The _________________ *(designated official)*, or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.
- The _________________ *(designated official)*, or his/her designee(s), will notify the Executive Director of the TCEQ within five days of implementation of Stage 3.
- *Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.*

<u>Stage 4 Response -- CRITICAL Water Shortage Conditions</u>

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

- The ________________ (designated official), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate additional mandatory measures to reduce non-essential water use (e.g., implement Stage 4 or appropriate stage of the customer's drought contingency plan).
- The _________________ (designated official), or his/her designee(s), will initiate pro rata curtailment of water diversions and/or deliveries for each wholesale customer.
- The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

- The _________________ (designated official), or his/her designee(s), will notify the Executive Director of the TCEQ within five days of implementation of Stage 4.
- Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Stage 5 Response -- EMERGENCY Water Shortage Conditions

- Whenever emergency water shortage conditions exist as defined in Section VII of the Plan, the _______________ *(designated official)* shall:
- Assess the severity of the problem and identify the actions needed and time required to solve the problem.
- Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and suggest actions, as appropriate, to alleviate problems (e.g., notification of the public to reduce water use until service is restored).
- If appropriate, notify city, county, and/or state emergency response officials for assistance.
- The _________________ *(designated official)*, or his/her designee(s), will notify the Executive Director of the TCEQ within five days of implementation of Stage 5.
- Undertake necessary actions, including repairs and/or clean-up as needed.
- Prepare a post-event assessment report on the incident and critique of emergency response procedures and actions.

SECTION X: PRO RATA WATER ALLOCATION

In the event that the triggering criteria specified in Section VII of the Plan for Stage 3 – Severe Water Shortage Conditions have been met, the ____________ *(designated official)* is hereby authorized initiate allocation of water supplies on a pro rata basis in accordance with Texas Water Code, §11.039.

SECTION XI: CONTRACT PROVISIONS

The ____________ *(name of your water supplier)* will include a provision in every wholesale water contract entered into or renewed after adoption of the plan, including contract extensions, that in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with Texas Water Code, §11.039.

SECTION XII: ENFORCEMENT

During any period when either mandatory water use restrictions or pro rata allocation of available water supplies are in effect, wholesale customers shall pay the following surcharges on excess water diversions and/or deliveries:

____ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation from ___ percent through ___ percent above the monthly allocation.

Mandatory water use restrictions or pro rata allocation of available water supplies may be imposed during drought stages and emergency water management actions. These water use restrictions will be enforced by warnings and penalties as follows:

- On the first violation, customers will be notified by written notice that they have violated the mandatory water use restriction.
- If the first violation has not been corrected after ten (10) days from the written notice, __________ *(name of your water supplier)* may assess a fine up to $______ per violation.
- _______ *(name of your water supplier)* may install a flow restricting device in the line to limit the amount of water which will pass through the meter in a 24-hour period. The utility may charge the customer for the actual cost of installing and removing the flow restricting device, not to exceed fifty dollars ($50.00);
- ______ *(name of your water supplier)* maintains the right, at any violation or action level, to disconnect irrigation systems and/or suspend water services to a customer for public safety issues with reconnection fees and possible citations.
- Subsequent violations of the plan shall result in increased fines or upon the occurrence of ______ violations, after notice, the discontinuation of services. Services discontinued under this provision shall be restored only upon payment of a reconnection fee and any other costs incurred by the utility in discontinuing service.

SECTION XIII: VARIANCES

The ________________ *(designated official)*, or his/her designee, may, in writing, grant a temporary variance to the pro rata water allocation policies provided by this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the public health, welfare, or safety and if one or more of the following conditions are met:

- Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the _________________ *(designated official)* within 5 days after pro rata allocation has been invoked. All petitions for variances shall be reviewed by the __________ *(governing body)*, and shall include the following:

- Name and address of the petitioner(s).
- Detailed statement with supporting data and information as to how the pro rata allocation of water under the policies and procedures established in the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
- Description of the relief requested.
- Period of time for which the variance is sought.
- Alternative measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- Other pertinent information.

Variances granted by the ___________________ *(governing body)* shall be subject to the following conditions, unless waived or modified by the ____________ *(governing body)* or its designee:

- Variances granted shall include a timetable for compliance.
- Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

SECTION XIV: SEVERABILITY AND AMENDMENT

It is hereby declared to be the intention of the ________________ *(governing body of your water supplier)* that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the ____________________ *(governing body of your water supplier)* without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

The ___________________ *(name of your water supplier)* reserves the right to review, change, amend, or alter any provision of this plan at any time. The ___________________ (*name of your water supplier*) shall review and update this Plan, as appropriate, at least every five years in consideration of new or updated information.

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MODEL DROUGHT CONTINGENCY PLAN FOR RETAIL PUBLIC WATER PROVIDERS

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SECTION I: DECLARATION OF POLICY, PURPOSE, AND INTENT

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ___________________ *(name of your water supplier)* hereby adopts the following regulations and restrictions on the delivery and consumption of water through an ordinance/or resolution.

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section X of this Plan.

SECTION II: PUBLIC INVOLVEMENT

Opportunity for the public to provide input into the preparation of the Plan was provided by the ______________ *(name of your water suppli*er) by means of ________________ *(describe methods used to inform the public about the preparation of the plan and provide opportunities for input; for example, scheduling and providing public notice of a public meeting to accept input on the Plan)*.

SECTION III: PUBLIC EDUCATION

The ______________ *(name of your water supplier)* will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of __________________ *(describe methods to be used to provide information to the public about the Plan; for example, public events, press releases or utility bill inserts).*

SECTION IV: COORDINATION WITH REGIONAL WATER PLANNING GROUPS

The service area of the _____________ *(name of your water supplier)* is located within the ____________ *(name of regional water planning area or areas)* and ___________ *(name of your water supplier)* has provided a copy of this Plan to the ____________ *(name of your regional water planning group or groups)*.

SECTION V: AUTHORIZATION

The ___________________ *(designated official; for example, the mayor, city manager, utility director, general manager, etc.)*, or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _______________, *(designated official)* or his/her designee shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

SECTION VI: APPLICATION

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the ___________________ *(name of your water supplier)*. The terms “person” and “customer” as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

SECTION VII: DEFINITIONS

For the purposes of this Plan, the following definitions shall apply:

- Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.
- Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.
- Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.
- Customer: any person, company, or organization using water supplied by _______________ (name of your water supplier).
- Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.
- Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.
- Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.
- Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.
- Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;
(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or Jacuzzi-type pools;
(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and

(i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

- Odd numbered address*:* street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

SECTION VIII: CRITERIA FOR INITIATION AND TERMINATION OF DROUGHT RESPONSE STAGES

The ________________ *(designated official)* or his/her designee shall monitor water supply and/or demand conditions on a __________ *(example: daily, weekly, monthly)* basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified triggers are reached.

The triggering criteria described below are based on ______________________________________

(provide a brief description of the rationale for the triggering criteria; for example, triggering criteria / trigger levels based on a statistical analysis of the vulnerability of the water source under drought of record conditions, or based on known system capacity limits).

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation

Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII Definitions, when________

(Describe triggering criteria / trigger levels; see examples below).

Following are examples of the types of triggering criteria that might be used in one or more successive stages of a drought contingency plan. One or a combination of such criteria must be defined for each drought response stage, but usually not all will apply. Select those appropriate to your system:

Example 6: Annually, beginning on May 1 through September 30.
Example 7: When the water supply available to the _______ (name of your water supplier) is equal to or less than _______ (acre-feet, percentage of storage, etc.).
Example 8: When, pursuant to requirements specified in the _____________(name of your water supplier) wholesale water purchase contract with ____________ (name of your wholesale water supplier), notification is received requesting initiation of Stage 1 of the Drought Contingency Plan.
Example 9: When flows in the _______ (name of stream or river) are equal to or less than ____cubic feet per second.
Example 10: When the static water level in the ____________ (name of your water supplier) well(s) is equal to or less than _____ feet above/below mean sea level.
Example 11: When the specific capacity of the __________________ (name of your water supplier) well(s) is equal to or less than _____ percent of the well's original specific capacity.

Example 12: When total daily water demand equals or exceeds ______ million gallons for ___consecutive days of ____ million gallons on a single day (example: based on the safe operating capacity of water supply facilities).

Example 13: Continually falling treated water reservoir levels which do not refill above __ percent overnight (example: based on an evaluation of minimum treated water storage required to avoid system outage).

The public water supplier may devise other triggering criteria which are tailored to its system.

Requirements for termination

Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(e.g. 3)* consecutive days.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section IX of this Plan when ____________ (*describe triggering criteria; see examples in Stage 1*).

Requirements for termination

Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(example: 3)* consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when ____________ *(describe triggering criteria; see examples in Stage 1)*.

Requirements for termination

Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(example: 3)* consecutive days. Upon termination of Stage 3, Stage 2 becomes operative. The _________ *(name of your water supplier)* will notify its wholesale customers and the media of the termination of Stage 3.

<u>Stage 4 Triggers -- CRITICAL Water Shortage Conditions</u>

<u>Requirements for initiation</u>

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when ____________ *(describe triggering criteria; see examples in Stage 1)*.

<u>Requirements for termination</u>

Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(e.g., 30)* consecutive days. Upon termination of Stage 4, Stage 3 becomes operative.

<u>Stage 5 Triggers -- EMERGENCY Water Shortage Conditions</u>

<u>Requirements for initiation</u>

Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when ____________ *(designated official)*, or his/her designee, determines that a water supply emergency exists based on:

- Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or
- Natural or man-made contamination of the water supply source(s).

<u>Requirements for termination</u>

Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(e.g., 30)* consecutive days. The _________ *(name of your water supplier)* will notify its wholesale customers and the media of the termination of Stage 5.

<u>Stage 6 Triggers -- WATER ALLOCATION</u>

<u>Requirements for initiation</u>

Customers shall be required to comply with the water allocation plan prescribed in Section IX of this

Plan and comply with the requirements and restrictions for Stage 5 of this Plan when ____________ *(describe triggering criteria, see examples in Stage 1)*.

Requirements for termination

Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ *(example: 3)* consecutive days.

Note: The inclusion of WATER ALLOCATION as part of a drought contingency plan may not be required in all cases. For example, for a given water supplier, an analysis of water supply availability under drought of record conditions may indicate that there is essentially no risk of water supply shortage. Hence, a drought contingency plan for such a water supplier might only address facility capacity limitations and emergency conditions (example: supply source contamination and system capacity limitations).

SECTION IX: DROUGHT RESPONSE STAGES

The _______________ *(designated official)*, or his/her designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of this Plan, shall determine that a mild, moderate, severe, critical, emergency or water shortage condition exists and shall implement the following notification procedures:

Notification of the Public:

The _________ *(designated official)* or his/ her designee shall notify the public by means of:

Examples:

publication in a newspaper of general circulation,

direct mail to each customer,

public service announcements,

signs posted in public places

take-home fliers at schools.

Additional Notification:

The _________ (designated official) or his/ her designee shall notify directly, or cause to be notified directly, the following individuals and entities:

Examples:

Mayor / Chairman and members of the City Council / Utility Board

Fire Chief(s)

City and/or County Emergency Management Coordinator(s)

County Judge & Commissioner(s)

State Disaster District / Department of Public Safety

TCEQ (required when mandatory restrictions are imposed)

Major water users

Critical water users, i.e. hospitals

Parks / street superintendents & public facilities managers

Note: The plan should specify direct notice only as appropriate to respective drought stages.

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

- Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m. to midnight on designated watering days.
- All operations of the ______________ (name of your water supplier) shall adhere to water use restrictions prescribed for Stage 2 of the Plan.
- Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.
- *Describe additional measures, if any, to be implemented directly by (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, activation and use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.). ***Under threat of penalty for violation, the following water use restrictions shall apply to all persons:***

- Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00

midnight on designated watering days. However, irrigation of landscaped areas is permitted at any time if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

- Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.
- Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.
- Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the ____________________ *(name of your water supplier)*.
- Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the ________________ *(name of your water supplier)*, the facility shall not be subject to these regulations.
- All restaurants are prohibited from serving water to patrons except upon request of the patron.
- The following uses of water are defined as non-essential and are prohibited:

(a) wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(b) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(c) use of water for dust control;
(d) flushing gutters or permitting water to run or accumulate in any gutter or street; and
(e) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

- The __________ *(designated official)* or his/ her designee shall notify the Executive Director of the TCEQ within five days of the initiation of Stage 2.
- *Describe additional measures, if any, to be implemented directly by _____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Stage 3 Response -- SEVERE Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.). ***All requirements of Stage 2 shall remain in effect during Stage 3 except:***

- Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.
- The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the ____________________ *(name of your water supplier)*.
- The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.
- The _________ *(designated official)* or his/ her designee shall notify the Executive Director of the TCEQ within five days of the initiation of Stage 3.
- *Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Stage 4 Response -- CRITICAL Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.). ***All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:***

- Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.
- Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.
- The filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited.
- Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.
- No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher-numbered stage shall be in effect.

- The _________ *(designated official)* or his/ her designee shall notify the Executive Director of the TCEQ within five days of the initiation of Stage 4.
- *Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Stage 5 Response -- EMERGENCY Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ *(example: total water use, daily water demand, etc.)*. ***All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:***

- Irrigation of landscaped areas is absolutely prohibited.
- Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.
- The _________ *(designated official)* or his/ her designee shall notify the Executive Director of the TCEQ within five days of the initiation of Stage 5.
- *Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Stage 6 Response -- WATER ALLOCATION

In the event that water shortage conditions threaten public health, safety, and welfare, the ____________ *(designated official)* is hereby authorized to allocate water according to the following water allocation plan:

Single-Family Residential Customers

The allocation to residential water customers residing in a single-family dwelling shall be as follows:

Persons per Household	Gallons per Month
1 or 2	6,000
3 or 4	7,000
5 or 6	8,000
7 or 8	9,000
9 or 10	10,000
11 or more	12,000

Household means the residential premises served by the customer's meter. Persons per household include only those persons currently physically residing at the premises and expected to reside there for the entire billing period. It shall be assumed that a particular customer's household is comprised of two (2) persons unless the customer notifies the _____________ *(name of your water supplier)* of a greater number of persons per household on a form prescribed by the ____________ *(designated official)*. The _________ *(designated official)* shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every residential customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the ____________ *(name of your water supplier)* offices to complete and sign the form claiming more than two (2) persons per household. New customers may claim more persons per household at the time of applying for water service on the form prescribed by the __________ *(designated official)*. When the number of persons per household increases so as to place the customer in a different allocation category, the customer may notify the _________ *(name of water supplier)* on such form and the change will be implemented in the next practicable billing period. If the number of persons in a household is reduced, the customer shall notify the _________*(name of your water supplier)* in writing within two (2) days. In prescribing the method for claiming more than two (2) persons per household, the _________ *(designated official)* shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of persons in a household or fails to timely notify the ____________ *(name of your water supplier)* of a reduction in the number of person in a household shall be fined not less than $________.

Residential water customers shall pay the following surcharges:

$____ for the first 1,000 gallons over allocation.

$____ for the second 1,000 gallons over allocation.

$____ for the third 1,000 gallons over allocation.

$____ for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Master-Metered Multi-Family Residential Customers

The allocation to a customer billed from a master meter which jointly measures water to multiple permanent residential dwelling units (example: apartments, mobile homes) shall be allocated 6,000 gallons per month for each dwelling unit. It shall be assumed that such a customer's meter serves two dwelling units unless the customer notifies the ____________ (name of your water supplier) of a greater number on a form prescribed by the __________ (designated official). The _________ (designated official) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every such customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the ____________ (name of your water supplier) offices to complete and sign the form claiming more than two (2) dwellings. A dwelling unit may be claimed under this provision whether it is occupied or not. New customers may claim more dwelling units at the time of applying for water service on the form prescribed by the __________ (designated official). If the number of dwelling units served by a master meter is reduced, the customer shall notify the _________ (name of your water supplier) in writing within two (2) days. In prescribing the method for claiming more than two (2) dwelling units, the _________ (designated official) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of dwelling units served by a master meter or fails to timely notify the ____________ (name of your water supplier) of a reduction in the number of person in a household shall be fined not less than $________.

Customers billed from a master meter under this provision shall pay the following monthly surcharges:

$____ for 1,000 gallons over allocation up through 1,000 gallons for each dwelling unit.

$____, thereafter, for each additional 1,000 gallons over allocation up through a second 1,000 gallons for each dwelling unit.

$____, thereafter, for each additional 1,000 gallons over allocation up through a third 1,000 gallons for each dwelling unit.

$ ____, thereafter for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Commercial Customers

A monthly water allocation shall be established by the __________ *(designated official)*, or his/her designee, for each nonresidential commercial customer other than an industrial customer who uses water for processing purposes. The non-residential customer's allocation shall be approximately __ *(e.g. 75%)* percent of the customer's usage for corresponding month's billing period for the previous 12 months. If the customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no history exists. Provided, however, a customer, __ percent of whose monthly usage is less than ____ gallons, shall be allocated ____ gallons. The _________ *(designated official)* shall give his/her best effort to see that notice of each non-residential customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the ____________ *(name of your water supplier)* to determine the allocation. Upon request of the customer or at the initiative of the ___________ *(designated official)*, the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the customer's normal water usage, (2) one nonresidential customer agrees to transfer part of its allocation to another nonresidential customer, or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the ___________ *(designated official or alternatively, a special water allocation review committee)*. Nonresidential commercial customers shall pay the following surcharges:

Customers whose allocation is _____ gallons through ______ gallons per month:

$____ per thousand gallons for the first 1,000 gallons over allocation.

$____ per thousand gallons for the second 1,000 gallons over allocation.

$____ per thousand gallons for the third 1,000 gallons over allocation.

$____ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is ______ gallons per month or more:

___ times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.

___ times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.

___ times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.

___ times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, block rate means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Industrial Customers

A monthly water allocation shall be established by the __________ *(designated official)*, or his/her designee, for each industrial customer, which uses water for processing purposes. The industrial customer's allocation shall be approximately __ *(example: 90%)* percent of the customer's water usage baseline. Ninety (90) days after the initial imposition of the allocation for industrial customers, the industrial customer's allocation shall be further reduced to __ *(example: 85%)* percent of the customer=s water usage baseline. The industrial customer's water use baseline will be computed on the average water use for the ______ month period ending prior to the date of implementation of Stage 2 of the Plan. If the industrial water customer's billing history is shorter than ___ months, the monthly average for the period for which there is a record shall be used for any monthly period for which no billing history exists. The _________ *(designated official)* shall give his/her best effort to see that notice of each industrial customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the ____________ *(name of your water supplier)* to determine the allocation, and the allocation shall be fully effective notwithstanding the lack of receipt of written notice. Upon request of the customer or at the initiative of the ___________ *(designated official)*, the allocation may be reduced or increased, (1) if the designated period does not accurately reflect the customer's normal water use because the customer had shutdown a major processing unit for repair or overhaul during the period, (2) the customer has added or is in the process of adding significant additional processing capacity, (3) the customer has shutdown or significantly reduced the production of a major processing unit, (4) the customer has previously implemented significant permanent water conservation measures such that the ability to further reduce water use is limited, (5) the customer agrees to transfer part of its allocation to another industrial customer, or (6) if other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the ___________ *(designated official or alternatively, a special water allocation review committee)*. Industrial customers shall pay the following surcharges:

Customers whose allocation is _____ gallons through _______ gallons per month:

$____ per thousand gallons for the first 1,000 gallons over allocation.

$____ per thousand gallons for the second 1,000 gallons over allocation.

$____ per thousand gallons for the third 1,000 gallons over allocation.

$____ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is ______ gallons per month or more:

___ times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.

___ times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.

___ times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.

___ times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, block rate means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

SECTION X: ENFORCEMENT

- No person shall knowingly or intentionally allow the use of water from the __________________ *(name of your water supplier)* for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by _____________ *(designated official)*, or his/her designee, in accordance with provisions of this Plan.
- Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than _______ dollars ($__) and not more than ______ dollars ($__). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the _____________ *(designated official)* shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at $______, and any other costs incurred by the ___________________ *(name of your water supplier)* in discontinuing service. In addition, suitable assurance must be given to the ________________ *(designated official)* that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.
- Any person, including a person classified as a water customer of the ______________ *(name of your water supplier)*, in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person's property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred

on property within the parents' control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

- Any employee of the _______________ *(name of your water supplier)*, police officer, or other _____ employee designated by the ___________ *(designated official)*, may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the _____________ *(example: municipal court)* on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator's immediate family or is a resident of the violator=s residence. The alleged violator shall appear in _________ *(example: municipal court)* to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in __________ *(example: municipal court)*, a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant. These cases shall be expedited and given preferential setting in __________ *(example: municipal court)* before all other cases.

SECTION XI: VARIANCES

The ________________ *(designated official)*, or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

- Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
- Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the _________________ (*name of your water supplier)* within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the __________ *(designated official)*, or his/her designee, and shall include the following:

- Name and address of the petitioner(s).
- Purpose of water use.
- Specific provision(s) of the Plan from which the petitioner is requesting relief.
- Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
- Description of the relief requested.
- Period of time for which the variance is sought.

- Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
- Other pertinent information.

SECTION XII: SEVERABILITY AND AMENDMENT

It is hereby declared to be the intention of the ________________ *(governing body of your water supplier)* that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the ____________________ *(governing body of your water supplier)* without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

The ___________________ *(name of your water supplier)* reserves the right to review, change, amend, or alter any provision of this plan at any time. The ___________________ *(name of your water supplier)* shall review and update this Plan, as appropriate, at least every five years in consideration of new or updated information.

MODEL DROUGHT CONTINGENCY PLAN FOR IRRIGATION DISTRICTS

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SECTION I: DECLARATION OF POLICY, PURPOSE, AND INTENT

The Board of Directors of the ____________________ *(name of irrigation district)* deems it to be in the interest of the District to adopt Rules and Regulations governing the equitable and efficient allocation of limited water supplies during times of shortage. These Rules and Regulations constitute the District's drought contingency plan required under Section 11.1272, Texas Water Code, Vernon's Texas Codes Annotated, and associated administrative rules of the Texas Commission on Environmental Quality (Title 30, Texas Administrative Code, Chapter 288).

SECTION II: USER INVOLVEMENT

Opportunity for users of water from the __________________ (name of irrigation district) was provided by means of _________________ (describe methods used to inform water users about the preparation of the plan and opportunities for input; for example, scheduling and providing notice of a public meeting to accept user input on the plan).

SECTION III: USER EDUCATION

The ______________ *(name of irrigation district)* will periodically provide water users with information about the Plan, including information about the conditions under which water allocation is to be initiated or terminated and the district's policies and procedures for water allocation. This information will be provided by means of _______________ *(e.g. describe methods to be used to provide water users with information about the Plan; for example, by providing copies of the Plan and by posting water allocation rules and regulations on the district's public bulletin board)*.

SECTION IV: COORDINATION WITH REGIONAL WATER PLANNING GROUPS

The water service area of the _______________ *(name of irrigation district)* is located within the ________________ *(name of regional water planning area or areas)* and the ______________ *(name of irrigation district)* has provided a copy of the Plan to the _____________ *(name of your regional water planning group or groups)*.

SECTION V: AUTHORIZATION

The _______________ *(e.g., general manager)* is hereby authorized and directed to implement the applicable provision of the Plan upon determination by the Board that such implementation is necessary to ensure the equitable and efficient allocation of limited water supplies during times of shortage.

SECTION VI: APPLICATION

The provisions of the Plan shall apply to all persons utilizing water provided by the ________________ *(name of irrigation district)*. The term "person" as used in the Plan includes individuals, corporations, partnerships, associations, and all other legal entities.

SECTION VII: CRITERIA FOR INITIATION AND TERMINATION OF WATER ALLOCATION

The __________ *(designated official)* shall monitor water supply conditions on a __________ *(e.g. weekly, monthly)* basis and shall make recommendations to the Board regarding irrigation of water allocation. Upon approval of the Board, water allocation will become effective when _________________ *(describe the criteria and the basis for the criteria)*:

Below are examples of the types of triggering criteria that might be used; singly or in combination, in an irrigation district's drought contingency plan:

Example 1: Water in storage in the ___________ (name of reservoir) is equal to or less than _____________ (acre-feet and/or percentage of storage capacity).

Example 2: Combined storage in the _________________ (name or reservoirs) reservoir system is equal to or less than _____________ (acre-feet and/or percentage of storage capacity).

Example 3: Flows as measured by the U.S. Geological Survey gage on the ______________ (name of reservoir) near _________________ ______________, Texas reaches ____ cubic feet per second (cfs).

Example 4: The storage balance in the district's irrigation water rights account reaches ______ acre-feet.

Example 5: The storage balance in the district's irrigation water rights account reaches an amount equivalent to _______ (number) irrigations for each flat rate acre in which all flat rate assessments are paid and current.

Example 6: The ____________ (name of entity supplying water to the irrigation district) notifies the district that water deliveries will be limited to ___________ acre-feet per year (i.e. a level below that required for unrestricted irrigation).

Example 7: The ____________ (name of entity supplying water to the irrigation district) notifies the district that ____________ (name of entity supplying water to the irrigation district) has enacted measures under their drought contingency plan.

The district's water allocation policies will remain in effect until the conditions defined in this section of the Plan no longer exist and the Board deems that the need to allocate water no longer exists.

SECTION VIII: NOTICE

Notice of the initiation of water allocation will be given by notice posted on the District's public bulletin board and by mail to each ________ *(e.g. landowner, holders of active irrigation accounts, etc.).*

SECTION IX: WATER ALLOCATION

In identifying **specific, quantified targets** for water allocation to be achieved during periods of water shortages and drought, each irrigation user shall be allocated _____ irrigations or ________ acre-feet of water each flat rate acre on which all taxes, fees, and charges have been paid. The water allotment in each irrigation account will be expressed in acre-feet of water. *Include explanation of water allocation procedure. For example, in the Lower Rio Grande Valley, an "irrigation" is typically considered to be equivalent to eight (8) inches of water per irrigation acre; consisting of six (6) inches of water per acre applied plus two (2) inches of water lost in transporting the water from the river to the land. Thus, three irrigations would be equal to 24 inches of water per acre or an allocation of 2.0 acre-feet of water measured at the diversion from the river.*

As additional water supplies become available to the District in an amount reasonably sufficient for allocation to the District's irrigation users, the additional water made available to the District will be equally distributed, on a pro rata basis, to those irrigation users having ________________.

Example 1: An account balance of less than ______ irrigations for each flat rate acre (i.e. ____ acre-feet).

Example 2: An account balance of less than _____ acre-feet of water for each flat rate acre.

Example 3: An account balance of less than _ ___ acre-feet of water.

The amount of water charged against a user's water allocation will be ____ *(e.g. eight inches)* per irrigation, or one allocation unit, unless water deliveries to the land are metered. Metered water deliveries will be charges based on actual measured use. In order to maintain parity in charging use against a water allocation between non-metered and metered deliveries, a loss factor of ____ percent of the water delivered in a metered situation will be added to the measured use and will be charged against the user's water allocation. Any metered use, with the loss factor applied, that is less than eight (8) inches per acre shall be credited back to the allocation unit and will be available to the user. It shall be a violation of the Rules and Regulations for a water user to use water in excess of the amount of water contained in the users irrigation account.

Acreage in an irrigation account that has not been irrigated for any reason within the last two (2) consecutive years will be considered inactive and will not be allocated water. Any landowner whose land has not been irrigated within the last two (2) consecutive years, may, upon application to the District expressing intent to irrigate the land, receive future allocations. However, irrigation water allocated shall be applied only upon the acreage to which it was allocated and such water allotment cannot be transferred until there have been two consecutive years of use.

SECTION X: TRANSFERS OF ALLOTMENTS

A water allocation in an active irrigation account may be transferred within the boundaries of the District from one irrigation account to another. The transfer of water can only be made by the landowner's agent who is authorized in writing to act on behalf of the landowner in the transfer of all or part of the water allocation from the described land of the landowner covered by the irrigation account.

A water allocation may not be transferred to land owned by a landowner outside the District boundaries.

or

A water allocation may be transferred to land outside the District's boundaries by paying the current water charge as if the water was actually delivered by the District to the land covered by an irrigation account. The amount of water allowed to be transferred shall be stated in terms of acre-feet and deducted from the landowner's current allocation balance in the irrigation account. Transfers of water outside the District shall not affect the allocation of water under Section VII of these Rules and Regulations.

Water from outside the District may not be transferred by a landowner for use within the District. *or*

Water from outside the District may be transferred by a landowner for use within the District. The District will divert and deliver the water on the same basis as District water is delivered, except that a ___ percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered.

SECTION XI: PENALTIES

Any person who willfully opens, closes, changes or interferes with any headgate or uses water in violation of these Rules and Regulations, shall be considered in violation of Section 11.0083, Texas Water Code, *Vernon's Texas Codes Annotated,* which provides for punishment by fine of not less than $10.00 nor more than $200.00 or by confinement in the county jail for not more than thirty (30) days, or both, for each violation, and these penalties provided by the laws of the State and may by enforced by complaints filed in the appropriate court jurisdiction in ______ County, all in accordance with Section 11.083; and in addition, the District may pursue a civil remedy in the way of damages and/or injunction against the violation of any of the foregoing Rules and Regulations.

SECTION XII: SEVERABILITY, AMENDMENT, AND EFFECTIVE DATE

It is hereby declared to be the intention of the Board of Directors of the _____________ *(name of irrigation district)* that the sections, paragraphs, sentences, clauses, and phrases of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Board without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

The ___________________ *(name of irrigation district)* reserves the right to review, change, amend, or alter any provision of this plan at any time. The ___________________ *(name of irrigation district)* shall review and update this Plan, as appropriate, at least every five years in consideration of new or updated information.

The effective date of this Rule shall be five (5) days following the date of Publication hereof and ignorance of the Rules and Regulations is not a defense for a prosecution for enforcement of the violation of the Rules and Regulations.

SECTION XIII: AUTHORITY

The foregoing rules and regulations are adopted pursuant to and in accordance with Sections 11.039, 11.083, 11.1272; Section 49.004; and Section 58.127-130 of the Texas Water Code, *Vernon's Texas Codes Annotated.*

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Chapter 8 – Unique Stream Segments, Reservoir Sites, and Other Recommendations

8.1 INTRODUCTION

Chapter 31, Section 357.43 of the Texas Administrative Code (TAC) specifies that the regional water plan (RWP) shall include recommendations on regulatory, administrative, or legislative issues. The regional water planning group establishes these recommendations in order to facilitate the orderly development, management, and conservation of water resources. In addition, the group forms recommendations to prepare for and respond to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the state and regional water planning area. Furthermore, Chapter 31 TAC 357.43 specifies that each regional water planning group throughout Texas shall make recommendations to identify which streams (all or parts), if any, can be classified as ecologically unique within the region along with determining unique sites for reservoir construction. This chapter presents the recommendations, made by the Region H Planning Group, referencing these chapters from the Texas Water Code.

The Region H Water Planning Group (RHWPG) believes that stewardship of the environment can be coupled with water supply development. Successful planning and implementation of these recommendations will serve to enhance the quality of life and sustain the local economy throughout the water planning area.

8.2 UNIQUE STREAM SEGMENTS

The TAC offers the opportunity to identify river and stream segments of unique ecological value within a planning area. Per the language of Section 357.43:

(b) Ecologically Unique River and Stream Segments. RWPGs may include in adopted RWPs recommendations for all or parts of river and stream segments of unique ecological value located within the RWPA by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment and a site characterization of the stream segment documented by supporting literature and data. The recommendation package shall address each of the criteria for designation of river and stream segments of ecological value found in this subsection. The RWPG shall forward the recommendation package to the Texas Parks and Wildlife Department and allow the Texas Parks and Wildlife Department 30 days for its written evaluation of the recommendation. The adopted RWP shall include, if available, Texas Parks and Wildlife Department's written evaluation of each river and stream segment recommended as a river or stream segment of unique ecological value.

Furthermore, 31 TAC 358.2 defines the criteria by which a stream segment may be identified as unique:

(1) A RWPG may recommend a river or stream segment as being of unique ecological value based upon the criteria set forth in §358.2 of this title (relating to Definitions).
(2) For every river and stream segment that has been designated as a unique river or stream segment by the legislature, during a session that ends not less than one year before the required date of submittal of an adopted RWP to the Board, or recommended as a unique river or stream segment in the RWP, the RWPG shall assess the impact of the RWP on these segments. The assessment shall be a quantitative analysis of the impact of the plan on the flows important to the river or stream segment, as determined by the RWPG, comparing current conditions to conditions with implementation of all recommended water management strategies. The assessment shall also describe the impact of the plan on the unique features cited in the region's recommendation of that segment.

Furthermore, 31 TAC 358.2 defines the criteria by which a stream segment may be identified as unique:

(A) **Biological function:** stream segments which display significant overall habitat value including both quantity and quality considering the degree of biodiversity, age, and uniqueness observed and including terrestrial, wetland, aquatic, or estuarine habitats;
(B) **Hydrologic function:** stream segments which are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge;
(C) **Riparian conservation areas:** stream segments which are fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas, or other areas held by governmental organizations for conservation purposes, or stream segments which are fringed by other areas managed for conservation purposes under a governmentally approved conservation plan;
(D) **High water quality/exceptional aquatic life/high aesthetic value:** stream segments and spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on or associated with high water quality; or
(E) **Threatened or endangered species/unique communities:** sites along stream where water development projects would have significant detrimental effects on state or federally listed threatened and endangered species; and sites along streams significant due to the presence of unique, exemplary, or unusually extensive natural communities.

The significance of streams of unique ecological value is defined in the Texas Water Code, 16.051:

The legislature may designate a river or stream segment of unique ecological value. This designation solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature under this subsection.

Texas Parks and Wildlife Department (TPWD) provided the RHWPG with the document "Ecologically Significant River and Stream Segments of Region H Regional Water Planning Area" (Norris and Linam, October 1999) that detailed information on the impact to water resources in the region due to rapid population growth. As the population continues to grow water resources will become limited; therefore, identifying ecological unique is imperative. Several sources were used to identify the 259 river stream segments that exist within Region H boundaries. The methodology stated above was used to determine which of these water bodies should be classified as ecologically unique. TPWD selected 29 for inclusion as "ecologically significant" streams. This analysis served as the basis for further consideration of which streams might be of "unique ecological value." In 2003, TPWD updated their recommendations list, adding two streams. Members of the RHWPG nominated two tributaries of Galveston Bay as unique due to high aesthetic value. In 2005, the Houston Sierra Club submitted nominations for 18 stream segments within the Region, nine of which coincided with previously mentioned nominations. Finally, in 2009, the Houston Sierra Club nominated four segments which had previously been nominated.

The RHWPG considered all 40 nominated stream segments, using the following described methodology to make a final selection.

(1) Screened 40 nominated streams based on data provided by Texas Parks and Wildlife Department and other sources (see *Table 8-1*) using a decision rule of selecting those streams with five or more criteria factors cited by the TPWD.
(2) Compared screened streams with previously studied reservoir sites and published or potential water conveyance plans and eliminated streams that might conflict with potential water development projects.
(3) Compared screened streams with the Texas Commission on Environmental Quality (TCEQ) water rights and wastewater discharge information and identified streams that might raise water quality permitting issues.
(4) Compared screened streams with Bayou Preservation Association and Houston Canoe Club ranking of streams in the region and other recreational use information.
(5) Compared screened streams with riparian conservation areas and public lands, adding segments entirely within conservation areas and narrowing the recommendations to only those segments bordered by public lands.

Table 8-1 – Streams Considered for Recommendation as Unique Stream Segments

River or Stream Segment	County	Biological Function	Hydrologic Function	Riparian Conservation Area	High Water Quality/ Aesthetic Value	Endangered/ Threatened Species	Conveyance Project/ Proposed Reservoir Site	Water Rights	WW Outfall
Considered in 2001 Regional Plan:									
Armand Bayou	Harris	●	●●	●●	●			●	●●
Austin Bayou	Brazoria	●	●	●●		●●●		●●	
Bastrop Bayou	Brazoria	●	●	●●		●●●		●	
Big Creek	Fort Bend	●	●	●●	●●			●	●
Big Creek	San Jacinto	●		●●●	●	●		R	●
Brazos River	Austin/Waller/Braz./Ft. Bend	●	●●●	●●●		●●	●	●●	●●
Caney Creek[1]	Walker/Harris	●	●●	●●					●
Carpenters Bayou	Harris	●	●●	●				●	●●
Cedar Lake Creek	Brazoria	●	●●	●●		●●●●		●	
Clear Creek	Waller	●	●●		●			R	
East Fork San Jacinto River	Walker/Harr./San J./Lib./Mont.	●	●●	●●	●●●				●
East Sandy Creek	Walker	●	●	●					
Halls Bayou	Brazoria	●	●			●			
Harmon Creek	Walker	●	●●	●	●			●●	●
Jones Creek	Brazoria	●	●	●●				●●	
Lake Creek	Montgomery	●	●●		●●●	●		R	●
Luce Bayou	Harris/Liberty	●	●●				●	●	
Menard Creek	Polk	●	●●	●		●		R	
Mill Creek	Austin	●	●●		●●	●			●●
Nelson Creek	Walker	●	●		●●				●
Old River	Liberty	●	●●	●	●				
Oyster Bayou	Chambers	●	●	●●				●●	
Redfish Bayou	Brazoria		●	●●				●	●
San Bernard River	Brazoria/Fort Bend/Austin	●	●●			●●		●●	●
Upper Trinity River	Walker/Leon/Houston		●			●		●●	
Lower Trinity River	Chambers/Liberty	●	●●●	●●●		●●	E	●●	●
Upper Keechi Creek	Leon	●	●	●				●	
Wheelock Creek	Leon		●		●				
Winters Bayou[1]	San Jacinto/Walker	●	●●	●	●				
Recommended by Houston Sierra Club (2005):									
Boswell Creek	Walker/San Jacinto	●	●	●	●	●●			
Briar Creek	Walker		●	●					
East Bay Bayou	Chambers		●	●				●●	
Henry Lake Branch	San Jacinto		●	●					●
Little Lake Creek[1]	Montgomery/Walker		●	●					
Lost River	Chambers/Liberty	●	●	●					
Onion Bayou West Fork San Jacinto	Chambers	●	●	●				●●	
West Fork San Jacinto[1]	Walker		●	●			●		
West Sandy Creek	Walker		●	●					
Recommended by RHWPG Members (2005):									
Lone Oak Bayou	Chambers	●	●		●				
Whites Bayou, below IH-10	Chambers/Liberty		●	●	●				

Note: More than one "●" in a criteria column indicates that the river or stream segment satisfies that particular criteria in more than one way. For example, Armand Bayou is a State Coastal Preserve and is also a part of the Great Texas Coastal Birding Trail.

More than one "●" on the Water Rights or WW Outfall column mean more than one located on that stream.

1 - Also proposed by Houston Sierra Club in 2009.

R - Rec permit w/o diversion

E - existing reservoir or impoundment

Based on the information provided in past Regional Water Plans (RWPs), the RHWPG elected to retain the unique designations for the eight segments designated by the Texas Legislature based on prior consideration and review. These segments are listed in *Table 8-2* and shown in *Figure 8-1*. The following text describes of each of the unique stream segments designated by the Texas Legislature and reaffirmed in the 2016 Region RWP.

Table 8-2 – Recommended Unique Stream Segments

Stream Segment	County
Armand Bayou	Harris
Austin Bayou	Brazoria
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Creek Lake	Brazoria
Menard Creek	Liberty and Polk
Oyster Bayou	Chambers

8.2.1 Armand Bayou

Armand Bayou is a coastal tributary of Clear Lake, a secondary bay in the Galveston Bay System, in southern Harris County. The bayou is often shallow and has a mean width of 40 feet that supports varying flow over a muddy substrate. This scenic natural bayou and associated riparian forest offer habitat for alligators, waterfowl, and other wildlife such as raccoons, bobcats, and river otters. Noteworthy bird species known to inhabit the area include: pileated woodpeckers, red shouldered hawks, barred owls, ospreys, and migratory songbirds. Several hundred acres of restored coastal prairie offer habitat for grassland species such as the sedge wren and Le Conte's sparrow. The associated marshes that border the riparian forest provide valuable habitat to commercially and recreationally important species such as white shrimp, blue crabs, and red drum. In addition, the bayou also provides valuable recreational opportunities to local residents within an urban context. The ecologically significant segment is from the confluence with Clear Lake in Harris County upstream to Genoa-Red Bluff Road in Harris County.

(1) **Biological Function:** significant riparian zone and associated marshes display significant overall habitat value.
(2) **Hydrologic Function:** performs valuable hydrologic function relating to flood attenuation for the Pasadena and Clear Lake areas.
(3) **Riparian Conservation Area:** fringed by the Armand Bayou Coastal Preserve and is a part of the Great Texas Coastal Birding Trail.
(4) **High Water Quality/Exceptional Aquatic Life/High Aesthetic Value:** high aesthetic value for outdoor recreation within an urban context.
(5) **Threatened or Endangered Species/Unique Communities:** none identified.

8.2.2 Austin Bayou

Austin Bayou is a scenic coastal plain bayou fringed by native prairie, agricultural land, and woodlands. It begins near Rosharon in north central Brazoria County and flows southeasterly 26 miles into Bastrop Bay. The bayou is narrow (about 25 feet wide) with a limited flow of water and provides valuable habitat for wildlife, and is a recreational resource to local residents. The bayou and associated coastal marsh offer significant habitat for wading birds such as the wood stork, reddish egret, and white-faced ibis. Other known inhabitants include white-tailed kites, white-tailed hawks, waterfowl (geese and sandhill cranes), and grassland species (sedge wren, Le Conte's sparrow, and grasshopper sparrow). The ecologically unique segment is that portion of the stream within the Brazoria National Wildlife Refuge (from the confluence with Bastrop Bayou to FM 2004).

(1) **Biological Function:** coastal stream fringed with native prairie and woodlands that display significant overall habitat value.
(2) **Riparian Conservation Area:** fringed by the Brazoria National Wildlife Refuge and is part of the Great Texas Coastal Birding Trail.
(3) **Threatened or Endangered Species/Unique Communities:** designated as an internationally significant shorebird site by the Western Hemisphere Shorebird Reserve Network, provides habitat for the wood stork, reddish egret, and white-faced ibis.

8.2.3 Bastrop Bayou

Bastrop Bayou is a scenic coastal waterway fringed by extensive freshwater wetland habitat. The bayou rises in the central part of Brazoria County and flows deeply in a southeasterly direction for 13 miles where it empties into Austin Bayou and ultimately Bastrop Bay. Like Austin Bayou, Bastrop Bayou provides valuable habitat for endangered or threatened shorebirds as well as waterfowl, grassland species, and birds of prey. These include geese, sandhill cranes, sedge wrens, grasshopper sparrows, white-tailed kites, and white-tailed hawks. In addition to numerous bird watching opportunities, the bayou also provides outdoor opportunities in the form of water related activities to local residents. The ecologically significant segment is that portion within the Brazoria National Wildlife Refuge. This segment is within TCEQ stream segment 1105.

(1) **Biological Function:** extensive freshwater wetland habitat that displays significant overall habitat value.
(2) **Hydrologic Function:** extensive freshwater wetlands perform valuable hydrologic function relating to water quality.
(3) **Riparian Conservation Area:** fringed by the Brazoria National Wildlife Refuge and is part of the Great Texas Coastal Birding Trail.
(4) **Threatened or Endangered Species/Unique Communities:** designated as an internationally significant shorebird site by the Western Hemisphere Shorebird Reserve Network, provides habitat for the wood stork, reddish egret, and white-faced ibis.

8.2.4 Big Creek (Fort Bend County)

Big Creek begins south of Rosenberg and flows southeasterly 25 miles into the Brazos River in Fort Bend County. The creek is an old Brazos River channel with associated sloughs, bayous, oxbow lakes, and coastal prairies that are bordered by bottomland hardwood forest. This habitat provides an excellent opportunity for bird watching, as over 270 species of birds have been sighted in this area.

Birds commonly seen here include purple gallinules, least bitterns, prothonotary warblers, barred owls, white-ibis, herons, and egrets among others. Other wildlife that inhabits the area includes alligators, bobcats, raccoons, feral hogs, and gray foxes. The ecologically significant segment is that portion of the stream within the Brazos Bend State Park.

(1) **Hydrologic Function:** bottomland hardwood forest and associated wetlands perform valuable hydrologic function relating to water quality.
(2) **Riparian Conservation Area:** fringed by Brazos Bend State Park and is part of the Great Texas Coastal Birding Trail.
(3) **High Water Quality/Exceptional Aquatic Life/High Aesthetic Value:** designated as an Ecoregion Reference Stream by the TPWD River Studies Program for high dissolved oxygen and diversity of benthic macroinvertebrates.
(4) **Threatened or Endangered Species/Unique Communities:** none identified.

8.2.5 Big Creek (San Jacinto County)

Big Creek rises near Cold Springs in central San Jacinto County and flows southeasterly into northern Liberty County where it joins the Trinity River. The creek is narrow with a sandy bottom, follows a run, riffle, pool sequence, and contains abundant woody debris. This provides habitat for a diverse community of fish and macroinvertebrates including the southern brook lamprey, blacktail shiner, blacktail redhorse, blackstripe topminnow, numerous perch species, and several species of sunfish. The creek meanders through pristine forestland in the Sam Houston National Forest and provides significant opportunities for bird watching and outdoor recreation. Bird species often found include Louisiana waterthrushes and worm-eating warblers, as well as the endangered red-cockaded woodpecker around which the National Forest Service developed an interpretive site. An interpretive trail through the Big Creek Scenic Area and the Lone Star Hiking Trail provide access to the creek and provide an opportunity to see mammals such as bobcats, squirrels, and beavers. The ecologically significant segment is that portion of the stream that exists within the Sam Houston National Forest within San Jacinto County.

(1) **Biological Function:** displays significant overall habitat value considering the high degree of biodiversity.
(2) **Riparian Conservation Area:** fringed by the Sam Houston National Forest and the Big Creek Scenic Area and is part of the Great Texas Coastal Birding Trail.
(3) **High Water Quality/Exceptional Aquatic Life/High Aesthetic Value:** exceptional aesthetic value.
(4) **Threatened or Endangered Species/Unique Communities:** red-cockaded woodpecker group nearby.

8.2.6 Cedar Creek Lake

Cedar Lake Creek begins in northwest Brazoria County and flows southeasterly 28 miles into Cedar Lake and ultimately to the Gulf of Mexico. The creek is bordered by bottomland hardwood forest in the northern portion and by interspersed native prairies, farmland, and coastal marshes in the south. It is one of the few remaining unchannelized bayous in the region. The creek itself and the adjacent San Bernard National Wildlife Refuge provide habitat to numerous bird species including the scissortailed flycatcher and numerous shorebirds. The ecologically significant segments are those portions of the stream adjacent to the proposed Wildlife Management Area and the San Bernard Wildlife Refuge within Brazoria County.

(1) **Biological Function:** undredged bayou with extensive forest and wetlands that display significant overall habitat value.
(2) **Hydrologic Function:** bottomland forest and wetlands perform valuable hydrologic functions relating to flood attenuation and water quality.
(3) **Riparian Conservation Area:** fringed by San Bernard National Wildlife Refuge and is part of the Great Texas Coastal Birding Trail.
(4) **Threatened or Endangered Species/Unique Communities:** significant due to presence of reddish egret, wood stork, and white-faced ibis.

8.2.7 Menard Creek

Menard Creek begins east of Livingston in central Polk County and flows southeasterly to the Polk County line, where it turns northwesterly and flows through Liberty County into the Trinity River. The creek channel is narrow and shallow with a sandy bottom and follows a sinuous path through banks lined with pine and hardwood forest. The ecologically significant segment is from the confluence with the Trinity River near the Polk/Liberty County line upstream to its headwaters located east of Livingston in the central part of Polk County. The portion that runs through Hardin County is not included in the segment as it is outside Region H.

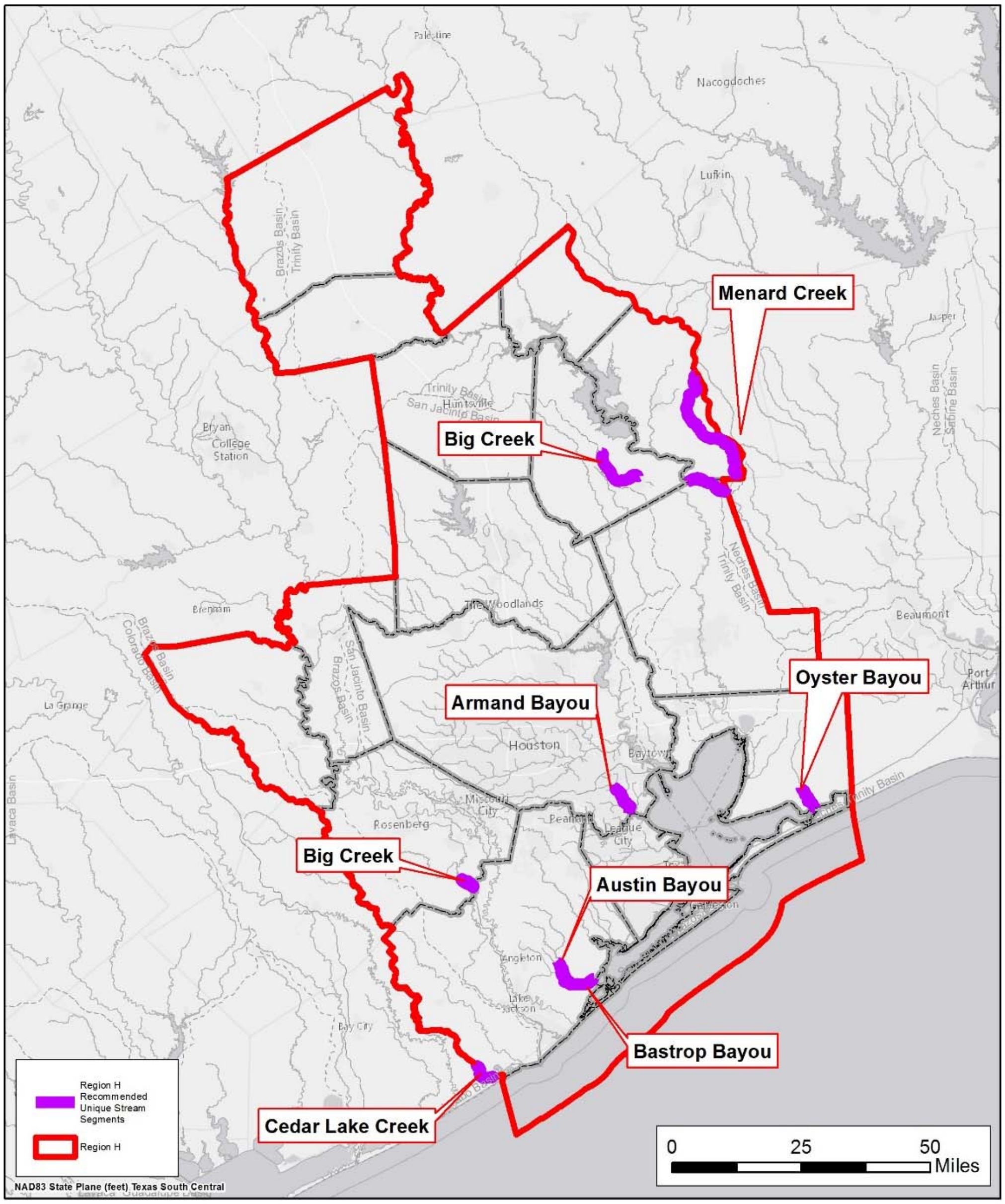
(1) **Biological Function:** bottomland hardwood forest that displays significant overall habitat value.
(2) **Hydrologic Function:** performs valuable hydrologic functions relating to water quality and groundwater recharge of the Chicot Aquifer.
(3) **Riparian Conservation Area:** fringed by the Big Thicket National Preserve.
(4) **Threatened or Endangered Species/Unique Communities:** high diversity of freshwater mussels, many of which are rare.

8.2.8 Oyster Bayou

Oyster Bayou, Chambers County: The segment within the Anahuac National Wildlife Refuge provides freshwater inflow to the coastal marsh. Wetland habitats provide important wintering and migration stopover habitat for migratory birds including Central Flyway waterfowl, shorebirds, wading birds and marsh and waterbirds. Upland habitats including prairie and woodlands are important to many neotropical/nearctic and temperate landbirds, including several sensitive/declining species. The mottled duck is an important resident waterfowl species for which the refuge provides habitat year round for nesting, brood-rearing, molting, and wintering. Coastal marshes serve as nursery areas for many important commercial and recreational fish and shellfish species including white and brown shrimp, blue crab, red drum, flounder, and speckled sea trout. The ecologically significant segment is that portion of the stream within the Anahuac National Wildlife Refuge.

(1) **Biological Function:** Provides nursery for commercial and recreational fisheries.
(2) **Hydrologic Function:** Provides sediment removal above East Bay.
(3) **Riparian Conservation Area:** part of the Anahuac National Wildlife Refuge.
(4) **Threatened or Endangered Species/Unique Communities:** piping plover habitat within the Anahuac NWR.

Figure 8-1 – Recommended Unique Stream Segments



REGION H
Water Planning Group

Recommended Unique Stream Segments

Texas

8.3 UNIQUE RESERVOIR SITES

According to the 2012 State Water Plan, Texas has 188 major water supply reservoirs, and more than half of Texas' surface water is from reservoirs. The SWP also recommended the construction of 26 reservoirs for future supplies, meaning that reservoirs will continue to be a vital asset in future water management and should be protected.

The TAC offers an opportunity to designate sites of unique value for use as surface water supply reservoirs within a planning region. The following criteria are outlined in order to provide for this protection. Per the language of §357.43:

A RWPG may recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation and expected beneficiaries of the water supply to be developed at the site. The criteria of §358.2 of this title shall be used to determine if a site is unique for reservoir construction:

(A) Site-specific reservoir development is recommended as a specific water management strategy or as a unique reservoir site in an adopted regional water plan; or
(B) The location, hydrologic, geologic, topographic, water availability, water quality, environmental, cultural, and current development characteristics, or other pertinent factors make the site uniquely suited for reservoir development to provide water supply for:
    a. The current planning period; or
    b. Where it might reasonably be needed to meet needs beyond the 50-year planning period.

The significance of sites of unique value for reservoir construction is defined in the TWC, 16.051:

> *The legislature may designate a site of unique value for the construction of a reservoir. A state agency or political subdivision of the state may not obtain a fee title or an easement that would significantly prevent the construction of a reservoir on a site designated by the legislature under this subsection.*

The TWC continues to declare that the reservoir sites designated as having a unique value in the 2007 SWP are designated under this section until September 1, 2015. In July 2008, the Texas Water Development Board provided the *Reservoir Site Protection Study* that recommended proposed reservoir project sites to be designated as unique reservoir sites under legislature. The board identified 220 major reservoir sites in Texas that were previously included in previous studies to be screened. The Texas Water Development Board (TWDB) used the screening process stated above in the TWC for all the reservoirs. After technical evaluations, the 16 top ranked reservoirs (14 major and 2 minor reservoirs) were selected to be recommended as a unique reservoir. Among this list, four sites reside within the Region H boundaries, which are Bedias Reservoir, Allens Creek Reservoir, Little River Reservoir, and Little River Off-channel Reservoir. These four reservoir sites were listed in the 2007 State Water Plan. Bedias Reservoir, Little River, and Little River Off-channel were classified as unique reservoir sites by the 80th Texas Legislature; Allens Creek was previously designated as unique. However, Bedias Reservoir was the only site listed in both the 2008 *Reservoir Site Protection Study* and the 2007 State Water Plan/80*th* Texas Legislature as a recommended reservoir site.

Of the four unique reservoir sites identified in the TWDB study, Region H has continued to include two of them as active strategies in the 2011 RWP and the 2016 RWP. In both plans, Allens Creek Reservoir has been selected as a water management strategy and Little River Off-Channel Reservoir has been identified as a potential alternative water management strategy. Shifts in water supply needs and alternate options for water supply development along with difficulties in developing some projects have made Bedias and Little River On-Channel Reservoirs less likely solutions for long-term water supply needs

In light of this shift, the RHWPG recommends the continuation of the unique reservoir site designations for Allens Creek and Little River Off-Channel Reservoir. Details on these projects are described below and both sites are illustrated in *Figure 8-2*.

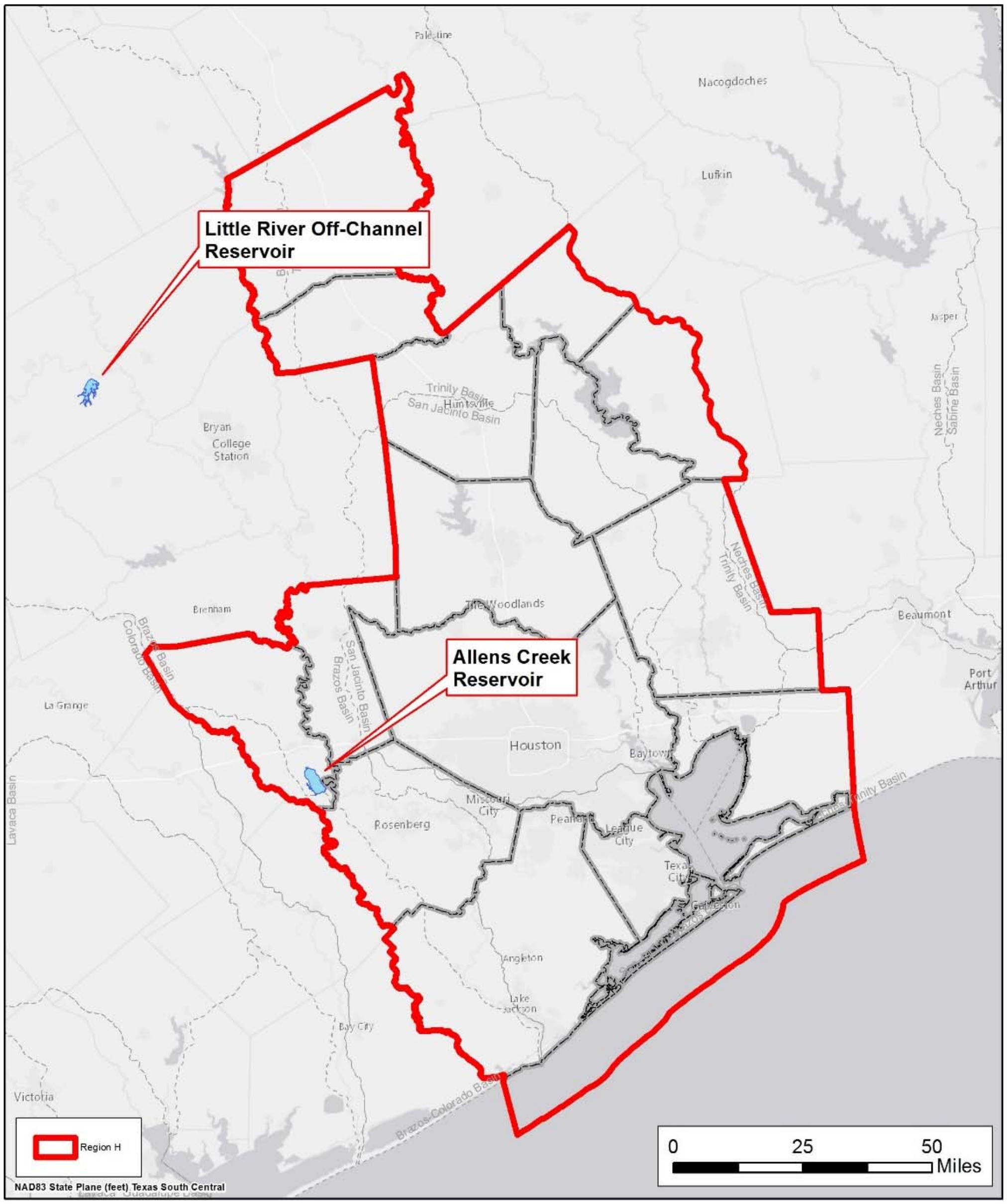
8.3.1 Allens Creek Reservoir

This site is located in Austin County, one mile north of the City of Wallis, on Allens Creek, a tributary to the Brazos River. This site exists within the Brazos River Basin and is in Region H. Approximately 7,000 acres would be inundated. This project is configured as a scalping reservoir that would divert stormwater flows (periods of high water) from the Brazos River and impound these flows in the reservoir to create storage yield. During periods of median to low flows, diversions are limited by instream flow thresholds established to protect the environment and down-stream water rights. The maximum dam height is 53 feet. The conservation storage quantity is approximately 145,500 acre-feet at an elevation of 121 feet msl. The projected firm yield of this project is 99,650 acre-feet per year. The total project capital cost is estimated at $316,226,894. The Brazos River Authority and City of Houston will jointly develop this reservoir project for their water users within the lower Brazos and San Jacinto river basins.

8.3.2 Little River Off-Channel Reservoir

This site is located in Milam County, approximately five miles northeast of the City of Milano, on Beaver Creek, a tributary of Little River. This site exists within the Brazos River Basin and is in Region G. Approximately 4,350 acres would be inundated. Little River Off-Channel Reservoir is configured as a scalping reservoir that would divert stormwater flows during periods of high water from Little River and impound the flows to create storage yield. The maximum dam height is approximately 120 feet. The conservation storage quantity is approximately 155,812 acre-feet at an elevation of 260 feet msl. The projected firm yield of this project is 27,225 acre-feet per year. The total project capital cost is estimated as $67,620,000. The Brazos River Authority will develop this reservoir project for their water users within the lower Brazos river basin.

Figure 8-2 – Recommended Unique Reservoir Sites



Recommended Unique Reservoir Sites

Texas

8.4 OTHER REGULATORY, ADMINISTRATIVE, AND LEGISLATIVE RECOMMENDATIONS

RWPGs may develop and include in the RWP regulatory, administrative, or legislative recommendations that will facilitate the orderly development, management, and conservation of water resources in Texas, and will facilitate more voluntary water transfers and help the state prepare for and respond to droughts. In addition, they may develop information regarding the potential impacts of recommendations enacted into law once proposed changes are in effect.

These recommendations are addressed to each governmental agency that has the appropriate jurisdiction over each subject. It is generally assumed that regulatory recommendations are directed toward the TCEQ, that administrative recommendations are directed toward the TWDB, and that legislative recommendations are directed toward the State of Texas Legislature (Legislature.)

The RHWPG has adopted the following regulatory, administrative, and legislative recommendations. They are discussed in detail in ***Appendix 8A***.

8.4.1 Regulatory and Administrative Recommendations

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

The Region H Water Planning Group recommends that the TCEQ clarify the TPDES rules for wastewater permitting so that the environmental impacts of reuse and reclamation facility discharges are assessed in conjunction with appurtenant reductions in discharges for their source water facilities. This will eliminate double-counting of waste loads and remove a potential obstacle for some wastewater reuse projects in the State.

The Region H Water planning Group recommends that TCEQ rules be amended to include a reasonable timeline for the update of WAMs based associated with significant changes to water rights conditions in each basin and also on a routine basis as the historical period of record grows over time. Furthermore, these rules should require that the most recent model for each basin be made available through the TCEQ website for use by both the RWPGs and the public.

8.4.2 Legislative Recommendations

Allow RWPGs to work with local regulatory bodies to develop appropriate, dry-year groundwater supplies for use in regional water planning that are consistent with local conditions and regulation.

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

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

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

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

The Region H Water Planning Group wishes to recognize the Legislature's efforts in implementing the SWIFT program and also supports ongoing and expanded support for financing methods by the State of Texas for development of water supply projects recommended within adopted RWPs.

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

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

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

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

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

The Region H Water Planning Group recommends that the State direct the State Demographer's office to explore the potential changes in population distribution made possible by rapid advancements in information technology.

The Region H Water Planning Group recommends that the TWDB request additional and adequate funding and the adoption of the appropriate administrative procedures from the legislature to facilitate ongoing activities of the RWPGs. Funding should be made available throughout the entirety of the planning cycle without funding "gaps" that make it difficult for planning groups to accomplish their ongoing efforts.

8.4.3 Infrastructure Finance Recommendations

Increase funding of the Board Participation Program as needed to allow development of these water supply projects.

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

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

Provide a mechanism to leverage Federal grant programs for agriculture by providing the local matching share. Increase funding of associated loan programs and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators. Provide opportunities for joint cooperation between growers and land owners to facilitate the use of funding programs for property under long-term lease agreements.

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

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

Support continued and increased funding of Water and Waste Disposal Loans and Grants from USDA Rural Utilities Service at the Federal level, and fund the State Rural Water Assistance Fund.

Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities to develop a customer base, and pursue Federal funding for desalination programs. Focus particular attention to “near-term” efforts such as brackish groundwater desalination as a way of bridging current and long-term seawater desalination alternatives.

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

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

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APPENDIX 8-A

DETAILED DISCUSSION OF OTHER REGULATORY, ADMINISTRATIVE, AND LEGISLATIVE RECOMMENDATIONS

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<table>
<tr><th>Recommendation</th><th>Type</th></tr>
<tr><td>Quantitative Environmental Analysis</td><td>Regulatory and Administrative</td></tr>
<tr><td colspan="2">Discussion:</td></tr>
<tr><td colspan="2">The Regional Water Planning Guidelines require that the evaluation of potentially feasible water management strategies include a quantitative analysis of environmental factors including effects on wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico (31TAC357.7.(a)(8)(A)). The TWDB has provided detailed guidance on specific study methods to be used in determining population, water demand, project costs, socioeconomic impacts and yield from current and proposed supply sources, but it has not provided similar guidance in the area of environmental impacts. This lack of specificity is resulting in different methods being used in different regions. Additionally, it places the planning groups at risk of needing to conduct additional analysis after state agencies review the Initially Prepared Plans, and add those results to the report after the public review period has closed.</td></tr>
<tr><td colspan="2">Recommendation:</td></tr>
<tr><td colspan="2">The Region H Water Planning Group recommends that the TWDB determines, in conjunction with the TCEQ and TPWD, which specific environmental studies and analysis are required for each category of management strategy (i.e., new water right, new reservoir, etc.). Furthermore, the guidance should be added to the Planning Guidelines, so that RWPGs can reflect the cost of those requirements in their budgets and scopes of work. Adding environmental guidelines will also make water plans consistent across the State.</td></tr>
</table>

Recommendation	Type
TPDES Permitting of Wastewater Reclamation Facilities	Regulatory and Administrative
Discussion:	
Existing Texas Pollutant Discharge Elimination System (TPDES) permit requirements do not encourage, and in fact discourage, wastewater reuse and reclamation. This recommendation relates solely to issues in the TPDES permitting process and not rules directly applicable to the use of reuse and reclaimed water outlined in TCEQ Section 210. Authorization of reclaimed water use may require a new or amended permit when the treatment results in a discharge of wastewater into waters within the state. This effectively double-counts the waste load from a facility and could potentially provide a regulatory obstacle for some wastewater reuse projects. In terms of wastewater reuse (e.g., without further treatment), a violation of an end-user's discharge permit could be caused by using effluent to replace or supplement another water source. An example would be an industry, whose discharge is close to its permitted limit for a given constituent, exceeding that limit by virtue of its use of effluent from a separate wastewater treatment plant. In terms of wastewater reclamation (e.g., with further treatment), permitting the discharge from a wastewater reclamation facility could be difficult and unnecessarily expensive in certain cases. Wastewater reclamation often entails advanced treatment of wastewater discharged from one or more treatment facilities for industrial use. If this advanced treatment facility is separate, it may require a separate TPDES permit. Under current TCEQ rules for consolidated permits, discharges from a new facility are considered as occurring in addition to all currently permitted discharges for the purpose of assessing the collective effect on the receiving stream. While this is the correct procedure for evaluating a discharge from a new waste source, it effectively double-counts the waste load from a reclamation facility; once at the original plant, and again at the additional treatment facility. Designing a reclamation facility to sufficiently mitigate this double-counting is unneeded and may be cost-prohibitive. In actuality, the waste load should be divided between the applicable facilities depending upon the reuse and reclamation demands. Therefore, the permitting process should be modified to address both reuse and reclamation projects that draw effluent from existing wastewater plants, so that daily loads may be accurately assessed on a combined maximum daily load and maximum daily concentration basis. Wastewater plants should be permitted accordingly.	
Recommendation:	
The Region H Water Planning Group recommends that the TCEQ clarify the TPDES rules for wastewater permitting so that the environmental impacts of reuse and reclamation facility discharges are assessed in conjunction with appurtenant reductions in discharges for their source water facilities. This will eliminate double-counting of waste loads and remove a potential obstacle for some wastewater reuse projects in the State.	

Recommendation	Type
Access to Current Water Availability Models	Regulatory and Administrative
Discussion:	
Water Availability Models (WAMs) are a core component of the regional water planning process and, furthermore, are required by TWDB's rules for plan development. During the development of the 2016 RWP, TWDB's rules required the use of the most current Run 3 (Full Authorization) WAM and also the consideration of environmental flows standards as adopted by TCEQ for each applicable basin. However, model versions for the San Jacinto and Brazos River Basins including environmental flows standards were not made available in a reasonable timeline for use in the development of the RWP despite the adoption of these standards in 2011 and 2014, respectively. The absence of these models required the Regional Water Planning Groups working in these basins to develop representative models themselves in an effort to account for TWDB-mandated requirements to consider environmental flows. This produced not only an undue burden on the Planning Groups, but also introduced an opportunity for inconsistency across Groups and between the Groups and the State regarding their interpretation and application of the environmental flow standards. In addition, models for various models throughout the state were often not available through TCEQ's website during this planning process with the only explanation provided as "WAM files for this basin are being updated and are currently unavailable." Finally, due to extreme hydrologic conditions, many basins throughout Texas have experienced new drought of record in recent years that are not included in the historic period of the current WAMs. To date, no timeline has been proposed for the extension of these periods in order to cover these conditions which has also placed additional burden on the development of RWPs in these regions. Due to the critical nature of these models for both regional planning and water rights analyses, it is imperative that a more robust system be implemented for maintaining these models and making them available to the public.	
Recommendation:	
The Region H Water planning Group recommends that TCEQ rules be amended to include a reasonable timeline for the update of WAMs based associated with significant changes to water rights conditions in each basin and also on a routine basis as the historical period of record grows over time. Furthermore, these rules should require that the most recent model for each basin be made available through the TCEQ website for use by both the RWPGs and the public.	

Recommendation	Type
Availability of Groundwater within Jurisdictions of Groundwater-Regulating Entities	Legislative

Discussion:

During the development of the 2016 Region H Regional Water Plan, it was recognized that the approach to groundwater availability required by TWDB's rules may place an unrealistic limit on groundwater production for various reasons, including:

- Although GCDs are bound to the DFCs adopted by GMAs, they are not required to use the MAG as a means of achieving that goal.
- The perspectives of the GMA and RWP processes are inherently different. Where pumpage estimates used in GMA planning represent long-term levels of groundwater production, the demands and supplies used by RWPGs must represent dry-year conditions. Strict adherence to the MAG prevents the use of flexibility in dealing with short-term supply needs.
- The requirement that RWPs be developed using the MAGs as the sole source of groundwater supply information may create an undue burden to the GMA process. As demands in Region H change over time, so does the allowable level of groundwater pumpage, requiring the GMA process to regularly

The result of this requirement has been the undue unrealistic water needs in excess of 200,000 ac-ft/yr along with costs that are not consistent with the actual, long-term water supply strategy for the region.

Recommendation:

Allow Regional Water Planning Groups to work with local regulatory bodies to develop appropriate, dry-year groundwater supplies for use in regional water planning that are consistent with local conditions and regulation.

Recommendation	Type
Interbasin Transfers	Legislative

Discussion:

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

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

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

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

Recommendation:

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

Recommendation	Type
Texas Bays and Estuaries Program Funding	Legislative
Discussion:	
The Texas 80th Legislature established the current process of assessing the environmental quality of riverine and estuarine systems and applying the "best available science" in prescribing actions to preserve these systems. These recommendations have, in turn, been incorporated into the Regional Water Planning process and serve as a critical standard for the evaluation of future water management strategies. However, the current levels of funding within the State of Texas Bay & Estuary program are insufficient to continue the needed monitoring, study, and development of management strategies for the bay.	
Recommendation:	
The Region H Water Planning Group recommends establishment of additional and dedicated funding to pursue necessary future efforts of the Galveston Bay & Estuary program.	

Recommendation	Type
Rule of Capture	Legislative
Discussion:	
Groundwater is a vital resource within Region H. This is especially true within the rural counties of the region that are predominantly dependent on groundwater. Current groundwater law based on the Rule-of-Capture has facilitated orderly development of groundwater systems throughout the State of Texas and, barred the intrusion of private interests, and it could continue to serve the water usage interests throughout the state. It appears that the Rule-of-Capture could continue per the status quo to serve the groundwater interests within the region.	
Recommendation:	
The Region H Water Planning Group supports continued usage of the Rule-of-Capture as the basis of groundwater law throughout the State of Texas except as modified through creation of certified groundwater conservation districts.	

Recommendation	Type
Groundwater Conservation Districts	Legislative
Discussion:	
Region H communities, particularly those within the rural areas of the region, are dependent on groundwater supplies. Groundwater is a very valuable resource to this region. Region H contains counties, specifically Austin, Leon and Madison, where some municipalities, water supply corporations, and property owners believe Groundwater Conservation Districts (GCD) are needed to retain long-term groundwater supplies within their respective counties. Region H also has several counties, including Brazoria, Waller and Montgomery, where groundwater supplies will, in theory, reach their maximum sustainable yield due solely to projected in-county water usage rates. A GCD is a potential vehicle for these counties to manage and protect groundwater supplies from over-development within each respective county. Senate Bill 2 of the 77th Legislature authorized the formation of four new GCDs in Region H (Bluebonnet, Brazoria County, Lone Star, and Mid-East Texas) to manage and protect groundwater resources.	
Recommendation:	
The Region H Water Planning Group supports creation of GCDs, as necessary, by local subarea water interests. The RHWPG supports development of truly regional GCDs as opposed to single county districts to recognize the regional expansiveness of underground aquifers and to provide the greatest degree of regional water supply protections.	

Recommendation	Type
Water Supply Project Financing Mechanism	Legislative
Discussion:	
The Region H Regional Water Plan includes development of several surface water reservoirs and other supply projects. The capital cost to develop these projects is significantly higher than the historic cost of water supply projects. The high projected costs dissuade local communities from making a financial commitment to support future projects. These financing issues will delay the implementation of needed projects. The 80th Texas Legislature (2007) appropriated funding to enable issuance of $440 million in bonds for the Water Infrastructure Fund (WIF) to fund water plan projects. The program is designed with a maximum repayment period of 20 years, which may not be adequate for financing larger projects such as surface water reservoirs. In 2013, the Texas Legislature created the State Water Implementation Fund for Texas (SWIFT) which was approved by Texas voters to provide $2 billion dollars for the creation of a new loan program for the implementation of the State Water Plan. This program offers low-interest and deferred loan with maturities up to 30 years which enhances the opportunity for finding large, capital projects that are critical to the SWP. In addition, the program also funds the option of State ownership in projects as another alternative for development.	
Recommendation:	
The Region H Water Planning Group wishes to recognize the Legislature's efforts in implementing the SWIFT program and also supports ongoing and expanded support for financing methods by the State of Texas for development of water supply projects recommended within adopted RWPs.	

Recommendation	Type
Groundwater Availability Modeling Funding	Legislative
Discussion:	
Many areas of Region H are totally dependent on groundwater to support the long-term viability of these areas. The current Groundwater Availability Modeling (GAM) effort is supported since it is the most comprehensive groundwater assessment and analysis effort of the previous 20 years. The current GAMs effort, however, is omitting minor aquifers and other groundwater considerations that are vital for certain local communities.	
Recommendation:	
The Region H Water Planning Group supports continued funding for the GAMs effort and recommends comprehensive analysis of all groundwater resources within the state.	

Recommendation	Type
Agricultural and Irrigation Conservation Funding	Legislative
Discussion:	
The Region H water management plan includes a number of irrigation conservation based water management strategies. It is apparent that adoption of irrigation conservation practices may benefit the irrigation and agricultural industry in addition to local communities that may take advantage of water supply savings resulting from irrigation conservation. Additionally, the RHWPG supports further research and development of water-efficient and drought-resistant crop and species.	
Recommendation:	
The Region H Water Planning Group supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices.	

Recommendation	Type
Water Conservation	Legislative
Discussion:	
The RHWPG strongly supports water conservation at all levels. The RHWPG has incorporated water conservation in the regional water plan as a management strategy. However, realizing advanced conservation savings in municipal county-other areas may be difficult, as these practices require some management, funding, and oversight. While the RHWPG does not advocate a one-size-fits-all conservation program for the State of Texas, they recommend that the legislature address water conservation and provide some guidance and ability for county and local governments to implement these programs. The 78th Legislature appointed a Water Conservation Task Force to study water conservation policies and best management practices, and to report their results to the 79th Legislature in 2005. The 80th Legislature passed Senate Bill 3 creating a Water Conservation Advisory Council consisting of 23 members to provide a resource with expertise in water conservation.	
Recommendation:	
Region H Water Planning Group supports water conservation and recommends that the legislature continue to address and improve water conservation activities in the state.	

Recommendation	Type
Water Conservation Research Funding	Legislative
Discussion:	
The Water Conservation Implementation Task Force identified numerous best management practices in TWDB Report 362 – Water Conservation Best Management Practices Guide. The Best Management Practices outlined in the report were developed using information compiled from past research and studies along with information provided by the task force members. Additional water-saving technologies may still be developed in the future.	
Recommendation:	
The Region H Water Planning Group recommends that the State fund research into advanced conservation technologies.	

Recommendation	Type
Flood Liability of Water Supply Reservoirs	Legislative
Discussion:	
Flood control reservoirs are generally drawn down at the beginning of the annual wet season so that when large rain events occur, the runoff may be captured and later released more slowly into the receiving stream. These reservoirs therefore reduce downstream flood levels and prevent inundation in low areas. In contrast, water supply reservoirs are operated to capture and retain as much stream flow as allowable under their permits in order to have supply available during periods of high demand. This practice results in less available storage volume to capture runoff during major storms. When a major storm event occurs upstream or above a water supply reservoir, the reservoir operator must sometimes release flood flows during and after the event to prevent flooding upstream of the reservoir or to prevent damage to the dam and other facilities associated with the reservoir. Although this flood flow can contribute to downstream flooding, most reservoirs actually reduce the amount of flooding which could have occurred had the reservoir not been constructed. In recent years, plaintiffs with property in the downstream floodplains have brought multiple lawsuits against major water supply reservoir operators. Some recent court decisions have held the operators liable for damages to the downstream properties. If this trend is allowed to continue, it will increase insurance rates for these entities and will force operational changes to occur that may result in less available water supply for periods of need. The net effect to water users will be an increase in the cost of surface water throughout the state.	
Recommendation:	
Consider State legislation clarifying the liability exposure of reservoir operators for passing storm flows through water supply reservoirs.	

Recommendation	Type
Incorporation of Technology Advancements in Projections	Legislative
Discussion:	
Current population projections based on traditional historic growth patterns may not accurately reflect the changes likely to occur in the future as digital connectivity continues to alter our economic, educational, and social institutions.	
Recommendation:	
The Region H Water Planning Group recommends that the State direct the State Demographer's office to explore the potential changes in population distribution made possible by rapid advancements in information technology.	

Recommendation	Type
Ongoing RWPG Activities	Legislative
Discussion:	
It is apparent that the RWPGs will have to meet periodically to address changed conditions related to the adopted regional water management plans. Ongoing activities will include, but not be limited to: 1. Consideration of additions and modifications to the adopted plans 2. Serving as communications liaisons with the water user communities within each region 3. Assisting in the reconciliation of inter-regional water issues It will be necessary to consider additional and adequate funding to support maintenance of the RWPGs. Also, the administrative provisions of Senate Bill One and the subsequent policies that have been enacted should be reviewed to determine if the appropriate organizational structure exists to accomplish the work of the RWPGs. Additional funding should be developed to support technical studies necessary to support the needs of the RWPGs.	
Recommendation:	
The Region H Water Planning Group recommends that the TWDB request additional and adequate funding and the adoption of the appropriate administrative procedures from the legislature to facilitate ongoing activities of the RWPGs. Funding should be made available throughout the entirety of the planning cycle without funding "gaps" that make it difficult for planning groups to accomplish their ongoing efforts.	

<table>
<tr><th>Recommendation</th><th>Type</th></tr>
<tr><td>Board Participation Program for regional water and wastewater projects</td><td>Infrastructure Finance</td></tr>
<tr><td colspan="2">Discussion:</td></tr>
<tr><td colspan="2">This program enables the Water Development Board to assume a temporary ownership interest in a regional project when the local sponsors are unable to assume debt for an optimally sized facility. Payments on the funds provided by the State are deferred until a customer base grows into the capacity it funded. The deferred interest payments do not accrue additional interest. By funding up to 50% of a project, the program helps the local sponsors optimize facility sizes and avoid later expansions and replacements.

This program will be extremely important for the development of the recommended water management strategies, as well as for water treatment and distribution systems. Large projects, particularly reservoirs, must be developed in anticipation of future demands due to the long periods of time required for planning, permitting, property acquisition, and construction. For example, Allens Creek Reservoir is estimated to cost over $316 million. The current customer base cannot support this high cost. The Board Participation program is one of the few programs available to assist local sponsors with this water management strategy. Other reservoir projects within Region H could also experience similar financing issues.

The Board Participation Program will also be important during the expansion of surface water service into areas affected by subsidence. As areas develop and implement Groundwater Reduction Plans, it is expected that communities will develop plans for regional treatment and distribution systems to reduce costs. Board participation in these facilities will allow them to be optimally sized at their inception. The Board Participation Program offers the important advantage of reducing the unit costs for water service for both existing and future water users of the optimally sized facility.</td></tr>
<tr><td colspan="2">Recommendation:</td></tr>
<tr><td colspan="2">Increase funding of the Board Participation Program as needed to allow development of these water supply projects.</td></tr>
</table>

Recommendation	Type
State Revolving Fund Programs (Drinking Water State Revolving Fund and Clean Water State Revolving Fund)	Infrastructure Finance

Discussion:

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

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

Recommendation:

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

Recommendation	Type
State Loan Program	Infrastructure Finance
Discussion:	
The State Loan Program provides loans to Political Subdivisions and Water Supply Corporations for water, wastewater, flood control, and municipal solid waste projects. Payments are not deferred in this program as they are under the State Participation Program, and the interest rates are not subsidized as they are in the Revolving Fund Programs. These loans are available for both local projects and for the local sponsors of regional projects. Acquisition and construction of water treatment and distribution systems are eligible for funding. Loans are made on a first come, first served basis. This program will be heavily utilized in groundwater-served areas introducing surface water to meet current and projected demands. The ready availability of groundwater across the region has allowed development to occur outside existing surface water service areas. As the limits of available groundwater are reached (sustainable yields and/or regulatory limits), surface water treatment and transmission systems must be constructed to meet future demands. The costs are significant in that they are required in a short time span, instead of initiated and expanded over time as they are in areas originally served by surface water. Where local rate payers cannot afford to directly pay for transition costs, State loans offer a significant cost advantage over most commercial and many public funding options, using the State's high bond rating rather than the rating of the local sponsor.	
Recommendation:	
Increase funding of the State Loan Program to meet near-term infrastructure cost projections.	

Recommendation	Type
Agricultural Water Conservation Loan Program	Infrastructure Finance

Discussion:

This program provides loans to soil and water conservation districts, underground water conservation districts and districts authorized to supply water for irrigation. These districts may further lend the funds to private individuals for equipment and materials, labor, preparation, and installation costs to improve water-use efficiency related to irrigation of their private lands. There is also a grant program for equipment purchases by eligible districts for the measurement and evaluation of irrigation systems and agricultural water conservation practices, and for efficient irrigation and conservation demonstration projects, among others. However, these grants are not available to individual irrigators. Similar Federal loan and grant programs are available, but require a 25% to 50% local match.

In the Region H Water Plan, irrigation conservation is a recommended strategy in eight counties (Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, and Waller). In some cases, the conservation of water through these agricultural programs provides additional water for use by municipalities that also sue groundwater supplies. As it is unlikely that municipalities will seek out and fund irrigation conservation projects, the task of encouraging conservation will fall to the wholesale water providers and those government entities with jurisdiction in those counties. Even with Agricultural Water Conservation Loan Program assistance, irrigators will be slow to invest in water-conserving equipment until water rates increase, making it economically advantageous to do so. The difficulty increases in areas where groundwater is the primary supply source for irrigation.

Additionally, irrigators in Region H also find it difficult to access funding programs as these typically require ownership of the irrigated property. Much of the production within the region is performed by farmers who lease land from others, making them ineligible for these programs.

Eligible districts will need to act as conservation brokers, identifying those irrigators with the potential to reduce water demand through equipment improvements, and matching them with available loans. By reducing usage in this manner, water suppliers will be able to provide the saved portion of their supply to new customers. To assist with the immediate adoption of these improved conservation practices, a one-time grant or subsidy program for water-efficient equipment purchases may help by reducing the loans amounts required by each irrigator. If the requirements of an existing Federal loan or grant program could be met, the State could provide all or part of the local matching share. Since the methods used by irrigators vary across the state, such a program would need to be flexible, with local oversight provided by those districts currently eligible for the Agricultural Water Conservation Loan Program. Consistency with the applicable Regional Water Plan may be included as a prerequisite for this program, as it is for other State grants and loans.

Recommendation:

Provide a mechanism to leverage Federal grant programs for agriculture by providing the local matching share. Increase funding of associated loan programs and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators. Provide opportunities for joint cooperation between growers and land owners to facilitate the use of funding programs for property under long-term lease agreements.

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

Recommendation	Type
Regional Water Supply and Wastewater Facilities Planning Program	Infrastructure Finance

Discussion:

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

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

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

Recommendation:

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

Recommendation	Type
Water and Waste Disposal Loans and Grants from the USDA Rural Utilities Service	Infrastructure Finance
Discussion:	
This Federal program provides loans and grants in rural areas and communities of up to 10,000 people for water, wastewater, storm water, and municipal solid waste projects. The program is intended for communities that cannot obtain commercial loans at reasonable rates. Loans are made at or below market rates, depending upon the eligibility of the recipient. Grants can cover up to 75% of project costs when required to reduce user costs to a reasonable level. A separate program of Emergency Community Water Assistance Grants (up to $500,000 per project) is also available to communities experiencing rapid declines in water quality or quantity. This program is similar to the state loan and revolving fund programs. It offers another option to small communities and rural areas unable to finance required infrastructure without assistance. However, this is a nationwide program, and the competition for available funds is correspondingly greater. Colonias and border areas are specifically identified as target areas for the grant portion of this program, and it is therefore in the State's interest to support its continued funding. The TWDB was recently authorized by the 77th Texas legislature to establish a similar program at the state level. The Rural Water Assistance Fund will provide low-interest loans to municipalities, water districts, and non-profit water supply corporations. The program is still under development and has not yet been funded.	
Recommendation:	
Support continued and increased funding of Water and Waste Disposal Loans and Grants from USDA Rural Utilities Service at the Federal level, and fund the State Rural Water Assistance Fund.	

Recommendation	Type
Desalination Research and Demonstration Projects	Infrastructure Finance
Discussion:	
House Bill 1370 of the 78th Texas legislature directed the Texas Water Development Board to "undertake or participate in research, feasibility and facility planning studies, investigations and surveys as it considers necessary to further the development of cost-effective water supplies from seawater desalination in the state." The TWDB has concluded desalination site assessments, and is preparing to assist in the construction of three demonstration facilities along the Texas Gulf Coast. The Region H Water Planning Group supports this demonstration project.	
Recommendation:	
Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities to develop a customer base, and pursue Federal funding for desalination programs. Focus particular attention to "near-term" efforts such as brackish groundwater desalination as a way of bridging current and long-term seawater desalination alternatives.	

Recommendation	Type
Water Research Program - Agriculture	Infrastructure Finance
Discussion:	
The Texas Water Development Board offers research grants to individuals or political subdivisions for water research on topics published in the Board's Request for Proposals. Eligible topics include product and process development. In the Region H Water Plan, one recommendation to the legislature is to establish funding for agricultural research in the areas of efficient irrigation practices and the development of water-efficient and drought-resistant crop and species. Irrigators cannot generally afford the increased cost of water when new supplies are developed in today's market. By reducing demand in a cost-efficient manner, small irrigators may be able to continue farming. This is another potential topic for the Water Research Program.	
Recommendation:	
Provide increased research grants to study and better develop drought-resistant crop species and efficient irrigation practices.	

Recommendation	Type
Regionalization	Infrastructure Finance
Discussion:	
As communities assess the growing costs of water infrastructure, economies of scale can be realized by combining the needs of water user groups into larger, more efficient water supply, treatment and distribution facilities. Regional facilities offer interconnections between existing systems, which can increase overall reliability. The individual system connections to these systems can be phased over time to meet regional demands with less impact on individual systems than each individually trying to expand. In areas where groundwater limits are being reached, regional groups can identify areas where surface water supply is most needed, and allow other areas to remain on groundwater systems. Sharing costs across a wide customer base keeps rates comparable between service areas. A range of cooperative options exists, including formation of regional authorities, inter-local agreements, public-private partnerships, local government corporations, and public contracting with a private regional supplier. The optimal arrangement between political subdivisions depends upon the specific project and the goals of the parties. Partnerships with private investors through public-private partnerships and direct contracting with privately-owned facilities offer an advantage of using private financing to meet part of the initial planning and construction costs. The regulations governing these partnerships must protect the public represented by the partnership, but if too restrictive, may prevent the partnership from realizing potential cost savings through the use of private-sector procurement and construction practices. Consideration should be given to reducing procurement restrictions for Local Government Corporations to encourage the pooling of resources for funding regional projects. Also, existing assistance programs should remain available when political subdivisions enter into public/public or public/private partnerships.	
Recommendation:	
Region H supports the forming of regional partnerships and encourages the State to allow them the greatest possible latitude for financing in their governing regulations. Additionally, the State Participation Program should be made available to these public/private partnerships and to private nonprofit water supply corporations.	

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Chapter 9 – Reporting of Financing Mechanisms for Water Management Strategies

9.1 INTRODUCTION

In Senate Bill 2 of the 77th Texas Legislature, the preparation of an Infrastructure Financing Report (IFR) was added to the regional planning process. The purpose of the IFR is to identify the funding needed to implement the water management strategies recommended in the 2016 Regional Water Plan. The primary objectives of this chapter/report are:

- Determine the number of Political Subdivisions with identified needs that will be unable to finance their water infrastructure needs;
- Determine the amount of infrastructure costs in the 2016 Regional Water Plan that cannot be financed by the local Political Subdivisions;
- Determine funding options, such as State funding, that are proposed by the Political Subdivisions to finance water infrastructure costs that cannot be financed locally; and
- Determine additional roles the Regional Water Planning Group proposes for the State in financing the recommended water supply projects.

A survey of Water User Groups (WUGs) with identified infrastructure needs will be conducted, and the results of those surveys summarized in *Section 9.3* of this chapter. Completion of the survey and tabulation of the results will follow the completion of the Initially Prepared Plan (IPP). Additional text will be included in *Chapter 9* to discuss each proposed project detailing its location in the regional water plan, the sources and water user groups associated with the project.

The Region H Water Planning Group reviewed the current role of the State in financing water supply projects and made recommendations for program increases and new initiatives in ***Chapter 8*** of this plan. Updates to this section will be completed after the 2016 water infrastructure financing survey is completed.

9.2 CAPITAL COSTS FOR THE 2016 REGION H WATER PLAN

The estimated cost of the 2016 Region H Water Plan is approximately $11.0 billion over the 50-year planning period. This cost includes the development of new water sources, estimates for distribution and treatment facilities, and the capital improvements required to achieve agricultural conservation targets. In addition, these costs also include WUG-level projects that are required to make the supplies originating from major projects accessible to meet WUG demands. Costs for key projects in the 2016 RWP are shown below in *Table 9-1.* Detailed costs for projects can be found in ***Appendix 5-A*** or in the detailed discussion of key water projects in ***Appendix 5-B***.

Table 9-1 – Key Project Overview

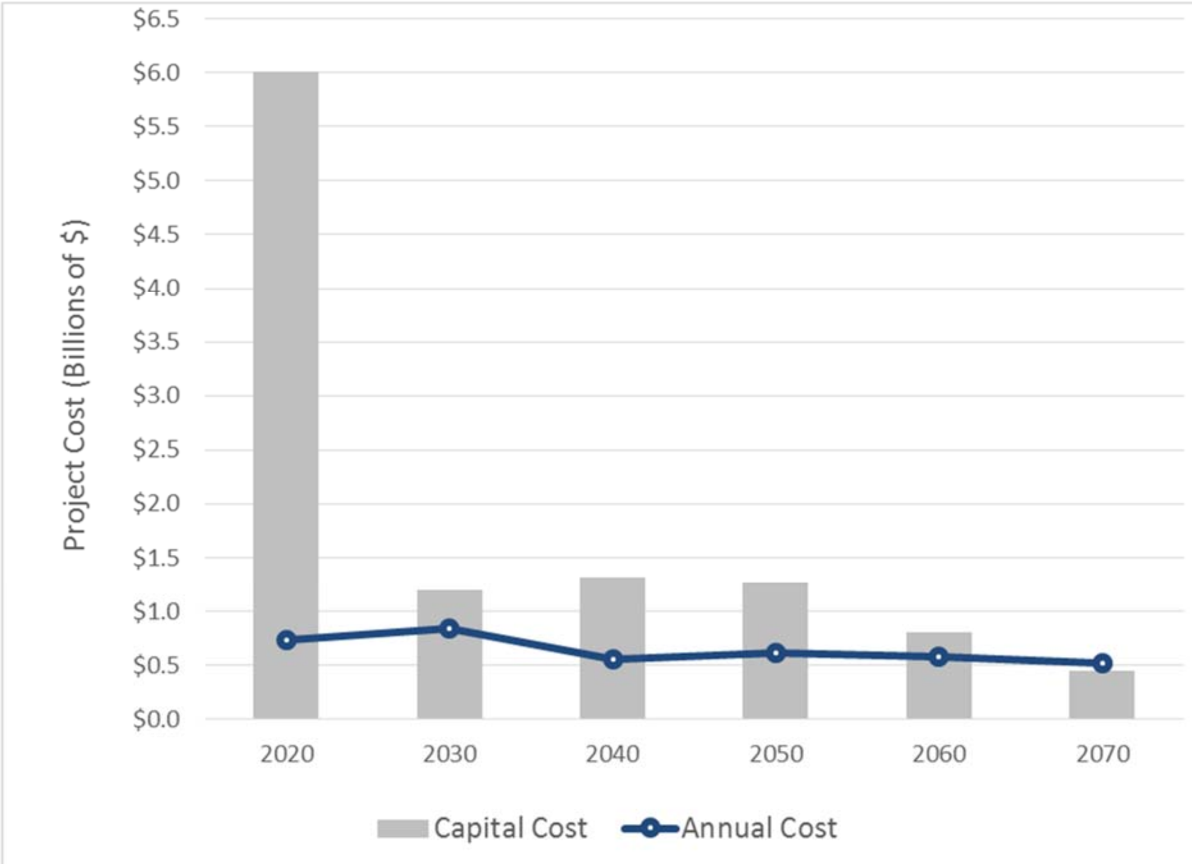
Project	Potential Volume[1] (ac-ft)	Capital Cost ($)	Unit Cost ($/ac-ft)		Start Decade
			Start Decade	2070	
Conservation					
Industrial Conservation[2]	65,261	$0	$0	$0	2020
Irrigation Conservation	86,123	$1,155,709	$113	$112	2020
Municipal Conservation (incl. Loss Reduction)	150,655	$1,699,918,210	$726	$726	2020
Contractual Transfer					
TRA to COH Transfer	150,000	$0	$5	$5	2020
Conveyance					
CHCRWA Transmission and Distribution Expansion	4,682	$23,207,659	$409	$44	2020
COH/NHCRWA/CHCRWA Second Source Pipeline	148,042	$150,325,381	$83	$9	2020
East Texas Transfer	250,000	$388,064,210	$145	$15	2040
Lake Livingston to SJRA Transfer	50,000	$166,710,892	$311	$32	2050
Luce Bayou Transfer	450,000	$360,004,806	$143	$23	2020
NFBWA Distribution Expansion	62,496	$65,450,062	$95	$7	2020
NHCRWA Distribution Expansion	143,360	$922,549,086	$307	$50	2020
NHCRWA Transmission Line	143,360	$155,993,406	$86	$6	2020
Old Galveston Road Transmission Improvements	24,300	$99,886,253	$322	$25	2020
WHCRWA Distribution Expansion	91,896	$293,290,000	$299	$32	2020
WHCRWA/NFBWA Transmission Line	154,392	$642,986,052	$340	$34	2020
Groundwater Development					
Brackish Groundwater Supplies[3]	Varies	Varies by project	Varies	Varies	2020
BWA Brackish Groundwater	3,136	$34,016,950	$600	$346	2020
Conroe Brackish Reverse Osmosis	5,600	$40,691,342	$857	$323	2020
Expanded Use of Groundwater[3]	30,000+	Varies by WUG	Varies by WUG	Varies by WUG	2020
Groveton Groundwater Expansion	161	$2,195,000	$1,277	$136	2020
SJRA Catahoula Aquifer Supplies	7,840	$10,980,367	$213	$96	2020
Groundwater Reduction Plans					
CHCRWA GRP[4]	4,682	$0	$0	$0	2020
City of Houston GRP[4]	130,544	$0	$0	$0	2020
City of Missouri City GRP	12,656	$50,959,636	$329	$33	2020
City of Richmond GRP	1,465	$32,167,109	$1,761	$146	2020
City of Rosenberg GRP	826	$12,469,012	$1,242	$131	2020
City of Sugar Land GRP	20,160	$148,650,964	$900	$283	2020
Fort Bend County MUD 25 GRP	744	$2,148,043	$282	$40	2030
Fort Bend County WCID 2 GRP	6,720	$36,668,844	$800	$343	2020
NFBWA GRP[4]	62,496	$0	$0	$0	2020
NHCRWA GRP[4]	143,360	$0	$0	$0	2020
Panorama Village and Shenandoah GRP	472	$1,619,114	$469	$132	2040

Project	Potential Volume[1] (ac-ft)	Capital Cost ($)	Unit Cost ($/ac-ft)		Start Decade
			Start Decade	2070	
Porter SUD GRP	2,240	$22,061,536	$1,250	$426	2020
River Plantation MUD GRP[5]	92	$0	$0	$0	2030
SJRA GRP	100,000	$834,931,018	$245	$81	2020
WHCRWA GRP[4]	91,896	$0	$0	$0	2020
Reuse					
City of Conroe Reuse[4]	3,694	$0	$0	$0	2020
City of Houston Reuse	197,467	$78,121,149	$56	$12	2040
City of Pearland Reuse	1,154	$5,895,808	$517	$90	2020
GCWA Reclaimed Water from COH	33,712	$56,379,232	$187	$47	2020
Grand Lakes Reclaimed Water System	661	$13,148,843	$2,276	$612	2020
Montgomery County MUDs #8 and #9 Reuse	1,680	$15,351,774	$1,360	$595	2020
Regional Return Flows[4]	150,994	$0	$0	$0	2020
SJRA Conroe Reuse Project[4]	6,807	$0	$0	$0	2020
Wastewater Reclamation for Municipal Irrigation	38,940	$103,454,114	$290	$161	2030
Surface Water Development					
Allens Creek Reservoir	99,650	$316,226,894	$321	$33	2020
BRA System Operation Permit[4]	25,350	$0	$0	$0	2020
Dow Expansion to Harris Reservoir	80,000	$255,865,694	$303	$36	2020
Freeport Seawater Desalination	11,200	$132,937,747	$2,454	$1,461	2040
Treatment					
BWA Water Treatment Plant Expansion	8,400	$15,951,976	$353	$194	2020
City of Houston Treatment Expansion	116,258	$288,529,429	$386	$183	2040
CLCND West Chambers System	2,800	$24,657,839	$1,354	$617	2020
COH Northeast Water Purification Plant Expansion	358,400	$1,263,612,418	$784	$489	2020
Pearland Surface Water Treatment Plant	22,400	$112,947,347	$839	$230	2020
Other Infrastructure					
Brazos Saltwater Barrier	72,396	$55,771,408	$69	$5	2020

1. Volumes listed in this table represent the maximum anticipated volume associated with the projects rather than new increments of yield. Volumes shown in this table may overlap and are not necessarily additive.
2. Insufficient information to determine cost.
3. Includes brackish groundwater projects implemented under Expanded Use of Groundwater. Costs vary by WUG.
4. Costs included under associated infrastructure projects.
5. Supply generated through expanded use of existing infrastructure. Cost estimated to be minimal.

The distribution of capital and annual costs over the planning period is shown in *Figure 9-1*. If necessitated by increasing strategy volumes, WUG capital costs are also shown in subsequent decades, reflecting phased infrastructure expansion to handle additional project capacity. A significant portion of the overall infrastructure will be built prior to the 2030 decade due to groundwater reduction goals. The City of Houston (COH), San Jacinto River Authority (SJRA), and Regional Water Authorities cost projection reflects meeting the surface water conversion milestones in Harris, Fort Bend, and Montgomery Counties as a result of local subsidence district regulations.

Figure 9-1 – Region H Capital and Annual Costs



9.3 INFRASTRUCTURE FINANCING SURVEY

Information in this section to be populated upon completion of infrastructure financing survey by Texas Water Development Board (TWDB).

APPENDIX 9-A

TABULATED SURVEY RESULTS

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APPENDIX 9-B

SURVEY QUESTIONNAIRES

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Chapter 10 – Adoption of Plan and Public Participation

10.1 INTRODUCTION

The Region H Water Planning Group (RHWPG) has sought to encourage public involvement and the participation of interested parties during the process of plan development so that any concerns could be addressed before the draft plan was completed. From its initial deliberations in preparing the 2001 Regional Water Plan, the RHWPG has made a commitment to an open planning process and has actively solicited public input and involvement in developing the elements of the 2016 Regional Water Plan (RWP). Securing a high level of public participation continues to be a challenge for long-term planning, even for a topic so vital to public well-being as the water supply, particularly if there is no drought. The attention of the news media in a major media market is rarely focused on continuing efforts that result in lengthy documents, no matter how important those documents may be to the region's future. Nevertheless, the RHWPG has reached out to communicate with the general public and especially with those segments of the population who will be most affected by the results of the regional water plan. This has been accomplished by pursuing several avenues to gain public involvement.

10.1.1 Regional Water Planning Group as Stakeholder Representatives

The first line of public involvement occurs through the membership of the RHWPG. Each of the members of the RHWPG represent an interest category, such as river authority, agriculture, small businesses, general public, etc. They also represent the different geographic areas within this large region. Most of these members have linkages to the community through various organizations. These linkages, such as professional organizations or citizens groups, are the first avenue for taking information to the public and for receiving input to the RHWPG.

During development of the 2016 RWP, the RHWPG has met on the first Wednesday of the month at least quarterly, but often on a more frequent basis, so that interested parties can plan to attend and follow the proceedings. Notices of these meetings are posted in each of the counties in Region H and are e-mailed to a list of "interested persons" who have requested to be informed. The RHWPG maintains minutes of its meetings and places them on the Region H Water website for review, along with a multitude of other meeting resources.

10.1.2 Public Outreach

In addition meetings related to routine business of plan development, the RHWPG and its representatives participated in numerous opportunities to address organizations associated with water supply and natural resources as well as the general public. A partial list of these organizations include the following:

- Brazoria County Economic Development Alliance
- Brazoria County Petrochemical Council
- Brazos River and Associated Bay and Estuary System Stakeholder Committee

- City of Conroe
- Houston-Galveston Area Council
- Deer Park Community Advisory Council
- Galveston County
- Groundwater Management Area 14
- Gulf Coast Water Efficiency Network
- Harris-Galveston Regional Land and Water Conservation Task Force
- Houston Gulf Coast Irrigation Association
- National League of Cities
- North Houston Association
- Rice Design Alliance
- Texas Chemical Council
- Texas Land/Water Sustainability Forum

10.1.3 Public Notes and Press Releases

Media coverage was sought in conjunction with each series of public meetings or hearings. For each series, paid meeting notices were placed in fourteen newspapers providing service to all fifteen of the counties in Region H. Direct first-class mailings to county judges and mayors accompanied the issuance of public notices.

10.1.4 Region H Water Website

A website was developed at the onset of the first biennium of the 2011 RWP in order to maintain a constant level of contact with the public and to provide members of the RHWPG with resources for plan development. The new site, Region H Water (http://www.regionhwater.org), provides visitors with background on the importance of water and conservation efforts as an overview of the regional planning process in Texas. The site also provides information and announcements for meetings of the RHWPG and downloads of past and in-progress RWPs.

10.1.5 Texas Water Development Board Website

The Region H Water Planning Group has taken advantage of the Internet site provided by Texas Water Development Board (TWDB) on its home page (www.twdb.texas.gov). Upcoming meetings, minutes of previous meetings, and contact information are posted. TWDB has posted a copy of prior RWPs on its site as well.

10.2 SUMMARIES OF REGIONAL PLANNING GROUP MEETINGS

The public meetings held as part of the planning process for Region H are summarized below. Information on RHWPG member attendance and public speakers are included in tabular form. Names of members in attendance are shaded in green, with members represented by a designated alternate shaded in orange. Additional information and supporting materials are available on the Region H Website (http://www.regionhwater.org).

10.2.1 Public Meeting, January 5, 2011

A public meeting to receive comments on the statement of qualifications and selection of a Consultant Team to prepare the Region H Water Plan was held on January 5, 2011 at 10:00 a.m. The meeting was held at the San Jacinto River Authority offices in Conroe. One individual provided comments.

Mr. Dan Davis, representing the Lake Conroe Communities Network (LCCN) stated that he met with Judge Sadler and they both wanted to express appreciation for the Group's efforts in working to update the population data in the effort of acquiring additional water supplies. He stated that Lone Star Water Smart information, including the Montgomery County Water Conservation Study is posted on the websites of Montgomery County Municipal Utility District No. 8 and the LCCN. Mr. Davis briefly discussed the main recommendations of that study.

Other Speakers			
Dan Davis, LCCN			
Region H Water Planning Group Voting Members			
Alexander	Bartos	Blount	Bruner
Chang	Eichelberger	Evans	Hebert
Henson	Hofmann	Howard	Istre
Leathers	Lieper	Long	Marcell
Morrisson	Neighbors	Schindewolf	Teer
Tyler	Vance	Wallace	Willcox
Region H Water Planning Group Non-Voting Members Present			
McKinnon	Schubert		

10.2.2 Public Meeting, May 4, 2011

A meeting hearing to receive comments on the proposed planning activities to be considered during the Fourth Cycle of Regional Water Planning for Region H was held on May 4, 2011 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. The meeting was held at the San Jacinto River Authority offices in Conroe. One individual provided comments.

Mr. Mike Reedy with Freese and Nichols stated that sixteen comments were received from various interested parties related to the scope of activities to be considered during the Fourth Cycle of Regional Water Planning. Mr. Reedy announced the name and details for each entity and/or individual that submitted comments.

Mr. Evans then introduced Mr. Mike Reedy with Freese and Nichols to update the Group on the status and schedule related to the application for a Regional Water Planning Grant. Mr. Reedy briefly introduced and announced that Mr. Jason Afinowicz (formerly with AECOM) recently joined Freese and Nichols and would be part of their regional water planning team. The Group welcomed Mr. Afinowicz. Mr. Reedy then continued by discussing the timeline for submitting such application and the consideration of same. He discussed the 4th Cycle (2011-2015) of Regional Water Planning and the individual tasks to be completed, including the cost for each. Mr. Reedy explained that the draft of the Regional Water Planning contract will be provided to SJRA by TWDB in May and that the final execution of the contract will be by August 31, 2011.

Moving on to the next item on the agenda, motion was then made by Mr. Neighbors, seconded by Mr. Hofmann and unanimously approved, to authorize the SJRA to execute an agreement with Freese & Nichols, Inc., for the development of the 2016 Regional Water Plan.

Other Speakers			
David Blackburn, City Manager from the City of Temple and the Region H liaison			
Region H Water Planning Group Voting Members			
Alexander	Bartos	Blount	Bruner
Chang	Eichelberger	Evans	Hebert
Henson	Hofmann	Howard	Istre
Leathers	Lieper	Long	Marcell
Morrisson	Neighbors	Schindewolf	Teer
Tyler	Vance	Wallace	
Region H Water Planning Group Non-Voting Members			
Hall	McKinnon	Silva	

10.2.3 Public Meeting, August 3, 2011

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on August 3, 2011 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. A presentation from the TWDB was also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. One member of the public provided comments.

Mr. Dan Davis with Lake Conroe Communities Network updated the Group on the socioeconomic impact study focused on the withdrawal of surface water from Lake Conroe, which is being conducted by Texas A&M University. He stated that seventeen hundred surveys have been mailed out and that he would keep the Group updated on same.

Mr. Dan Davis inquired as to the status of Judge Sadler's previous request related to water management strategies (WMS). Mr. Reedy stated that a technical memorandum will identify feasible WMS that the Group recommends should be studied further. He stated that the technical memorandum is due in 2013. Ms. McKinnon of the TWDB stated that the planning process is the same; however the process is now task targeted, but that the same rules and parameters apply as in previous planning cycles. The consensus of the Group was that Judge Sadler's recommendations are worthy of further study.

Other Speakers			
Dan Davis, LCCN			
Region H Water Planning Group Voting Members			
Bartos	Blount	Bruner	Chang
Eichelberger	Evans	Hebert	Henson
Hofmann	Howard	Istre	Leathers
Lieper	Long	Marcell	Morrisson
Neighbors	Schindewolf	Teer	Tyler
Vance	Wallace	Willcox	
Region H Water Planning Group Non-Voting Members			
Ahrens	McKinnon	Silva	

10.2.4 Public Meeting, December 7, 2011

A public meeting to receive comments and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on December 7, 2011 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. A presentation from the Consulting Team and the Texas Water Development Board was also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. Two newly elected individuals provided comments on the area they represent.

Mr. Jace Houston mentioned that although the Agenda stated that an action from the Group was anticipated, no vote was necessary because the new voting members representing local GMAs were assigned to the planning group by statute. Mr. Houston also stated that he will work on a Bylaws amendment to incorporate the changes to the Group's membership.

Mr. Robert Istre asked for comments from Kathy Jones and David Bailey on the area they represent. Ms. Kathy Jones thanked the group and stated that GMA 14 covers the area of southeast Texas from Houston to Louisiana and includes four groundwater conservation districts and two subsidence districts. Mr. David Bailey stated that he looks forward to serving on Region H and mentioned that GMA 12 covers an area north of GMA 14 overlying the Carrizo Wilcox aquifer, including Madison, Leon, and Freestone counties.

Other Speakers			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Eichelberger	Evans	Hebert
Henson	Hofmann	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Vance
Wallace	Willcox		
Region H Water Planning Group Non-Voting Members			
McKinnon	Silva		

10.2.5 Public Meeting, February 29, 2012

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on February 12, 2012 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. Presentations from the Consulting Team, the Texas Water Development Board, and members of the Region H WPG were also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. Two members of the public provided comments.

Mr. Eichelberger stated that the planning group is at the beginning of a planning cycle and therefore it is an appropriate time for Mr. Jace Houston to take his place. He mentioned that he has enjoyed his time as a member of the Region H WPG. Discussion ensued regarding Mr. Eichelberger's accomplishments while serving, and all remaining members thanked him for his time on the WPG.

Mr. Tom Michel gave a presentation regarding the Brazos River Basin and Bay Area Stakeholders Committee ("BBASC"). Mr. Michel explained that the Brazos BBASC desired to engage a facilitator to assist with its meetings, but it lacks funding to cover the cost of these services. He asked the Region H WPG to consider providing financial assistance.

Mr. Dan Davis, MUD Director in Montgomery County, thanked the Region H WPG for their service. He discussed Mayor Melder's legislative proposal for a one percent sales tax to be dedicated to water projects and how he would appreciate the WPGs assistance with implementation. He also encouraged the Group to look at brackish groundwater.

Ms. Kay Willcox, from the City of Anahuac, stated that there had been a serious problem with the City's water plant due to a mechanical failure. She continued by stating that the City contracted Rain for Rent to treat the water until the water treatment plant was operational. She also stated that this process is becoming more cost-effective.

Other Speakers			
Dan Davis, MUD Director in Montgomery County		Kay Willcox, City of Anahuac	
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Eichelberger	Evans	Hebert
Henson	Hofmann	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Vance
Wallace	Willcox		
Region H Water Planning Group Non-Voting Members			
McKinnon	Silva		

10.2.6 Public Meeting, May 2, 2012

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on May 2, 2012 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. A presentation from the Consulting Team and the WMS subcommittee were also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. One member of the public provided comment.

Mr. Evans stated that since Mr. Reed Eichelberger had stepped down from the planning group at the last meeting and because he also served as the Secretary of the Executive Committee, it was necessary to appoint someone to take his place. Mr. Jimmie Schindewolf encouraged the group to replace Mr. Eichelberger with Mr. Jace Houston.

Mr. Jason Afinowicz gave a presentation regarding the schedule and milestones for the first phase of development. He stated that nothing had changed since the last meeting.

Brandt Manchenn, with the Houston Chapter of the Texas Sierra Club, expressed his ongoing concerns regarding proposed new reservoirs.

Other Speakers			
Brandt Manchenn, Houston Chapter of the Texas Sierra Club			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Hebert	Henson
Hofmann	Houston	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Vance
Wallace	Willcox		
Region H Water Planning Group Non-Voting Members			
Hall	McKinnon	Silva	

10.2.7 Public Meeting, June 6, 2012

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on June 6, 2012 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. A presentation from the Consulting Team was also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. Two members of the public provided comment.

Mr. Manchenn expressed personal comments regarding WMS selection methodology and scoping agenda items and presented the planning group with a letter outlining his comments. Mr. Manchenn specifically pointed out the need for a clearly understandable evaluation criteria for the 2016 Region H Water Plan and expressed his ongoing concerns regarding proposed new reservoirs. Ken Cramer, Lone Star Chapter of the Sierra Club, discussed his concern regarding WMS analysis scoping. Mr. Cramer mentioned that there needs to be more focus on the lower Brazos.

Motion was made by Mr. Neighbors to accept the resignation of Mr. Danny Vance, representing River Authorities, seconded by Judge Hebert. The motion carried unanimously.

Motion was made by Mr. Henson to accept the selection of Mr. Kevin Ward as a member of the Region H Water Planning Group representing River Authorities, seconded by Mr. Bartos. The motion carried unanimously.

Mr. Jason Afinowicz gave a presentation regarding the schedule and milestones for the first phase of development. He stated that the Technical Memorandum schedule had been extended by a year.

Recommendation was made by Mr. Neighbors to authorize the Consultant Team to provide public notice and submit a grant application to TWDB on behalf of Region H for funding the second phase of the fourth round of regional water planning. Mr. John Hofmann seconded the motion. The motion carried unanimously.

Mr. Afinowicz updated the group on the draft surface water supply model results for the Trinity and San Jacinto River Basins, including the variations from the 2011 Plan. Discussion ensued regarding shortages in the Brazos and sedimentation. Mr. Afinowicz also briefed the group on the WMS selection process. Motion was made by Mr. Neighbors to authorize the consultant team to move forward with the strategy selection process and criteria for the 2016 Regional Water Plan. Mr. Marvin Marcell seconded the motion. The motion carried unanimously.

Mr. Mike Reedy updated the group on the budget estimate for accelerated funding under Task 4D of the 2016 Regional Water Plan. Motion was made by Mr. Neighbors to authorize the consultant team to submit a scope of services and budget estimate for accelerated funding under Task 4D. Mr. J. Kevin Ward seconded the motion. The motion carried unanimously.

Mr. Afinowicz continued by discussing recent community outreach activities. Additional comments regarding agency activities were provided by Ms. McKinnon and Mr. Hofmann.

Other Speakers			
Brandt Manchenn		Ken Cramer, Lone Star Chapter of the Sierra Club	
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Hebert	Henson
Hofmann	Houston	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Wallace
Ward	Willcox		
Region H Water Planning Group Non-Voting Members			
Balboa	Hall	McKinnon	Silva

10.2.8 Public Meeting, September 5, 2012

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on September 5, 2012 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. A presentation from the Texas Water Foundation was also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. One member of the public provided comment.

Mr. Justin Bower, H-GAC, expressed his personal comments regarding Agenda Item 7. Mr. Bower specifically pointed out that he is concerned about the population projections for rural cities. He continued by offering to meet with the consultant team regarding numbers.

Senator Kip Averitt advised the group about a project he and Carol Baker are implementing with the Texas Water Foundation. He stated that the concept of the project is to quantify conservation strategies in the Region H plan so that their impact can be correctly understood. He continued by expressing his gratitude towards the planning group. He then discussed another component of the project; how to engage in conservation efforts without negatively affecting revenue. Discussion ensued regarding the cost of the project.

Recommendation was made by Mr. Ron Neighbors for the Region H Planning Group to fully endorse, support, and encourage the proposed pilot project to quantify water conservation savings in Region H. Mr. John Bartos seconded the motion. The carried unanimously. Discussion continued. Mr. Jace Houston indicated that he would draft a letter from the Region H Planning Group in support of the pilot project.

Mr. Mike Reedy gave a presentation on the population and demand projections development process. He specifically stated that the Regional Groundwater Study provides the population projections for a five-county area, and the TWDB provides population projections for remaining counties. He then provided an overview of the projects for Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties.

Other Speakers			
Justin Bower, H-GAC			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Hebert	Henson
Hofmann	Houston	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Wallace
Ward	Willcox		
Region H Water Planning Group Non-Voting Members			
McKinnon	Silva		

10.2.9 Public Meeting, December 5, 2012

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on December 5, 2012 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. A presentation from the Consulting Team and the Population Demands subcommittee were also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. No public comments were provided.

Mr. Evans and Mr. Houston discussed with the group a Region H local contribution grant policy and a grant application from the Texas Water Foundation for a proposed pilot project to quantify water conservation savings in Region H. Motion was made by Mr. Neighbors to approve the Region H Local Contribution Account Grant Policy. Mr. Houston seconded the motion. The motion carried unanimously. Motion was made by Mr. Neighbors and seconded by Mr. Chang to approve a $50,000 grant to the Texas Water Foundation from the Region H Local Contribution account. The motion carried unanimously.

Mr. Afinowicz updated the group on the schedule and milestones. He stated that funding was authorized by the Texas Water Development Board in October. Mr. Houston mentioned that the Contract Amendment would be taken to the SJRA Board of Directors this month for approval.

Mr. Reedy updated the group on county-wide projections, WUG-level projections, and per capita demands. Group discussion followed. Mr. Afinowicz briefed the group on the role of conservation in the Region H Plan.

Mr. Reedy presented a proposed letter of support for the Luce Bayou Interbasin Transfer Project, requested by the Coastal Water Authority, to the group. Motion was made by Mr. Neighbors to approve the development and submittal of a letter of support for the Luce Bayou Interbasin Transfer Project, with the inclusion of the sentence above. Mr. Bruner seconded the motion. Mr. Steve Tyler opposed. Motion carried.

Mr. Afinowicz updated the group on community outreach activities, followed by an update on agency communication by Ms. McKinnon.

Other Speakers			
None			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Hebert	Henson
Hofmann	Houston	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Wallace
Ward	Willcox		
Region H Water Planning Group Non-Voting Members			
Hall	McKinnon	Silva	

10.2.10 Public Meeting, April 3, 2013

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on April 3, 2013 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. A presentation from the Salt of the Earth Energy was also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. Two member of the public provided comment.

Zach Holland, General Manager of the Bluebonnet Groundwater Conservation District, discussed Electro Purification, LLC's application. He stated that the application was filed before the Bluebonnet Groundwater Conservation District. Mr. Holland further discussed the process, procedure, and additional application information. Discussion ensued regarding geographic location of the wells.

Ken Parker, Woodlands homeowner, mentioned possible sites for additional water supply and flood control reservoirs. Specifically, he discussed a piece of property where the San Jacinto River meets Lake Creek.

Joe Veytia, Salt of the Earth Energy LLC Senior VP, and Todd Kinsey, League City-City Council Position 4, gave the presentation on desalination technology and potential water management strategies. Mr. Veytia discussed the development of a desalination plant in Galveston County, while Mr. Kinsey mentioned League City's extreme water shortage and strategies to address that issue. Discussion ensued regarding the salinity in the area, overall price, and amount of fresh water produced.

Other Speakers			
Zach Holland, General Manager of the Bluebonnet Groundwater Conservation District		Ken Parker, Woodlands homeowner	
Joe Veytia, Sal of the Earth Energy LLC Senior VP		Todd Kinsey, League City-City Council Position 4	
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Hebert	Henson
Hofmann	Houston	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Wallace
Ward	Willcox		
Region H Water Planning Group Non-Voting Members			
Bookout	Silva		

10.2.11 Public Meeting, July 3, 2013

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on July 3, 2013 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. The meeting was held at the San Jacinto River Authority offices in Conroe. Two member of the public provided comment.

Mr. Ken Kramer, Lone Star Chapter of the Sierra Club, presented a review of actions taken by the 83rd Texas Legislature in the regular session to advance water conservation, curb water loss, and respond to drought conditions. Mr. Kramer also discussed the schedule for revisiting the state's BMP guide for conservation and encouraged the group to carefully consider conservation when developing water management strategies.

Mr. Bookout presented the revised rules for regional water planning, summarizing the background, planning rules, and purpose of specific rule changes along with implementation and prioritization of the State Water Plan projects.

Mr. Brandt Mannchen, Houston Sierra Club, gave commentary regarding Austin County with questions about a canal system within their region.

Other Speakers			
Ken Kramer, Lone Star Chapter of the Sierra Club		Brandt Mannchen, Houston Sierra Club	
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Hebert	Henson
Hofmann	Houston	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Wallace
Ward	Willcox		
Region H Water Planning Group Non-Voting Members			
Bookout	Hall	Silva	

10.2.12 Public Meeting, November 6, 2013

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on November 6, 2013 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. The meeting was held at the San Jacinto River Authority offices in Conroe. One individual provided comment.

Andrew Pompay, Regional Planner with the Houston-Galveston Area Council, addressed the board requesting a letter of support for a proposed grant application for the purpose of studies related to drought preparation for communities. Mr. Pompay further explained that the project would include an advisory group with experts in water management, climatology, public policy, agriculture, and environmental protection, ensuring results are realistic and scientifically based in approaching drought preparation.

Motion was made by Mr. John Bartos to approve the letter of support, seconded by Mr. Robert Bruner. The motion carried unanimously.

Motion was made by Judge Art Henson to accept the resignation of Ted Long, seconded by Carl Masterson. The motion carried unanimously.

Motion was made by Carl Masterson to accept Gene Fisseler as a new voting member of the Region H WPG representing electric utilities. Seconded by Jace Houston. The motion carried unanimously.

Mr. Evans stated that Gene Fisseler would be appointed to serve on any Region H committees on which Ted Long previously served.

Other Speakers			
Andrew Pompay, Regional Planner with the Houston-Galveston Area Council			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Hebert	Henson
Hofmann	Houston	Howard	Istre
Jones	Leathers	Lieper	Long
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Wallace
Ward	Willcox		
Region H Water Planning Group Non-Voting Members			
Hall	McKinnon		

10.2.13 Public Meeting, February 5, 2014

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on February 5, 2014 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. The meeting was held at the San Jacinto River Authority offices in Conroe. One member of the public provided comment.

Motion was made by Mr. Bartos, seconded by Mr. Kramer, to authorize the consultant team to complete the draft TWDB prioritization scoring template and authorize the Water Management Strategies Committee to review and provide comment on the draft prioritization. The motion carried unanimously.

Motion made by Judge Henson, seconded by Judge Hebert, to authorize an agreement with the Texas Water Development Board for additional funding and scope of work related to prioritization of projects in the 2011 and 2016 regional water plan. The motion carried unanimously.

Motion was made by Judge Henson to accept the resignation of Mr. Harold Wallace, representing Water Utilities, seconded by Judge Hebert. The motion carried unanimously.

Motion was made by Mr. Marcell to accept the resignation of Ms. Glynna Leiper, representing Industry seconded by Mr. Blount. The motion carried unanimously. Ms. Leiper's resignation included her recommendation of Otis Dickinson.

Judge Evans stated that new officers would need to be elected. The Nominations Committee will consider vacancies and meet by phone. Judge Evans suggested any interested parties should submit a letter of interest stating their willingness to serve to Mr. Houston. A deadline was set for March 31, 2014, to give the Nominations Committee time to consider nominations.

Jill Savory, Fort Bend County resident, provided comments regarding water issues in Fort Bend County.

Other Speakers			
Jill Savory, Fort Bend County resident			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Fisseler	Hebert
Henson	Hofmann	Houston	Howard
Istre	Jones	Leathers	Marcell
Masterson	Morrisson	Neighbors	Schindewolf
Teer	Tyler	Ward	Willcox
Region H Water Planning Group Non-Voting Members			
Hall	McKinnon	Silva	

10.2.14 Public Meeting, May 7, 2014

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on May 7, 2014 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. A presentation regarding the status of the Texas Water Development Board Funding Programs was also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe. Three members of the public provided comments.

Don Ripley, Executive Director, Coastal Water Authority, gave an update on Luce Bayou Inter-Basin Transfer Project, reporting on its transition from years of planning into the final design of the project. He emphasized the importance of prioritization and construction funding with this project.

Susan Roth, an independent engineering consultant working with Brazosport Water Authority presented a minor amendment request for the 2011 Region H Water Plan. The request comes on behalf of BWA and supports their ability to gain eligibility for funding. The key issue is providing a reliable water supply and continued opportunities for regionalization.

Nancy Richards, Team Manager, East Texas Region, Texas Water Development Board, discussed additional funding programs available outside of SWIFT, both state and federally funded.

Senator Kip Averitt and Mr. Stephen Cortes, Project Director, presented the first year report on the Goldwater Project concerning water conservation efforts within Region H. Mr. Cortes explained the two main goals are tracking and measuring municipal conservation and providing individual utilities with reports to assist them in meeting their own water conservation plans. Senator Averitt concluded with announcing an upcoming meeting of the Goldwater stakeholder committee on May 30, 2014, at the office of Freese & Nichols, which will begin the process of how to use the data and develop a core group that will start implementation.

Mr. Afinowicz presented the draft prioritization, scoring template, and cover letter for submittal to the TWDB. Motion was made by Mr. Chang to submit the draft prioritization. Mr. Blount seconded the motion. The motion carried unanimously.

Mr. Afinowicz recommended consideration of a request for additional funding for the study of water management strategies. The amount of $448,807.00 has been requested to date and $351,600.00 still remains for potential funding. Mr. Masterson made the motion. Mr. Blount seconded the motion. The motion carried unanimously.

Jill Savory, Fort Bend County resident, provided comments regarding water issues in Fort Bend County.

Other Speakers			
Don Ripley, Executive Director of Coastal Water Authority		Susan Roth, Independent engineering consultant working with Brazosport Water Authority	
Jill Savory, Fort Bend County resident		Bech Brunn, Director of Texas Water Development Board	
Nancy Richards, Team Manager of Texas Water Development Board (East Texas Region)		Stephen Cortes, Project Director of Goldwater Project	
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Evans	Fisseler	Hebert
Henson	Hofmann	Houston	Howard
Istre	Jones	Leathers	Marcell
Masterson	Morrisson	Neighbors	Schindewolf
Teer	Tyler	Ward	Willcox
Region H Water Planning Group Non-Voting Members			
Ahrens	Hall	McKinnon	Silva

10.2.15 Public Meeting, August 6, 2014

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on August 6, 2014 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. Presentations from different Consultant Teams were also received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe.

Mr. Evans clarified this as being a proposed application to TWDB to make determination of a major or minor amendment. TWDB would report back to the water planning group with their evaluation for the November meeting.

Susan Roth, Consultant representing Brazosport Water Authority presented an overview of their request for minor amendments to 2011 Region H Water Plan and 2012 State Water Plan, highlighting facility study and giving summarization of the proposed water management strategy. Discussion was made about the environmental impact, permitting, pricing, and concern regarding subsidence from three or more members. Motion was made by Mr. O'Connell, seconded by Mr. Ward, for the submittal to TWDB for their determination of minor or major amendments, and, if determined to be a major amendment, allowing the consultants to proceed with the notification process for the November meeting. Mr. Neighbors, Mr. Marcell, and Mr. Kramer opposed with nays. Motion carried.

David Dunn from HDR on behalf of The Dow Chemical Company made a presentation on Dow's water supply system, drought susceptibility, and depiction of Harris Reservoir expansion project reflecting the need for a proposed amendment to the 2011 Region H Water Plan and approval in development and submittal of the application package to TWDB for the determination of minor amendment status and taking action necessary at the next November meeting. Motion made by Mr. Istre, seconded by Mr. Collinsworth, approving submittal of application package to TWDB. Motion carried.

Mr. Reedy gave the presentation regarding draft SWIFT/SWIRFT rules identifying the highest scoring criteria being: population served, urban/rural, regionalization, percentage of needs served. Comments to TWDB regarding the prioritization scoring will be accepted up to September 1, 2014. Comments for consideration by the Region H Executive Committee will be accepted till August 15, 2014 to submit to TWDB. Motion made by Mr. Fisseler for the Region H Executive Committee to submit comments to TWDB, seconded by Mr. Henson. Motion carried.

Other Speakers			
Susan Roth, Consultant representing Brazosport Water Authority		David Dunn, HDR (on behalf of the Dow Chemical Company)	
Dave Scholler, (North Fort Bend Water Authority)		Bech Brunn, Director of Texas Water Development Board	
Nancy Richards, Team Manager of Texas Water Development Board (East Texas Region)		Stephen Cortes, Project Director of Goldwater Project	
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Collinsworth	Comin	Evans
Fisseler	Hebert	Henson	Houston
Howard	Istre	Jones	Leathers
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Tyler	Ward
Willcox			
Region H Water Planning Group Non-Voting Members			
Ahrens	Bookout	Scholler	

10.2.16 Public Meeting, November 5, 2014

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on November 5, 2014 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. Presentations from the Consultant Team and Region H Water Management Strategies Committee were received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe.

Ms. Jill Savory presented public comments regarding TWDB efforts in standardization of water use measurements.

Mr. Evans welcomed Ms. Kathleen Jackson, Texas Water Development Board (TWDB). She introduced James Bronikowski and Jennifer White from TWDB. Ms. Jackson reviewed the internal changes that will make processes more efficient for communities to apply for TWDB grants.

Mr. Henson made a motion, seconded by Mr. Blount, to accept the resignation of Ms. Gená Leathers as a voting member of Region H representing Industry. The motion passed. Judge Hebert made a motion, seconded by Mr. Fisseler, to accept the recommendation of Glenn Lord as a voting member of the Region H WPG representing Industry. The motion passed.

Jason Afinowicz, consultant with Freese and Nichols, presented information related to the draft amendment package that was submitted to the Texas Water Development Board by Brazosport Water Authority. Mr. Evans opened the public hearing on the topic, with comment received from Ms. Savory.

Mr. Herbert made a motion, Seconded by Mr. Houston, to amend the 2011 Region H Water Plan to include water management strategies related to brackish groundwater development and expansion of surface water treatment infrastructure by Brazosport Water Authority. The potion passed unanimously.

Mr. Taebel of the Houston-Galveston Area Council presented information regarding the Houston-Galveston Area Council 2040 Regional Plan.

Mr. Afinowicz also briefed the group on the status of the proposed applications to amend the 2011 RWP by Dow Chemical Company and Gulf Coast Water Authority. After further discussion, Mr. Fisseler made a motion to approve the submittal of the GCWA application package to the Texas Water Development Board for the determination of minor amendment status. The motion was seconded by Mr. Blount with all present voting aye.

Mr. Afinowicz also briefed the group on schedules and milestones for the 2016 RWP, the draft of Chapters 4 and 7 of the RWP, and upcoming outreach activities. The Consultant Team and Water Management Strategy Committee also briefed the group on identification of needs and potential strategies.

Ms. McKinnon and Ms. Jackson provided an update on agency activities. Mr. Ken Kramer spoke of upcoming participation efforts regarding groundwater legislation, followed by additional public comment by Ms. Savory.

Other Speakers			
Jill Savory			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Collinsworth	Comin	Evans
Fisseler	Hebert	Henson	Houston
Howard	Istre	Jones	Leathers
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Ward	Willcox
Region H Water Planning Group Non-Voting Members			
Hall	McKinnon	Scholler	

10.2.17 Public Meeting, February 4, 2015

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on February 4, 2015 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. Presentations from the Consultant Team and Region H Water Management Strategies Committee were received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe.

Mr. Afinowicz provided an update regarding Dow Chemical's proposed amendment to the 2011 RWP. Mr. Houston made a motion to amend the 2011 Region H Water Plan to revise Water Management Strategies related to proposed expansion of an off-channel reservoir and pump station by Dow Chemical Company. The motion was seconded by Mr. Sims and carried unanimously.

Mr. Afinowicz provided an update regarding GCWA's proposed amendment to the 2011 RWP. Mr. Blount moved approval to amend the 2011 Region H Water Plan to include water management strategies related to proposed development of a system by Gulf Coast Water Authority to utilize reclaimed wastewater effluent from the City of Houston. The motion was seconded by Mr. Kramer and passed unanimously.

Mr. Houston discussed potential use of funds from the Region H Local Contribution Account to pay for a 2014 audit report and renewal of the director and officers liability insurance.

Mr. Afinowicz and the Water Management Strategy Committee discussed the status of identification of needs and potential strategies. Mr. Afinowicz also briefed the group on the contents of Chapter 8, recommendations for schedule for public meetings for the Initially Prepared Plan, and application for regional water planning grant funding. Mr. Neighbors made a motion to authorize the San Jacinto River Authority to provide public notice and submit a grant application to TWDB on behalf of Region H for funding the fifth round of Regional Water Planning. The motion was seconded by Mr. Hebert and carried unanimously.

Mr. Bookout provided an update from TWDB on the SWIFT process.

Other Speakers			
None			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Collinsworth	Comin	Evans
Fisseler	Hebert	Henson	Houston
Howard	Istre	Jones	Lord
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Ward	Willcox
Region H Water Planning Group Non-Voting Members			
Bailey	Bookout	Lambrecht	

10.2.18 Public Meeting, March 11, 2015

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on March 11, 2015 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. Presentations from the Consultant Team and Region H Water Management Strategies Committee were received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe.

Mr. Houston explained that each planning cycle, the Board must re-designate an administrative agency of the Regional Water Planning Group. A motion was made and carried to authorize the San Jacinto River Authority to continue in this capacity. A motion was also made and carried to provide funding for notice activities related to the fifth cycle of regional water planning to later be reimbursed by TWDB.

Mr. Afinowicz gave an overview of the schedule for development and submittal of the 2016 RWP. Mr. Afinowicz continued with an overview of the work of the Water Management Strategies Committee in evaluating projects recommended for meeting identified needs in the 2016 RWP.

Mr. Afinowicz provided an overview of the remaining chapters of the 2016 Region H Initially Prepared Plan including Chapter 5: Water Management Strategies, Chapter 5B: Conservation Recommendations, Chapter 6: Impacts of the Regional Water Plan, Chapter 8: Unique Stream Segments, Reservoir Sites, and Other Recommendations, Chapter 9: Reporting of Financial Mechanism for Water Management Strategies, Chapter 10: Adoption of Plan and Public Participation, and Chapter 11: Implementation and Comparison to Previous Regional Water Plan. A complete copy of the draft Initially Prepared Plan was provided to members for review and comment prior to the upcoming April 8 meeting.

Ms. Backhouse of the TWDB provided an update regarding contracts for the fifth cycle of water planning.

Mr. Khouw of IDS Engineering indicated the intention of the Central Harris County Regional Water Authority to submit an application for amendment of the 2011 Region H RWP to include costs associated with their surface water conversion projects.

Other Speakers			
Marcel Khouw, Representing the Central Harris County Regional Water Authority			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Collinsworth	Comin	Evans
Fisseler	Hebert	Henson	Houston
Howard	Istre	Jones	Lord
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Ward	Willcox
Region H Water Planning Group Non-Voting Members			
Bookout			

10.2.19 Public Meeting, April 1, 2015

A public hearing to receive input on the fifth round of regional water planning was held on April 1, 2015 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group.

Mr. Taucer provided an overview of the current plans for the fifth cycle of regional water planning including the initial scope of work for the project. Initial phases of study will focus on the development of revised population and water demand projections as well as the efforts associated with public involvement and adoption.

Ms. Anderson spoke about her company’s experience with reducing water loss. She estimates that close to one billion gallons of water lost due to infrastructure failure could be saved.

Other Speakers			
Katie Anderson, Save Water Co.			
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Collinsworth	Comin	Evans
Fisseler	Hebert	Henson	Houston
Howard	Istre	Jones	Lord
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Ward	Willcox
Region H Water Planning Group Non-Voting Members			
Bookout			

10.2.20 Public Meeting, April 8, 2015

A public meeting to receive updates and discuss updates from the Consultant Team regarding the 2016 Region H Regional Water Plan was held on April 8, 2015 at 10:00 a.m. as part of the regular meeting of the Region H Water Planning Group. Presentations from the Consultant Team were received during this meeting. The meeting was held at the San Jacinto River Authority offices in Conroe.

Ms. Seldomridge provided public comment on behalf of the Galveston Bay Foundation regarding the 2016 Region H Initially Prepared Comments. She reinforced the importance of conservation in sustainably meeting the region's needs and expressed concern with how costs for conservation were compared against other strategies that require multiple tiers of projects to provide water. She also indicated an interest in having an improved description of the way in which projects were evaluated and selected within the plan.

Mr. Afinowicz provided a summary of a proposed amendment to the 2011 Region H RWP by the Central Harris County Regional Water Authority. A motion was made and carried to submit this proposed application to TWDB for review and determination of major or minor amendment status.

Mr. Afinowicz gave an overview of the schedule for development and submittal of the 2016 RWP. The schedule for public hearings associated with the Initially Prepared Plan were also discussed.

Mr. Afinowicz provided a summary of comments received to date from planning group members as well as interested parties. These revisions included adjustments to applied projects in the document, additions of projects that are not to be recommended in the plan, clarifications, and addition of general items and revisions to text. A motion was made to certify and adopt the Initially Prepared Plan with the revisions described, submit to TWDB, and provide notice for public hearings related to the document. The motion was seconded and carried unanimously.

Mr. Afinowicz discussed an additional study item for considering water management strategies that arise during the review of the Initially Prepared Plan which must be submitted to TWDB for approval in order to utilize finds that have been allocated by TWDB. A motion was made, seconded, and carried.

Mr. Goedrich provided information relate to water loss and the potential to dramatically reduce demands within Region H. Their efforts have been focused largely on multi-family residential users. He indicated his interest in providing information to Region H and potential project sponsors in the area.

Other Speakers			
Emily Seldomridge, Galveston Bay Foundation		Kurt Goedrich, Save Water Co.	
Region H Water Planning Group Voting Members			
Bailey	Bartos	Blount	Bruner
Chang	Collinsworth	Comin	Evans
Fisseler	Hebert	Henson	Houston
Howard	Istre	Jones	Lord
Marcell	Masterson	Morrisson	Neighbors
Schindewolf	Teer	Ward	Willcox
Region H Water Planning Group Non-Voting Members			
Bookout			

10.2.21 Public Meeting, July 1, 2015

Summary to be provided in final, adopted RWP.

10.2.22 Public Meeting, October 7, 2015

Summary to be provided in final, adopted RWP.

10.2.23 Public Meeting, November 4, 2015

Summary to be provided in final, adopted RWP.

10.3 SUMMARIES OF TECHNICAL COMMITTEE MEETINGS

In addition to regular public meetings, the RHWPG also conducted several working meeting with technical committees. These meetings are described below.

10.3.1 Non-Population Demands Committee Meeting, January 11, 2012

A meeting to receive Non-Municipal Demand Projections regarding the 2016 Region H Regional Water Plan was held on January 11, 2012 at 2:00 PM. Items that were discussed include the projections and data of the following topics; irrigation, livestock, manufacturing, mining, and steam electric. The meeting was held via teleconference.

10.3.2 Non-Population Demands Committee Meeting, February 6, 2012

A meeting to receive Non-Municipal Demand Projections regarding the 2016 Region H Regional Water Plan was held on February 6, 2012 at 2:00 PM. Items that were discussed include the projections and data of the following topics; irrigation, livestock, manufacturing, mining, and steam electric. The meeting was held via teleconference.

10.3.3 Groundwater Supply Committee Meeting, April 5, 2012

A meeting to receive a presentation on the Modeled Available Groundwater estimates for use in the development of the Region H Regional Water Plan was held on April 5, 2012 at 10:00 AM. Discussion on the presentation ensued as well as any actions that are to be taken prior to the submission of the available groundwater supplies to the Region H Water Planning Group. The meeting was held at the Lone Star Groundwater Conservation District Office in Conroe.

10.3.4 Surface Water Supply Committee Meeting, April 16, 2012

A meeting to receive a presentation on the surface water supply estimates for use in the development of the Region H Regional Water Plan was held on April 16, 2012 at 10:00 AM. The presentation included supplies originating from the Trinity and San Jacinto River Basins and the Neches-Trinity, Trinity-San Jacinto, and Brazos-Colorado coastal basins. Discussions ensued regarding any actions that are to be taken prior to the submission of the available surface water supplies to the Region H Water Planning Group. The meeting was held at the Freese and Nichols Houston Office.

10.3.5 Water Management Strategy Committee Meeting, April 16, 2012

A meeting to receive a presentation on the regional shortages and needs from the 2011 Regional Water Plan for use in the development of the Region H Regional Water Plan was held on April 16, 2012 at 1:00 PM. Discussions ensued regarding strategies in the 2011 Regional Water Plan to develop a preliminary list of alternatives and methodologies for the selection of water management strategies in the development of the 2016 Regional Water Plan. Any actions that are to be taken prior to the submission of the available surface water supplies to the Region H Water Planning Group were discussed. The meeting was held at the Freese and Nichols Houston Office.

10.3.6 Water Management Strategy Committee Meeting, May 25, 2012

A meeting to discuss the Committee activities and schedule was held on May 25, 2012 at 9:00 AM. The schedule and preliminary scope and budget for requesting Task 4D funds for the initiation of detailed investigation into potential water management strategies was considered. The methodology for selection of the water management strategies in the development of the 2016 Regional Water Plan was discussed. The meeting was held at the Freese and Nichols Houston Office.

10.3.7 Population Demands Committee Meeting, July 23, 2012

A meeting to receive a presentation regarding the status of population projections for Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties was held on July 23, 2012 at 2:00 PM. Discussions ensued discussing the methodology for surveying Water User Groups for input regarding population projections and other data for use in the development of the 2016 Regional Water Plan. The meeting was held at the Freese and Nichols Houston Office.

10.3.8 Population Demands Committee Meeting, October 15, 2012

A meeting to discuss detailed WUG population projections for Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties was held on October 15, 2012 at 2:00 PM. Discussions ensued discussing the methodology for development of per capita water demands and calculation of Plumbing Code

Savings for determining municipal demands. The meeting was held at the Freese and Nichols Houston Office.

10.3.9 Water Management Strategy Committee Meeting, June 17, 2013

A meeting to discuss the Committee activities and schedule was held on June 17, 2013 at 9:00 AM. The status of accelerated Task 4D evaluations of water management strategies for inclusion in the 2016 Regional Water Plan and the potential Scopes of Work for additional Task 4D strategy evaluations for recommendations to the Region H Planning Group was discussed. The meeting was held at the Freese and Nichols Houston Office.

10.3.10 Population Demands Committee Meeting, June 24, 2013

A meeting to discuss the Committee activities and schedule was held on June 24, 2013 at 2:30 PM. Discussion ensued regarding detailed WUG population projections for Region H, per capita demand estimates from TWDB, and requests for amendment to draft population and water demand projections. Recommendation of population and demand projections to the Region H Planning Group for the 2016 Regional Water Plan was considered. The meeting was held at the Freese and Nichols Houston Office.

10.3.11 Water Management Strategy Committee Meeting, January 21, 2014

A meeting to discuss the Committee activities and schedule was held on January 21, 2014 at 1:30 PM. The status of ongoing water management strategy evaluations for inclusion in the 2016 Regional Water Plan was discussed. The meeting was held at the Freese and Nichols Houston Office.

10.3.12 Water Management Strategy Committee Meeting, March 18, 2014

A meeting to discuss the Committee activities and schedule was held on March 18, 2014 at 1:00 PM. Discussions included prioritization of water management strategies, further action of the prioritization of water management strategies by the Water Management Strategy Committee, and potential Scopes of Work for additional Task 4D strategy evaluations for recommendation to the Region H Planning Group. The meeting was held at the Freese and Nichols Houston Office.

10.3.13 Executive Committee Meeting, August 20, 2014

A meeting to discuss the Committee activities and schedule was held on August 20, 2014. Discussions included SWIFT and SWIRFT recommendations.

10.3.14 Water Management Strategy Committee Meeting, September 15, 2014

A meeting to discuss the Committee activities and schedule was held on September 15, 2014 at 9:30 AM. The results of the preliminary shortage analysis and approach to meeting shortages identified for the 2016 Region H Regional Water Plan were discussed. The meeting was held at the Freese and Nichols Houston Office.

10.3.15 Water Management Strategy Committee Meeting, December 9, 2014

A meeting to discuss the Committee activities and schedule was held on December 9, 2014 at 10:00 AM. The TWDB response to the Region H letter requesting guidance related to groundwater availability in Region H was discussed. Additional discussions included alternatives for meeting needs, collection of information related to strategies, and estimates of potential conservation savings in the 2016 Region H Regional Water Plan. The meeting was held in Fort Bend County in Richmond.

10.3.16 Water Management Strategy Committee Meeting, February 9, 2015

A meeting to discuss the Committee activities was held on February 9, 2015. The Committee discussed the application of general and known WMS and the resulting needs still requiring projects. Potential WMS were considered for closing the residual gaps in water supply prior to the development of the final chapters of the plan.

10.4 PUBLIC REVIEW AND COMMENT ON INITIALLY PREPARED PLAN

Additional information concerning public hearings associated with the public comment on the Initially Prepared Plan (IPP) will be added once these meetings are held following IPP submittal.

10.5 SUMMARY OF PUBLIC HEARINGS, PUBLIC MEETINGS, AND WRITTEN COMMENTS

Additional information concerning public hearings associated with the public comment on the Initially Prepared Plan (IPP) will be added once these meetings are held following IPP submittal.

APPENDIX 10-A

PUBLIC HEARING MATERIALS FOR IPP

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APPENDIX 10-B

WRITTEN COMMENTS

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APPENDIX 10-C

RESPONSES TO WRITTEN COMMENTS

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Chapter 11 – Implementation and Comparison to Previous Regional Water Plan

11.1 INTRODUCTION

The development of Regional Water Plans (RWPs) is a cyclical process that provides continual input to the State Water Plan (SWP). By design, the plans are updated regularly on a five-year cycle which allows for refinement of water demands, supplies, and recommended strategies. Previous plans had no mechanism designed to report on updates to the planning process from one cycle to another. The

Texas Water Development Board (TWDB) guidance for 2016 RWP development provides for the inclusion of a new Chapter 11 dedicated to the discussion of implementation of the previous RWP as well as identified differences between the two cycles of planning which point to revised perspectives on demands, supplies, and application of water management strategies (WMS). This chapter identifies the level of project implementation for projects identified in the 2011 RWP and speaks to the differences between the plan and the updated 2016 RWP.

11.2 IMPLEMENTATION OF PREVIOUSLY RECOMMENDED WATER MANAGEMENT STRATEGIES

The following sections discuss those projects and WMSs that were recommended in the 2011 RWP and have been partially or completely implemented since that plan was published. These WMSs or portions of the phased WMSs are not included in the current RWP.

In order to evaluate the status of various projects in Region, a variety of information was collected from a number of sources. These include information:

- Collected during the Region H Water User Group (WUG) and Wholesale Water Provider (WWP) survey conducted in 2013,
- From TWDB on funded projects form January 2000 to November 2014, and
- Known to members of and consultants to the Region H Water Planning Group (RHWPG).

11.2.1 Conservation Strategies

- **Industrial Conservation:** It is assumed that industrial conservation practices have been implemented in Region H since the development of the 2011 RWP even though the recommended savings in the plan were limited and based on only one specific case. Efforts by the Dow Chemical Company in conjunction with the Nature Conservancy have garnered particular focus in industrial conservation in the region. These projects continue to be a recommended WMS in the 2016 RWP.
- **Irrigation Conservation:** It is assumed that irrigation conservation practices have been implemented in Region H since the development of the 2011 RWP. These projects have been carried out by individual irrigators as the economics make conservation projects viable. These projects continue to be a recommended WMS in the 2016 RWP.

- **Municipal Conservation:** It is assumed that municipal conservation practices have been implemented in Region H since the development of the 2011 RWP. Several noteworthy conservation programs within Region H include the City of Conroe and efforts by the City of Houston to provide information to customers regarding their water usage patterns. These projects continue to be a recommended WMS in the 2016 RWP and now include the outreach efforts of the Goldwater Project in implementing and realizing conservation savings.

11.2.2 Contractual Strategies

- **Expand/Increase Current Contracts:** It is assumed that contractual arrangements have been made, where necessary, to increase supplies to current water users. These projects continue to be a recommended WMS in the 2016 RWP.
- **New Contracts from Existing Supplies:** It is assumed that contractual arrangements have been made, where necessary, to increase supplies to current water users. These projects continue to be a recommended WMS in the 2016 RWP.
- **Reallocation of Existing Supplies:** It is assumed that contractual arrangements have been made, where necessary, to increase supplies to current water users. These projects continue to be a recommended WMS in the 2016 RWP.
- **TRA to SJRA Contract:** The San Jacinto River Authority (SJRA) and Trinity River Authority (TRA) have entered into an agreement for the opportunity to purchase 50,000 acre-feet of water annually from Lake Livingston. This contract will work with infrastructure in the future to provide this supply to the SJRA service area. Infrastructure associated with this project continues to be a recommended WMS in the 2016 RWP.
- **WUG-Level Contracts:** It is assumed that contractual arrangements have been made, where necessary, to increase supplies to current water users. These projects continue to be a recommended WMS in the 2016 RWP.
- **WWP Contracts:** It is assumed that contractual arrangements have been made, where necessary, to increase supplies to current water users. These projects continue to be a recommended WMS in the 2016 RWP.

11.2.3 Groundwater Strategies

- **Expanded Use of Groundwater:** It is assumed that groundwater supply development has occurred, where necessary and in accordance with local regulation, to increase supplies to current water users. These projects continue to be a recommended WMS in the 2016 RWP.
- **Interim Strategies:** Interim strategies involve the use of groundwater beyond established estimates of Modeled Available Groundwater. This may still occur in areas where pumpage limits are not in place although the 2016 RWP process does not allow for inclusion of this strategy as a viable WMS.
- **New Groundwater Wells for Livestock:** It is assumed that groundwater supply development has occurred, where necessary and in accordance with local regulation, to increase supplies to current water users. These projects continue to be a recommended WMS in the 2016 RWP.

11.2.4 Groundwater Reduction Plans

- **CHCRWA GRP:** The Central Harris County Regional Water Authority (CHCRWA) implemented their 2010 phase of surface water conversion on the schedule set forth by the Harris-Galveston Subsidence District (HGSD). This project utilized Water Infrastructure Funding

(WIF) from TWDB to facilitate project implementation including shared infrastructure with the North Harris County Regional Water Authority (NHCRWA). Future phases of this project are included as recommended WMS in the 2016 RWP.

- **COH GRP:** The COH continues to utilize its surface water capacity for its own groundwater reduction requirement as well as that of its contract Groundwater Reduction Plan (GRP) participants. This strategy utilizes other infrastructure projects to allow for this conversion. Future phases of this project are included as recommended WMS in the 2016 RWP.
- **City of Missouri City GRP:** The City of Missouri City has successfully implemented the first phase of its GRP including the construction of a surface water treatment plant. Future phases of this project are included as recommended WMS in the 2016 RWP.
- **Fort Bend MUD 25 GRP:** Fort Bend County MUD 25 has successfully implemented the first phase of its GRP including the development of a reuse system for adjoining water users. Future phases of this project are included as recommended WMS in the 2016 RWP.
- **Fort Bend WCID 2 GRP:** Fort Bend WCID 2 has successfully implemented the first phase of its GRP including the construction of a surface water treatment plant. Future phases of this project are included as recommended WMS in the 2016 RWP.
- **NFBWA GRP:** The North Fort Bend Water Authority (NFBWA) implemented their first phase of surface water conversion on the schedule set forth by the Fort Bend Subsidence District (FBSD). This project developed infrastructure to deliver treated surface water from COH to participants in Fort Bend County. Future phases of this project are included as recommended WMS in the 2016 RWP.
- **NHCRWA GRP:** The North Harris County Regional Water Authority (NHCRWA) implemented their 2010 phase of surface water conversion on the schedule set forth by HGSD. This project functions in conjunction with infrastructure projects to receive treated surface water from the City of Houston Northeast Water Purification Plant (NEWPP). Future phases of this project are included as recommended WMS in the 2016 RWP.
- **Pecan Grove GRP:** Pecan Grove implemented their surface water conversion project to meet conversion requirements from FBSD. This project included the development of a water treatment plant which will serve the community for anticipated future phases of conversion.
- **Richmond/Rosenberg GRP:** Richmond and Rosenberg have adopted separate strategies for meeting FBSD GRP requirements since the development of the 2011 RWP. Richmond is in the process of developing a surface water treatment plant to fulfill its initial conversion obligation. Rosenberg is pursuing an arrangement to utilize treatment capacity owned by the Brazosport Water Authority (BWA) to receive surface water. Future phases of these projects are included as recommended WMS in the 2016 RWP.
- **River Plantation GRP:** River Plantation MUD is currently operating a reuse facility to provide for GRP conversion within the Lone Star Groundwater Conservation District (LSGCD). Future phases of this project, in conjunction with East Plantation MUD, are included as recommended WMS in the 2016 RWP.
- **SJRA WRAP:** The SJRA has initiated its first phase of surface water conversion for its GRP participants in Montgomery County. This project utilized Water Development Funding (WDR) and Water Infrastructure Funding (WIF) from TWDB to facilitate project implementation including the development of a lakeside raw water intake, a membrane filtration plant, a high service pump station, and a transmission system throughout the county. Future phases of these projects are included as recommended WMS in the 2016 RWP.

- **Sugar Land GRP:** Sugar Land has implemented infrastructure to provide for its first phase of conversion. This includes the construction of a surface water treatment plant. Future phases of this project are included as recommended WMS in the 2016 RWP.
- **WHCRWA GRP:** The West Harris County Regional Water Authority (WHCRWA) implemented their 2010 phase of surface water conversion on the schedule set forth by HGSD. This project functions in conjunction with infrastructure projects to receive treated surface water from the COH East Water Purification Plant (EWPP). Future phases of this project are included as a recommended WMS in the 2016 RWP.

11.2.5 Infrastructure Strategies

- **BWA Brackish Groundwater:** Brazosport Water Authority (BWA) is beginning the development of their brackish groundwater and membrane treatment facility. This project continues to be a recommended WMS in the 2016 RWP.
- **BWA Plant Expansion:** BWA is engaged in the implementation of improvements to their conventional water treatment facilities which will modernize and, ultimately, increase capacity of the facility. Some of these efforts are being funded through Drinking Water State Revolving Funds (DWSRF). This project continues to be a recommended WMS in the 2016 RWP.
- **CHCRWA Transmission Line:** CHCRWA has participated with NHCRWA in developing transmission infrastructure to receive water from the NEWPP and has implemented the first phase of these efforts. This project utilized WIF from TWDB to facilitate project implementation. Future phases of this project are included as a recommended WMS in the 2016 RWP.
- **CHCRWA Internal Distribution:** CHCRWA has worked to implement internal distribution for surface water as part of its GRP. This project utilized WIF from TWDB to facilitate project implementation. Future phases of this project are included as a recommended WMS in the 2016 RWP.
- **COH Distribution Expansion:** COH has continued a process of expanding distribution infrastructure throughout its service area. In addition to use for distribution to its retail customers, the infrastructure also serves as transmission to major wholesale customers throughout the region. Future phases of this project are included as a recommended WMS in the 2016 RWP.
- **COH Treatment Expansion:** Since the development of the 2011 RWP, COH has completed the expansion of the EWPP to 350 MGD and the SEWPP to 200 MGD. These facilities, in conjunction with the NEWPP, will be critical components to regional water supplies throughout the planning horizon. Future phases of these projects are included as a recommended WMS in the 2016 RWP.
- **Harris County MUD 50 WTP:** Harris County MUD 50 implemented the development of their surface water treatment plant to facilitate their GRP. This project was funded in part through the DWSRF and WDF programs
- **Huntsville WTP:** Huntsville in conjunction with the Trinity River Authority (TRA) Huntsville Regional Water Supply System completed construction of their second water treatment plant to provide water to Huntsville and surrounding contract customers.
- **LLWSSSC Surface Water Project:** Lake Livingston Water Supply and Sewer Service Company (LLWS) completed the development of two water treatment plants adjoining Lake Livingston

to provide an alternative source of supply from groundwater in the area. This program was funded through DWSRF finds form TWDB.

- **Luce Bayou Transfer:** The Coastal Water Authority (CWA) has completed planning and permitting efforts for the development of the some 27-mile conveyance from the Trinity River at Capers Ridge to Lake Houston. These efforts were assisted through the TWDB WIF program. This project continues to be a recommended WMS in the 2016 RWP.
- **NFBWA Internal Distribution:** NFBWA has worked to implement internal distribution for surface water as part of its GRP. Future phases of this project are included as a recommended WMS in the 2016 RWP.
- **NFBWA Shared Transmission Line:** NFBWA is participating with WHCRWA in developing transmission infrastructure to receive water from the NEWPP. This project is included as a recommended WMS in the 2016 RWP.
- **NHCRWA Internal Distribution:** NHCRWA has worked to implement internal distribution for surface water as part of its GRP. Future phases of this project are included as a recommended WMS in the 2016 RWP.
- **NHCRWA Transmission:** NHCRWA has participated with CHCRWA in developing transmission infrastructure to receive water from the NEWPP and has implemented the first phase of these efforts. Future phases of this project are included as a recommended WMS in the 2016 RWP.
- **WHCRWA Internal Distribution:** WHCRWA has worked to implement internal distribution for surface water as part of its GRP. Future phases of this project are included as a recommended WMS in the 2016 RWP.
- **WHCRWA Transmission Line:** WHCRWA is participating with NFBWA in developing transmission infrastructure to receive water from the NEWPP. Funding is being provided for this project through the WIF program. This project is included as a recommended WMS in the 2016 RWP.

11.2.6 Reservoir Strategies

- **Allens Creek Reservoir:** As managing partner for the project, the Brazos River Authority (BRA) is pursuing investigations into the development of Allens Creek Reservoir. This project is included as a recommended WMS in the 2016 RWP.
- **Dow Off-Channel Reservoir and Pump Station Expansion:** Dow Chemical has purchased the property required for the development of the reservoir expansion and is proceeding with permitting and design of the pump station and impoundment. This project is included as a recommended WMS in the 2016 RWP.

11.2.7 Reuse Strategies

- **Houston Indirect Reuse:** Houston currently uses a portion of its Water Right 5827 at Lake Houston for diversions to the NEWPP and the West Canal. Region H explored alternatives for use of these water supplies in the 2016 RWP and this project is included as a recommended WMS in the 2016 RWP.
- **GCWA Reclaimed Water from COH:** GCWA has pursued the purchase of effluent from COH as a primary alternative for future water supply. Pending a favorable outcome from this process, the project may proceed to advanced stages and implementation. This project is included as a recommended WMS in the 2016 RWP.

- **Wastewater Reclamation for Municipal Irrigation:** It is assumed that wastewater reuse for municipal use has been implemented in Region H since the development of the 2011 RWP. These projects continue to be a recommended WMS in the 2016 RWP.

11.2.8 Permit Strategies

- **BRA System Operations Permit:** The BRA System Operation Permit has been referred to the State Office of Administrative Hearings (SOAH) for consideration. Currently, the permit is awaiting approval in order for BRA to make use of the water available form enhanced operation of the comprehensive system. This project is included as a recommended WMS in the 2016 RWP.
- **Houston Bayous Permit:** This permit has been granted as Water Right 5826 for diversion from Sims, Brays, Whiteoak, and Buffalo Bayous and provides a small amount of firm supply in the 2016 RWP.

11.2.9 Other Strategies

- **Brazoria County Interruptible Supplies for Irrigation:** It is assumed that irrigators in Brazoria County take advantage of interruptible water supplies when available. Studies by Region H demonstrate a large portion of the agricultural water supply in the lower Brazos River Basin is subject to hydrologic impacts during the drought of record but may be available in most years. Although interruptible supplies remain an important resource for farmers, their nature as being non-drought-tolerant make them ineligible for inclusion as a recommended WMS in the 2016 RWP.
- **Brazos Saltwater Barrier:** The Brazos saltwater barrier is currently under further study by Dow Chemical as a potential option for enhancing the useful yield of surface water supplies in the lower end of the Brazos River. This project is included as a recommended WMS in the 2016 RWP.

11.3 COMPARISON TO PREVIOUS REGIONAL WATER PLAN

Each round of regional water planning produces a number of changes through the way in which demands, supplies, and strategies are represented. Some of these adjustments are brought about by updated information where others may be driven by shifts in water availability, regulation, or approach by water providers.

11.3.1 Water Demand Projections

Region H conducted a number of in-depth investigations into the development of population and non-population water demand projections during the development of the 2016 RWP. Committees were formed to provide input related to both categories of demands prior to approval by the RHWPG.

Non-population demands in Region H were extensively examined with particular attention paid to irrigation, manufacturing, and steam electric power demands. Irrigation demands in the region have fallen off rapidly in recent decades due to reduction in acreage dedicated to rice production. This review represented the first large-scale adjustment of irrigation water demands since the beginning of the regional planning process. Manufacturing is a substantial demand category in Region H and the committee spent great effort to review and verify the demands identified in Brazoria County. As mining demands have increased considerably across the state due to oil and gas development, the RHWPG carefully considered the potential increase in counties with anticipated hydraulic fracturing activity. At the same time, historical estimates in Chambers County mining demand were found to inflate actual regional mining demands. Steam electric demands were updated through a TWDB study during the 2011 RWP process but were not adopted by Region H for that plan. For the 2016 RWP, the RHWPG examined these demands more closely and developed a modified version of the demands presented in the TWDB study for use in planning.

Figures comparing 2011 RWP and 2016 RWP values for irrigation, livestock, manufacturing, mining, and steam electric power are shown below in *Figure 11-1* through *Figure 11-5*.

Figure 11-1 – Comparison of Irrigation Demand Projections

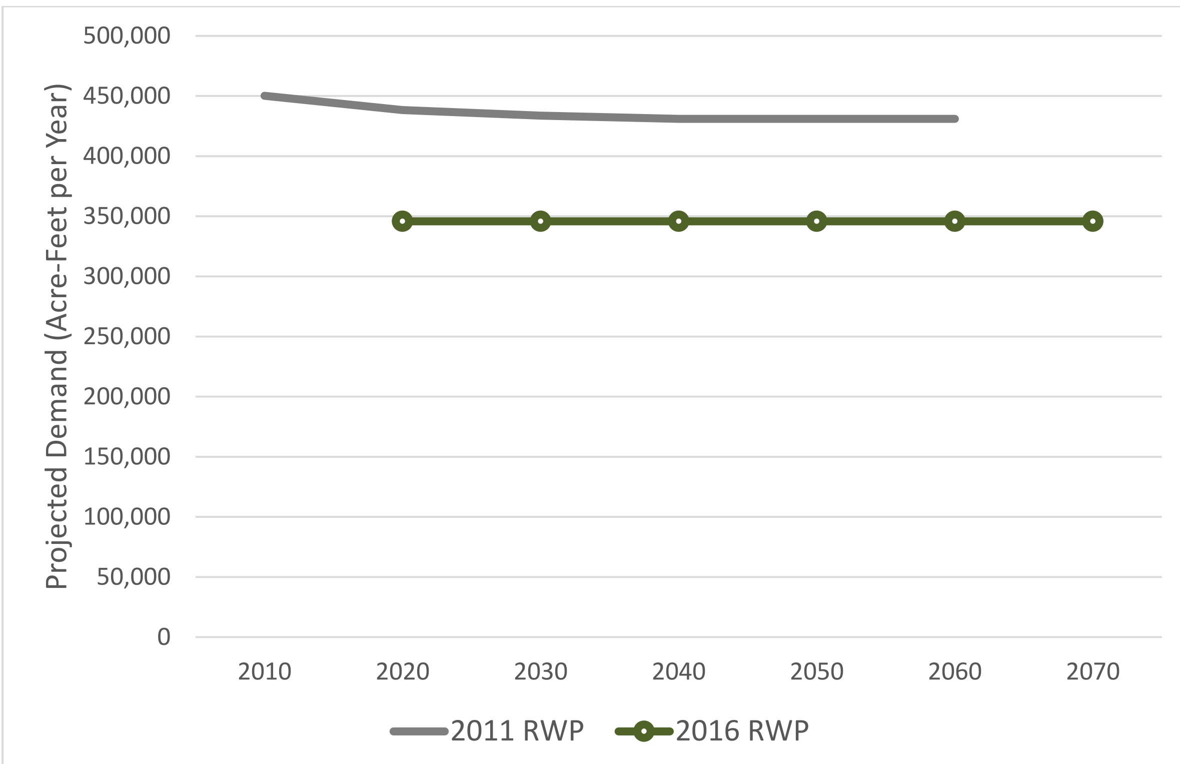


Figure 11-2 – Comparison of Livestock Demand Projections

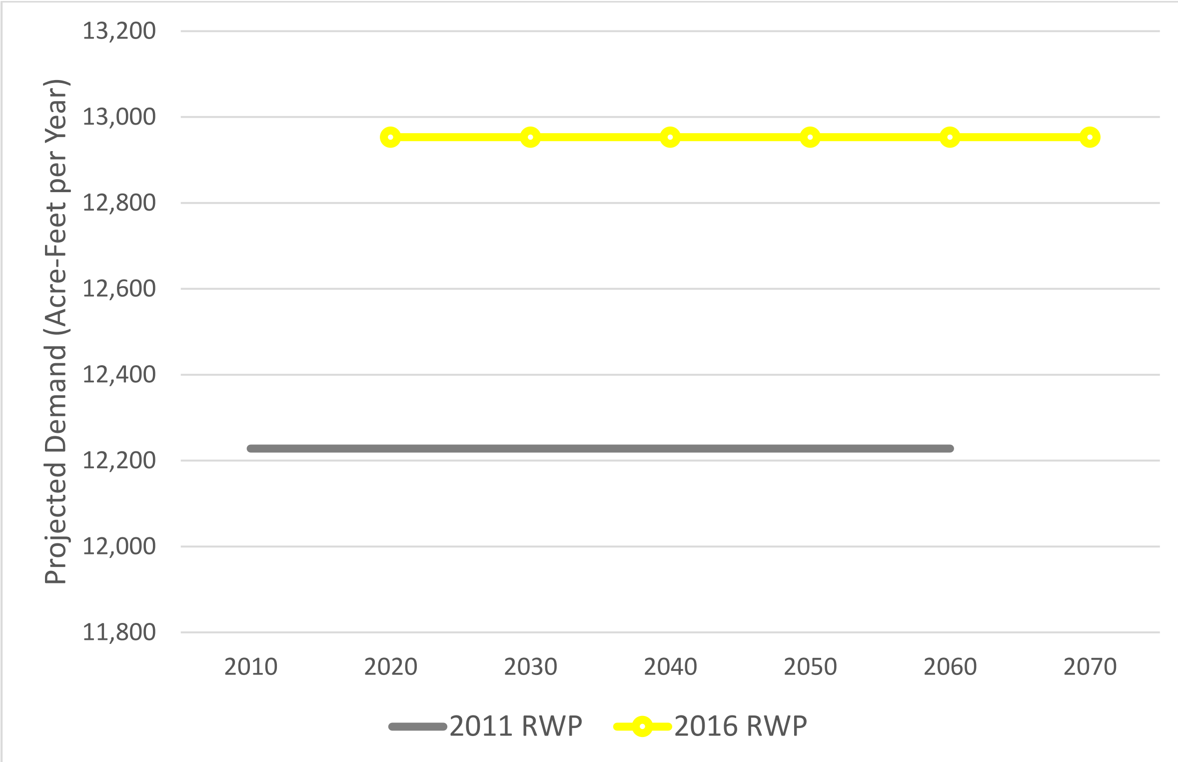


Figure 11-3 – Comparison of Manufacturing Demand Projections

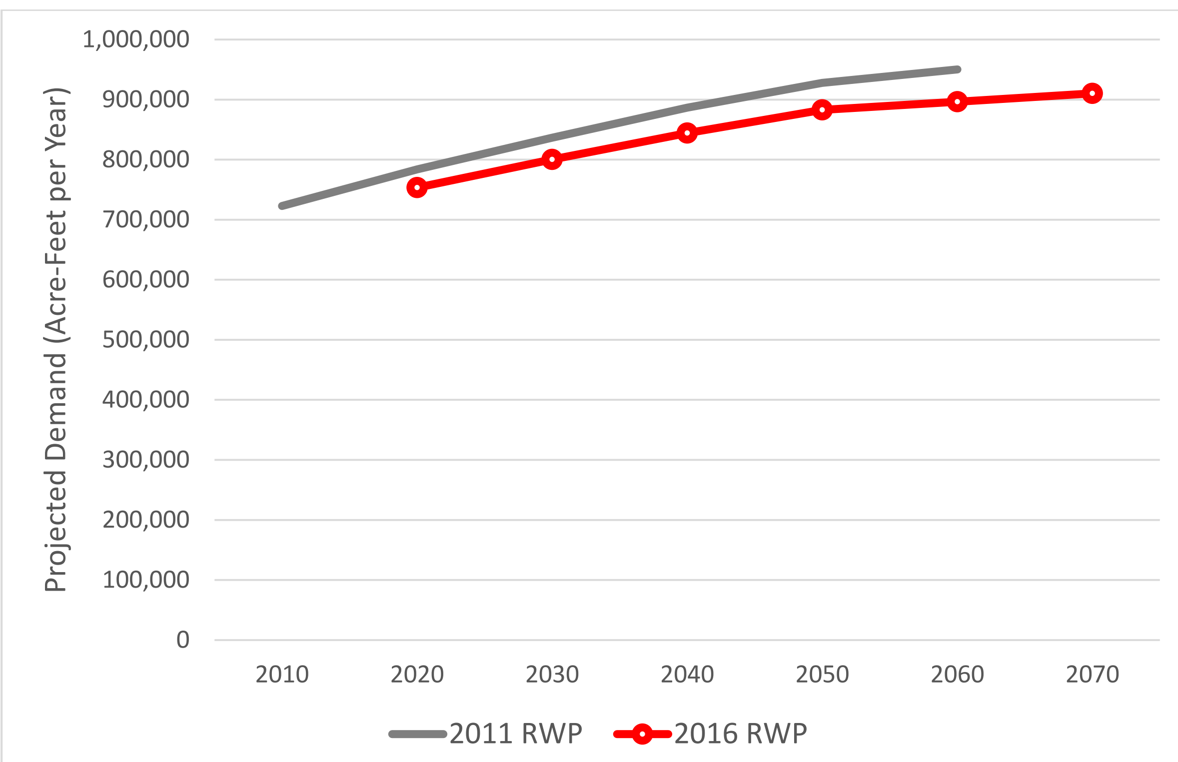


Figure 11-4 – Comparison of Mining Demand Projections

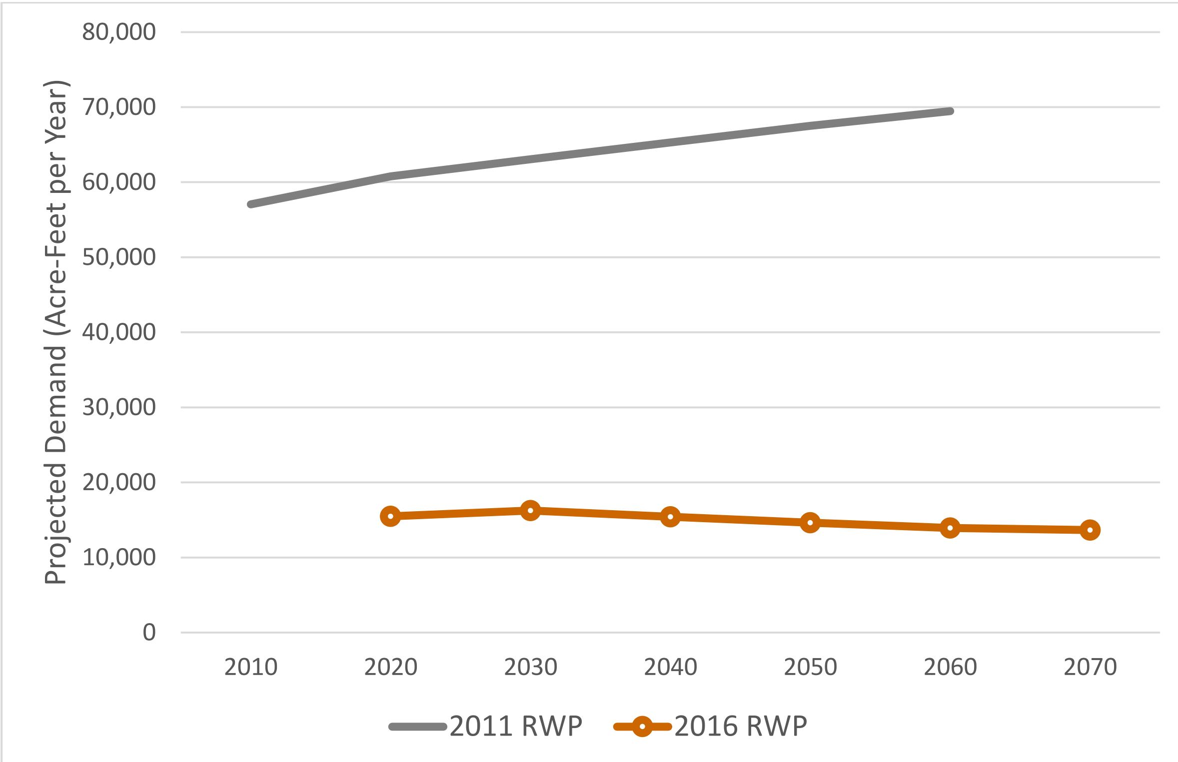
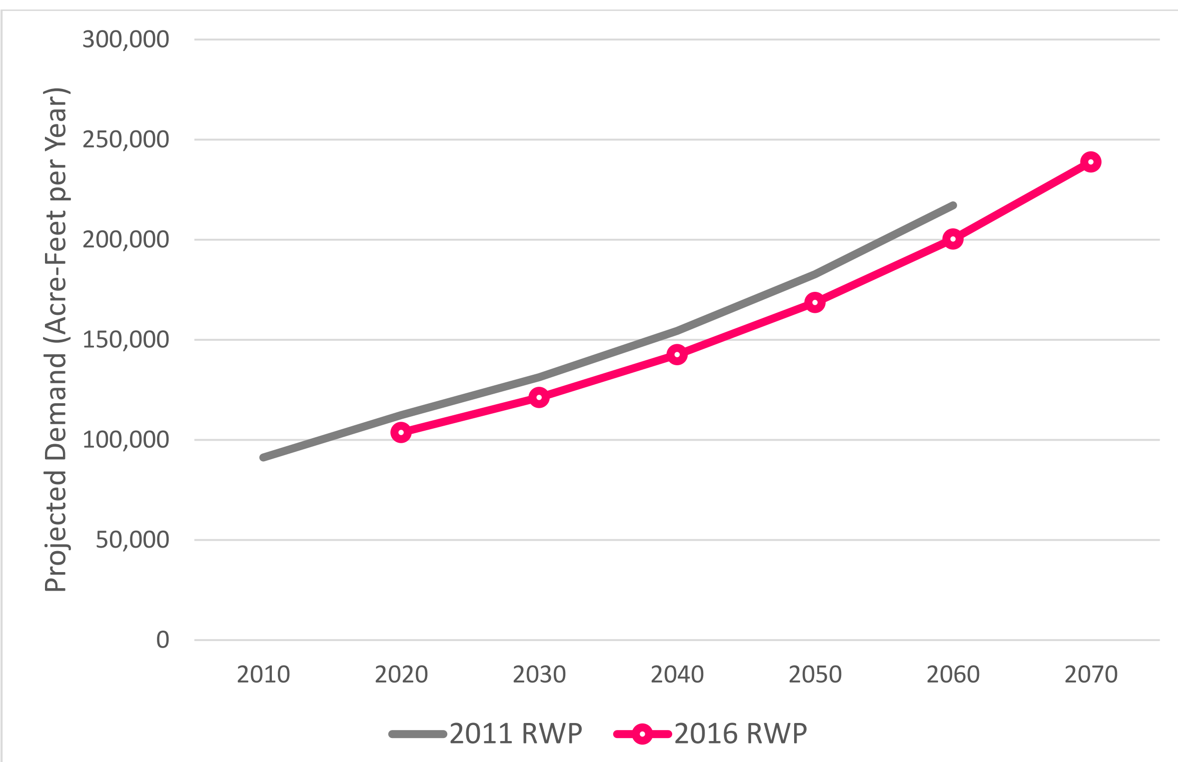
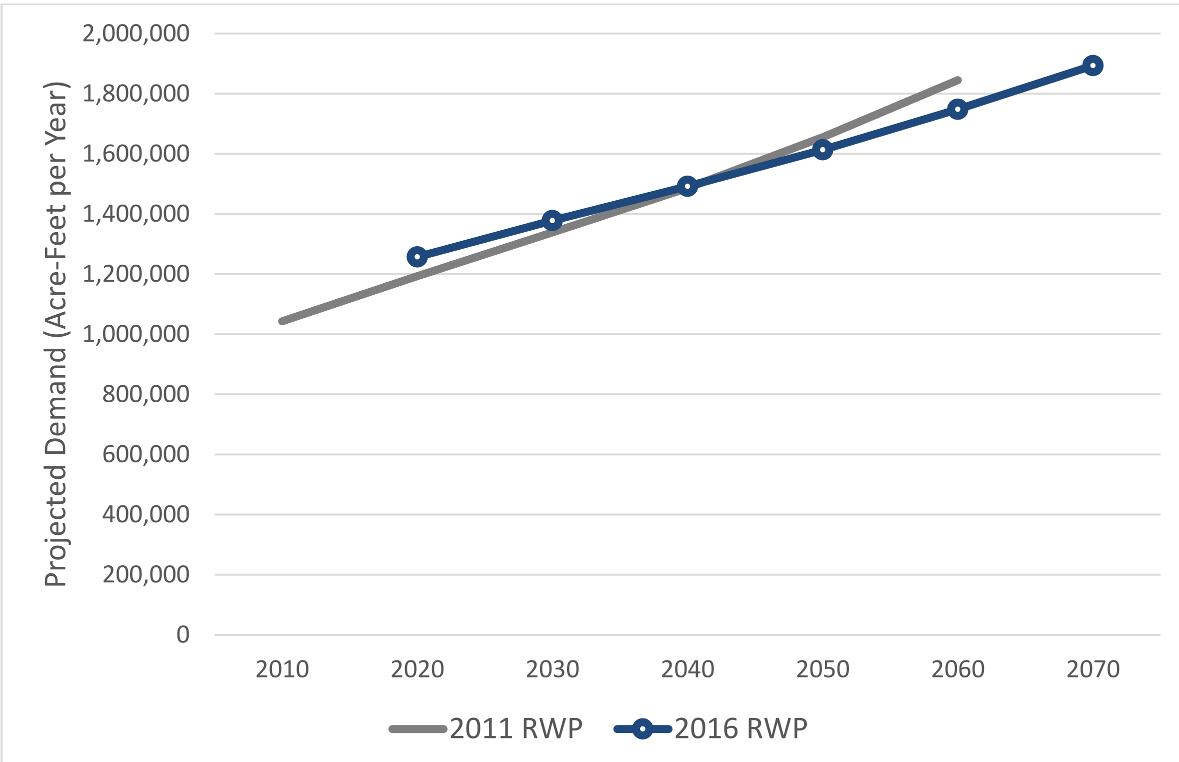


Figure 11-5 – Comparison of Steam Electric Power Demand Projections



Population demands were examined to a high degree in conjunction with a concurrent study being conducted by HGSD, FBSD, and LSGCD to evaluate regional groundwater availability and management. A major component of this study involved detailed population projections for the area in order to project the spatial extent of potential future groundwater pumpage. This effort was conducted by Freese and Nichols, Inc. in cooperation with Metrostudy and the University of Houston Center for Public Policy. The resulting population projections from this study were combined with TWDB-prepared estimates of per capita demand and passive conservation savings to produce the resulting population water demands for Region H. These results are shown below in *Figure 11-6*.

Figure 11-6 – Comparison of Municipal Demand Projections



Although overall demand projections in the 2016 RWP were similar to those in the 2011 RWP, the trends in county-wide population varied for some key areas in the region. Revised 2016 projections for Fort Bend County demonstrated an increased near-term growth trend that attenuated over time. Projections for Galveston County were determined to grow well beyond those projections in the 2011 RWP. Harris County projections were found to increase at a less aggressive rate beginning around the 2030 planning decade.

11.3.2 Drought of Record, Modeling Assumptions, and Existing Source Supplies

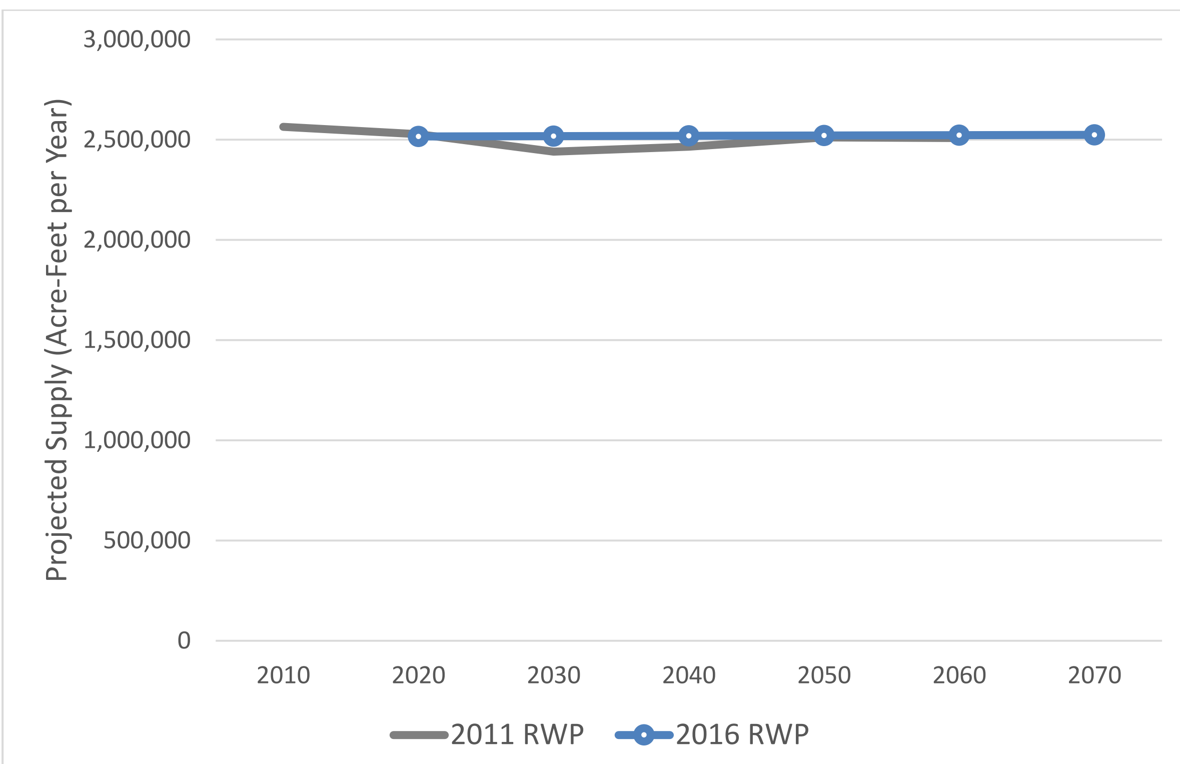
Both groundwater and surface water supplies in Region H are developed using guidelines that are either dictated by regional water planning guidance or applied at the discretion of the RHWPG. These assumptions and approaches vary between the 2011 and 2016 RWPs in a number of ways. However, there are also several similarities in the yield evaluation process that provide continuity between the two plans.

Surface water supplies in Region H are developed based on output from the Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAMs) for each basin. In addition, the following assumptions were applied in the 2011 and 2016 RWPs.

- In both the 2011 and 2016 RWPs, Region H has used the TCEQ WAM Run 3 with maximum permitted diversions and no return flows as the base model for evaluation of existing water supplies.
- In both the 2011 RWP and 2016 RWPs, Region H has elected to seek TWDB approval to modify the base Run 3 WAMs to include limited return flows. In the Trinity River Basin, this includes the confirmed wastewater flows from the Dallas-Fort Worth Metroplex after the application of reuse WMS. Region H also uses a modified WAM developed by the Brazos G RWPG that includes some limited return flows.
- The RHWPG has historically used the drought of the 1950s as a representation of drought of record conditions for all basins in the region. This assumption continues in the 2016 RWP.
- There are several contractual arrangements in excess of the provisions of issued water rights. These agreements allow for the use of storage to enhance yields of various rights. In development of surface water supplies for the 2011 RWP, these agreements were put in place and provided benefit to water yields. In the 2016 RWP, these provisions were not considered and raw results from the Run 3 models were used with the exception of other provisions described in this section.

Identified surface water supplies in the 2011 and 2016 RWPs are compared in *Figure 11-7*.

Figure 11-7 – Comparison of Surface Water Supply Projections

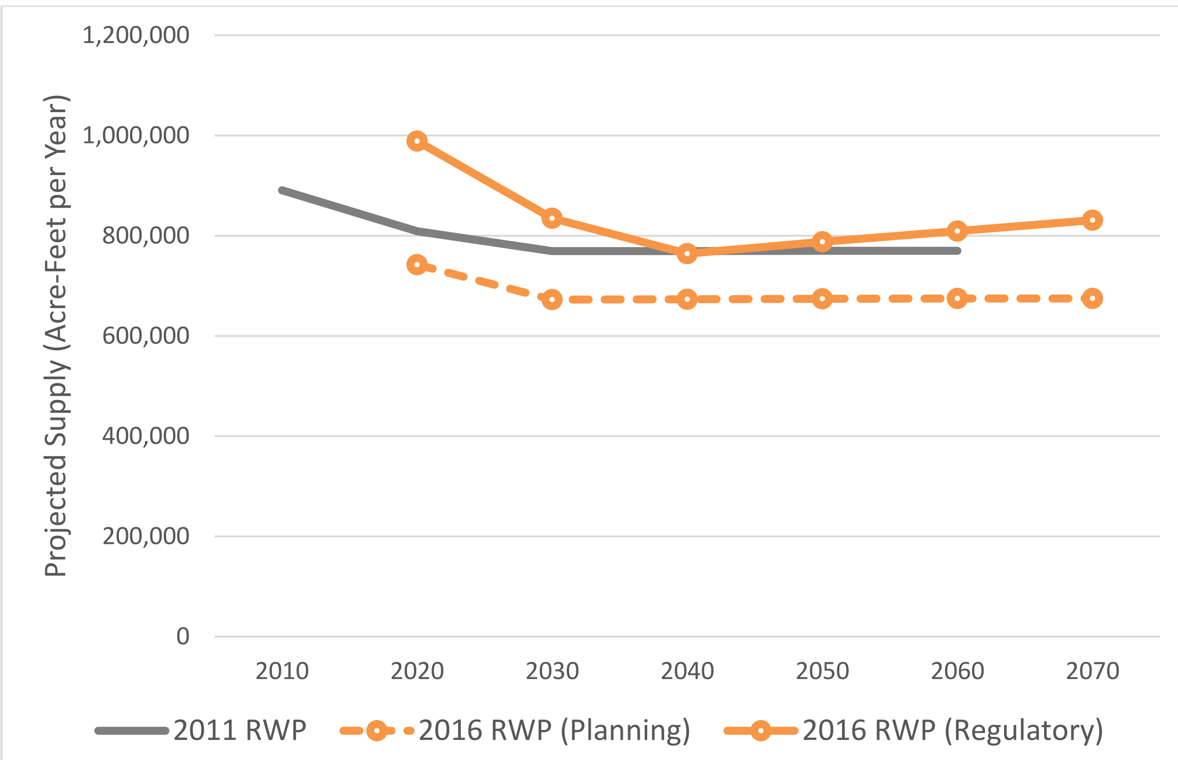


The process for determining groundwater availability in the 2016 RWP has changed radically from the development of the 2011 RWP. In the 2011 RWP, groundwater availability values were set based on local regulation in each county and the allowable groundwater pumpage for all WUGs receiving surface water. In the development of the 2016 RWPs, TWDB mandated that, where applicable, groundwater availability would be set as the Modeled Available Groundwater (MAG) for each formation included in the Groundwater Management Area (GMA) process.

This approach to groundwater availability has led to some issue in the application of available water supplies to Water User Groups (WUGs) and may unrealistically limit the availability of groundwater for some users. This concern has been documented in ***Chapter 3*** of the 2016 RWP.

Identified groundwater supplies in the 2011 and 2016 RWPs are compared in *Figure 11-8*. The figure includes both the regulatory groundwater availability that is appropriate to conditions in Region H as well as the required availability based on the MAG estimates.

Figure 11-8 – Comparison of Groundwater Supply Projections



Reuse supplies in both the 2011 and 2016 RWPs were developed based on knowledge of existing projects and permits. In the 2011 RWP, the SJRA reuse permit for effluent from wastewater treatment plants (WWTPs) in The Woodlands served as the only existing reuse supply. In the 2016 RWP, supplemental information provided by TWDB identified the existence of other reuse supplies including direct reuse projects for inclusion as existing supplies in the plan.

Identified reuse supplies in the 2011 and 2016 RWPs are compared in *Figure 11-9*.

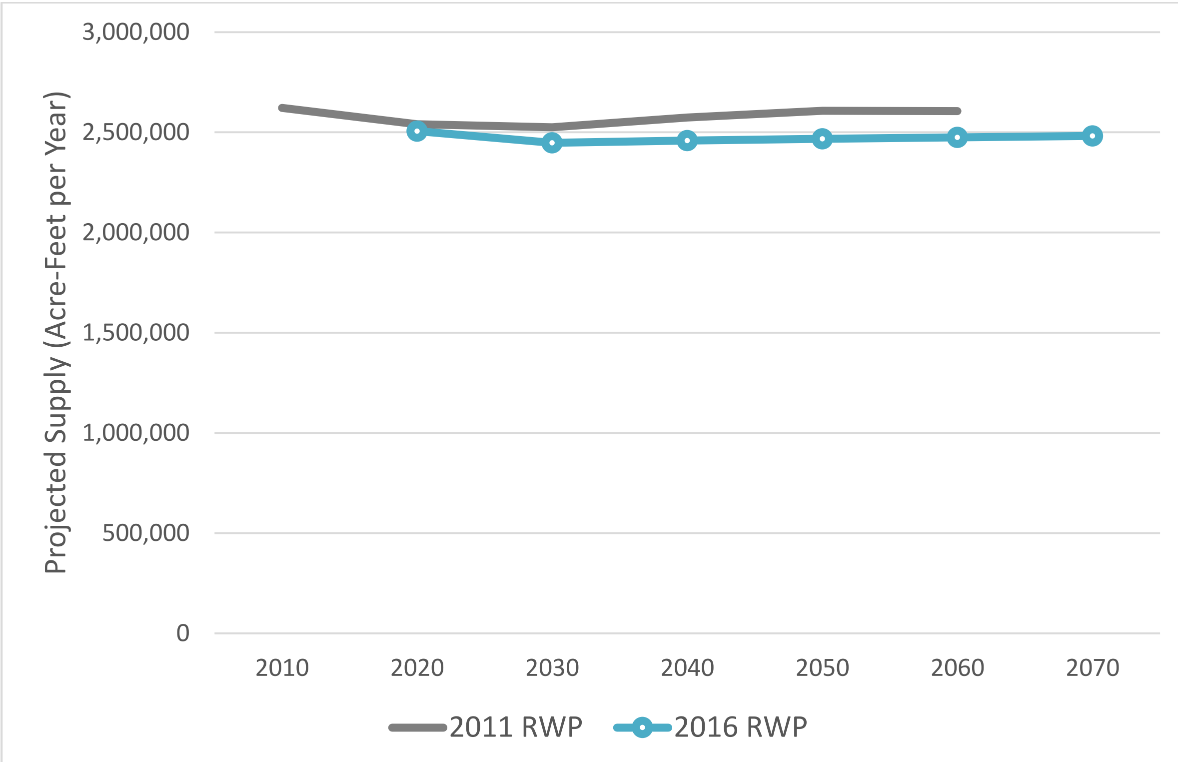
Figure 11-9 – Comparison of Reuse Supply Projections

11.3.3 WUG Supplies and Needs

In both the 2011 and 2016 RWPs, care was taken in assigning existing, available supplies based on stakeholder input and knowledge of the regional water supply. It should be noted that needs are not the mere difference between regional demand and regional supply, as water supplies are not uniformly distributed throughout the region and infrastructure is needed in the form of projects in order to make existing, developed sources of water available for end use. Effort was taken in order to realistically curtail supply availability to WUGs in order to properly demonstrate need and, eventually, the recommended management strategies to address the identified shortfall.

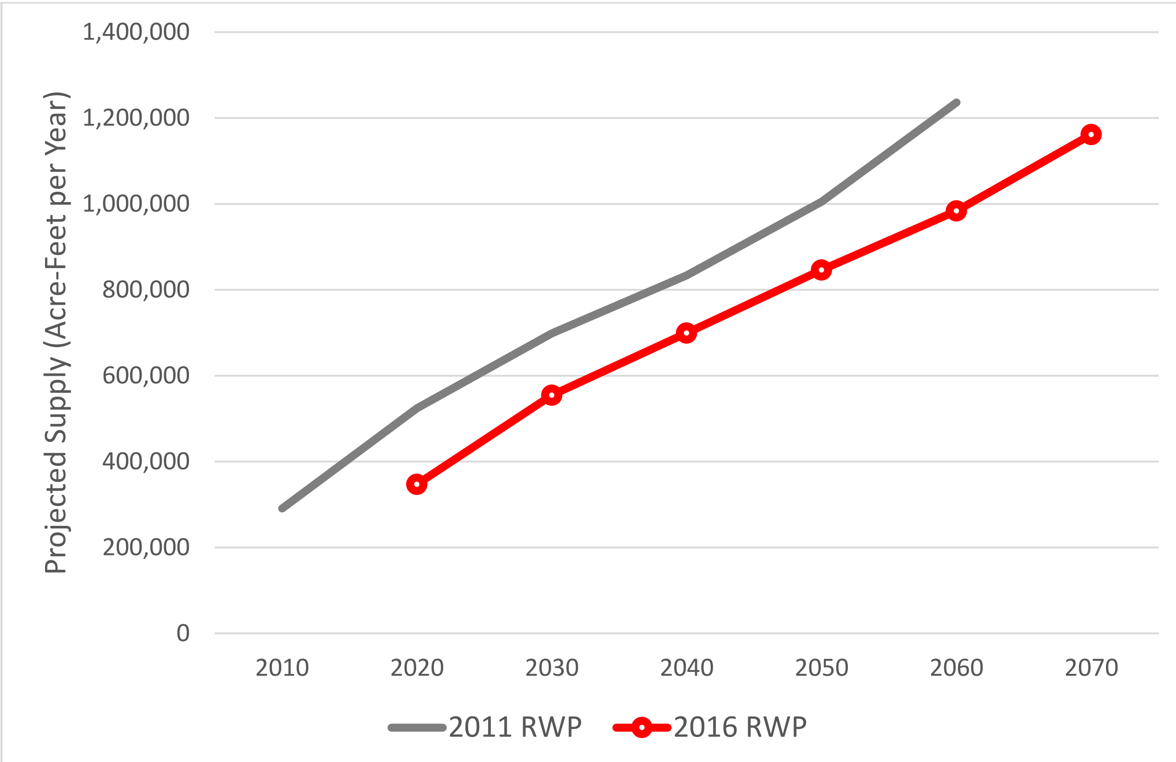
The supplies allocated to WUGs in both the 2011 and 2016 RWPs are shown in *Figure 11-10*. Note that these supplies include additional groundwater in excess of MAG availability in order to represent the regulatory availability in the region. These supplies are not contained in DB17.

Figure 11-10 – Comparison of WUG Allocations



Identified WUG needs in the 2011 and 2016 RWPs are shown in *Figure 11-11*. Note that the needs identified do not include the Regulatory Groundwater Disparity identified in ***Chapter 4*** as a side-effect of the mandated groundwater availability. Additional needs are shown in DB17 for these shortfalls.

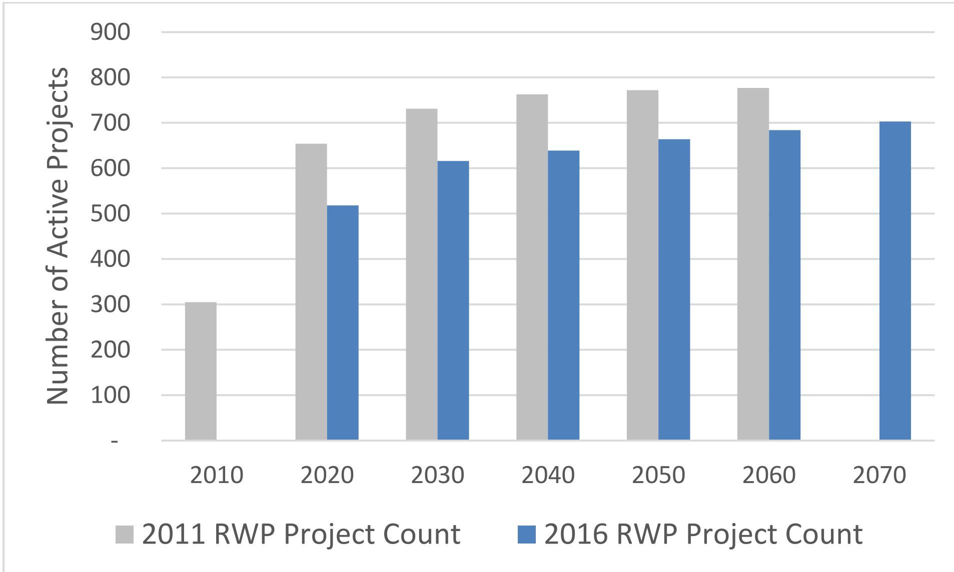
Figure 11-11 – Comparison of Identified WUG Needs



11.3.4 Recommended and Alternative Water Management Strategies

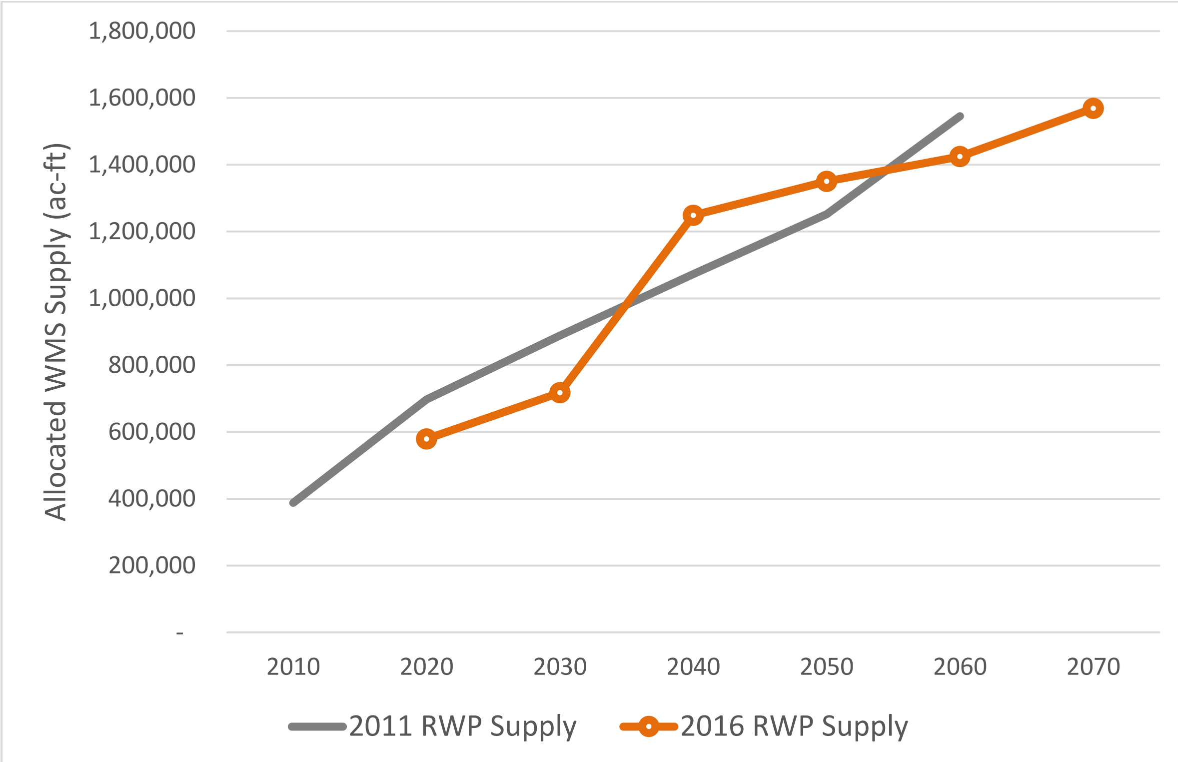
In total, the RHWPG recommended 70 WMSs and 705 projects for the 2016 RWP. This compares to 468 WMSs and 870 projects identified in the 2011 RWP. Much of the variation in WMS count is related to the way in which WMS are defined in the two RWPs. In the 2016 RWP, more strategy connections could be detailed through the use of WMSs and projects rather than the 2011 RWP structure that was built around WMSs and then, later, projects were developed from this list of WUGs and WMSs. The number of projects identified in each RWP are shown below in *Figure 11-12*.

Figure 11-12 – Comparison of Number of Active Projects



Allocations of WMS supplies in the 2016 RWP differ from those in the 2011 RWP for a number of reasons, including differences in projected WUG demands, establishment of new existing contracts between water providers and WUG customers, implementation of 2011 WMSs as existing supplies, changes in recommended WMS, and changes to associated project schedules. The WMS supply volumes allocated in each RWP are shown below in *Figure 11-13*.

Figure 11-13 – Comparison of Allocated WMS Supply Volumes



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