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Chapter 4– Identification, Evaluation and Selection of Water Management Strategies Based on Needs

4.1 Introduction

This chapter describes the analysis required within 31 TAC 357.7 (a) (4-7) regarding the identification of water user groups with needs and identification, evaluation and selection of appropriate water management strategies for the Region H water planning area. Water management strategies have been defined for each of the identified future water shortages within Region H as required by the regional water planning process. Included within this report are:

- Review of the projected water shortages.
- Description of the potentially available water management strategies.
- Definition of the recommended management strategies.
- Allocation of selected strategies to specific Wholesale Water Providers (WWPs) and Water User Groups (WUGs).

In addition to the above, this report contains a description of socioeconomic impacts of not meeting the identified needs.

4.2 Identification of Needs

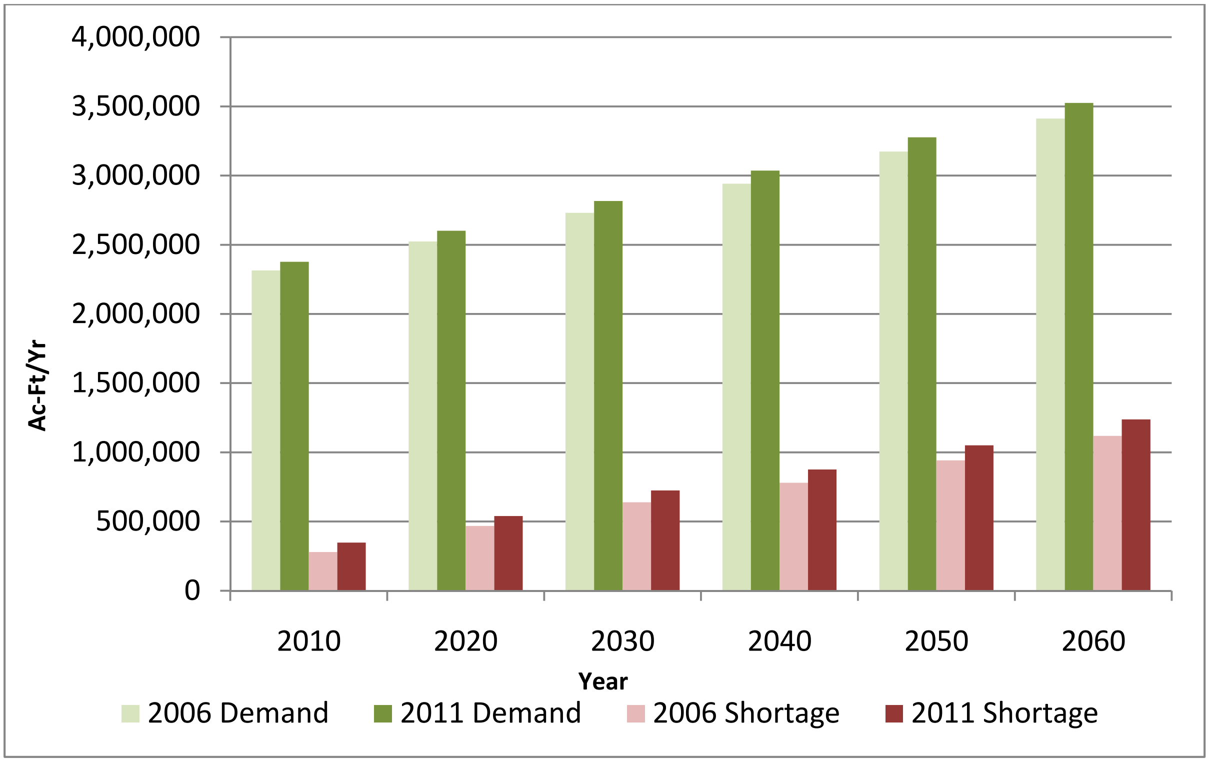
In Chapter 2, water demands were identified for all WUGs. In Chapter 3, water supplies available to Region H were identified and allocated to WUGs and WWPs based on current usage and contracts. By matching the supplies and the demands, projected surpluses and shortages were determined. Table 4A-1 in Appendix 4A lists all WUGs within Region H and their respective surplus or shortage. Projected shortages are referred to as needs. Needs by WWP are shown in *Table 4A-2*.

Total water demands in Region H were 2,087,409 acre-feet per year in the year 2000, and are projected to increase to 3,524,666 acre-feet per year in year 2060. Total current water supplies available to the region were estimated to be 3,556,538 acre-feet per year. Total supply in the year 2060 is expected to be 3,411,210 acre-feet per year. This decline in available supplies is attributable to reservoir sedimentation and limits on groundwater pumping enacted by subsidence districts.

It is estimated that Region H's population will grow from 6,020,078 in the year 2010 to 11,346,082 in the year 2060. This is roughly a four percent increase in population projections over the 2006 RWP. Municipal water demand projections show a projected demand of 1,042,864 acre-feet per year demand in 2010, increasing to a demand of 1,844,817 acre-feet per year in 2060. This represents an approximately 6-7 percent increase over the 2006 RWP. Manufacturing, Irrigation, Steam Electric Power Generation, Mining, and Livestock and livestock demands used in the 2006 RWP were retained in the 2011 RWP.

The sum of the projected shortages in *Table 4-1* is 290,890 acre-feet per year in the year 2010, increasing to 1,236,335 acre-feet per year in the year 2060. The 2011 RWP year 2060 shortage is greater than the projected shortage of 1,069,469 acre-feet per year addressed in the 2006 Region H Plan, as shown in *Figure 4-1*.

Figure 4-1
Comparison of Demands and Shortages: 2006 and 2011 RWPs



Initial shortages were present for all counties in the Region. Water shortages are projected for 337 WUGs (see *Table 4-1*). The projected shortages are predominantly in Brazoria, Fort Bend, Harris and Montgomery Counties, where the majority of the WUGs are located and current groundwater supplies from the Gulf Coast aquifer will be limited due to regulations imposed by subsidence and groundwater conservation districts.

Table 4-1
Projected Shortages by County and Category (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Austin						
MUN	0	-711	-1,189	-1,423	-1,543	-1,746
IRR	0	0	0	0	0	0
MFR	0	-23	-43	-62	-78	-103
MIN	0	-5	-8	-11	-14	-16
TOTAL	0	-739	-1,240	-1,496	-1,635	-1,865

Brazoria	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
MUN	-8,684	-12,338	-17,752	-23,288	-29,741	-36,768
IRR	-103,287	-91,897	-87,474	-84,831	-84,831	-84,831
MFR	-38,936	-81,734	-105,382	-129,211	-150,343	-175,892
MIN	0	-791	-1,026	-1,258	-1,490	-1,708
TOTAL	-150,907	-186,760	-211,634	-238,588	-266,405	-299,199
Chambers						
MUN	-1,495	-1,896	-2,258	-2,572	-2,908	-3,260
IRR	-27,053	-27,277	-27,411	-27,534	-27,652	-27,753
MFR	-8,264	-9,421	-10,449	-11,473	-12,394	-13,584
MIN	-5,708	-8,818	-10,713	-12,672	-14,658	-16,468
PWR	0	0	0	0	0	0
TOTAL	-42,520	-47,412	-50,831	-54,251	-57,612	-61,065
Fort Bend						
MUN	-86	-10,283	-48,273	-79,803	-118,879	-166,097
IRR	0	0	0	0	0	0
MFR	0	-771	-3,080	-3,297	-3,441	-3,029
MIN	0	-356	-1,255	-1,280	-1,303	-1,322
PWR	0	0	0	0	0	-8,500
TOTAL	-86	-11,410	-52,608	-84,380	-123,623	-178,948
Galveston						
MUN	-4,279	-5,435	-6,054	-6,171	-6,301	-6,458
IRR	-9,194	-9,204	-9,220	-9,220	-9,220	-9,219
MFR	0	0	0	0	0	0
MIN	-31	-45	-52	-59	-66	-73
PWR	-2,803	-1,782	-2,461	-3,288	-4,297	-5,526
TOTAL	-16,307	-16,466	-17,787	-18,738	-19,884	-21,276
Harris						
MUN	-23,375	-147,451	-210,034	-250,767	-290,634	-369,173
IRR	0	0	0	0	0	0
MFR	-27,495	-37,630	-46,275	-53,917	-59,635	-56,766
MIN	-143	-295	-390	-485	-581	-666
PWR	-400	-9,549	-13,602	-18,542	-24,564	-31,904
TOTAL	-51,413	-194,925	-270,301	-323,711	-375,414	-458,509
Leon						
MUN	0	-248	-361	-328	-286	-309
IRR	0	0	0	0	0	0
MFR	0	-128	-253	-379	-493	-599
MIN	0	0	0	0	0	0
TOTAL	0	-376	-614	-707	-779	-908

Liberty	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
MUN	0	-1,281	-2,494	-3,719	-5,127	-6,847
IRR	-11,846	-12,444	-13,930	-15,555	-17,478	-19,640
MFR	0	-72	-144	-218	-285	-343
MIN	0	-67	-124	-178	-237	-300
PWR	0	-1,278	-1,995	-2,869	-3,934	-5,233
TOTAL	-11,846	-15,142	-18,687	-22,539	-27,061	-32,363
Madison						
MUN	-1	-101	-172	-156	-216	-312
IRR	0	0	0	0	0	0
MFR	0	-29	-56	-83	-107	-138
MIN	0	0	0	0	0	0
TOTAL	-1	-130	-228	-239	-323	-450
Montgomery						
MUN	-17,149	-46,415	-67,850	-79,236	-115,706	-157,424
IRR	0	0	0	0	0	0
MFR	-469	-988	-1,384	-1,756	-2,129	-2,504
MIN	-110	-216	-279	-331	-382	-425
PWR	0	0	0	-27	-2,181	-4,809
TOTAL	-17,728	-47,619	-69,513	-81,350	-120,398	-165,162
Polk						
MUN	0	-115	-202	-268	-379	-507
IRR	0	0	0	0	0	0
MIN	0	-2	-3	-4	-5	-6
TOTAL	0	-117	-205	-272	-384	-513
San Jacinto						
MUN	0	-296	-525	-683	-778	-849
IRR	0	0	0	0	0	0
MFR	0	-4	-8	-12	-15	-20
MIN	0	0	0	0	0	0
TOTAL	0	-300	-533	-695	-793	-869
Trinity						
MUN	0	0	0	0	0	0
IRR	0	0	0	0	0	0
MIN	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0
Walker						
MUN	0	-96	-155	-196	-230	-282
IRR	0	0	0	0	0	0
MFR	0	-719	-1,500	-1,777	-2,154	-2,571
MIN	0	0	0	0	0	0
TOTAL	0	-815	-1,655	-1,973	-2,384	-2,853

Waller	2010	2020	2030	2040	2050	2060
MUN	-82	-1,440	-2,917	-4,532	-6,541	-8,902
IRR	0	-474	0	-13	-1,592	-3,398
MFR	0	-12	-23	-34	-44	-55
MIN	0	0	0	0	0	0
TOTAL	-82	-1,926	-2,940	-4,579	-8,177	-12,355

Region H Total						
MUN	-55,151	-228,106	-360,236	-453,142	-579,269	-758,934
IRR	-151,380	-141,296	-138,035	-137,153	-140,773	-144,841
MFR	-75,164	-131,531	-168,597	-202,219	-231,118	-255,604
MIN	-5,992	-10,595	-13,850	-16,278	-18,736	-20,984
PWR	-3,203	-12,609	-18,058	-24,726	-34,976	-55,972
TOTAL	-290,890	-524,137	-698,776	-833,518	-1,004,872	-1,236,335

4.3 Potential Water Management Strategies

Potentially feasible water management strategies (WMS) were identified in three ways. First, strategies recommended in the 2006 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 2011 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.

4.3.1 Studies by the RHWPG and Others

Potential water management strategies were defined based on the above determination of needs. Strategies were updated and configured to address the specific types and nature of identified shortages. The following potential management strategies were identified:

Conservation Strategies:

- Industrial Conservation
- Irrigation Conservation
- Municipal Conservation

Contractual Strategies:

- Expand/Increase Current Contracts (see WUG-Level Contracts)
- New Contracts from Existing Supplies (see WUG-Level Contracts)
- Reallocation of Existing Supplies (see WUG-Level Contracts)
- TRA to SJRA Contract
- TRA to Houston Contract
- WUG-Level Contracts

- WWP Contracts

Groundwater Strategies

- Expanded Use of Groundwater
- Interim Strategies
- New Groundwater Wells for Livestock

Groundwater Reduction Plans

- CHCRWA GRP (see CHCRWA Transmission)
- City of Houston GRP (see COH Treatment Expansion)
- City of Missouri City GRP
- Fort Bend MUD 25 GRP
- Fort Bend WCID 2 GRP
- NFBWA GRP (see NFBWA Transmission)
- NHCRWA GRP (see NHCRWA Transmission)
- Pecan Grove GRP
- Richmond/Rosenberg GRP
- River Plantation GRP
- SJRA WRAP
- Sugar Land GRP
- WHCRWA GRP (see WHCRWA Transmission)

Reservoir Strategies:

- Allens Creek Reservoir
- Brazoria County Off-Channel Reservoir
- Dow Off-Channel Reservoir
- Fort Bend County Off-Channel Reservoir
- GCWA Off-channel Reservoir
- Millican Reservoir
- Little River Off-Channel Reservoir
- Other Potential Reservoirs

Reuse Strategies:

- Fulshear Reuse
- Houston Indirect Reuse
- Montgomery County MUD 8/9 Indirect Reuse

- NHCRWA Indirect Reuse
- Wastewater Reuse for Industry
- Wastewater Reclamation for Municipal Irrigation

Permit Strategies

- Brazos River Authority System Operations Permit
- Houston Bayous Permit

Other Strategies

- Brazoria County Interruptible Supplies for Irrigation
- Brazos Saltwater Barrier
- Freeport Desalination
- Montgomery County MUD 8/9 Brackish Water Desalination
- Sabine to Region H Transfer

Infrastructure Strategies

- CHCRWA Transmission Line
- CHCRWA Internal Distribution (see CHCRWA Transmission Line)
- CLCND West Chambers System
- COH Distribution Expansion (see COH Treatment Expansion)
- COH Treatment Expansion
- Huntsville WTP
- Harris County MUD 50 WTP
- LLWSSSC Surface Water Project
- Luce Bayou Transfer
- NFBWA Internal Distribution (see NFBWA Transmission Line)
- NFBWA Shared Transmission
- NHCRWA Internal Distribution (see NHCRWA Transmission Line)
- NHCRWA Transmission Line
- Pearland SWTP
- Sealy Groundwater Treatment Expansion
- WHCRWA Internal Distribution (see WHCRWA Transmission Line)
- WHCRWA Transmission Line

For each of these management strategies a detailed technical memorandum is provided in Appendix 4B. Not all of the strategies evaluated are based on developing additional water. Several strategies consist of water transfer facilities only (e.g., Luce Bayou, Authority Transmission strategies), or allow for lower treatment costs (Brazos Saltwater Barrier). 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 / City of Houston water transfers). 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.

No groundwater transport strategies from remote areas were investigated since there is projected to be full utilization of the regulated or sustainable yield of all of the aquifers within the counties of highest water demand. The Region H Water Planning Group has elected to not consider strategies that move groundwater out of the county of origin.

The technical memorandum reviewing potential surface water reservoir projects was updated and is included in Appendix 4B. Separate, more detailed technical memoranda are included for Allens Creek Reservoir; GCWA,,Brazoria County, Dow, and Fort Bend County Off-Channel Reservoirs; and Millican (Panther Creek Dam) Reservoir.

The Brazos River Authority submitted a water right application in 2004 for additional yield gained through System Operations. The technical study in support of the application determined that additional firm yield could be realized from the BRA system when their reservoirs are operated as a system instead of as separate sources. The additional yield comes from a combination of reservoir capacity not recognized in the existing permits, efficiencies realized when operated as a system, and the ability to use unreliable river flows, when available, to meet demands and thus increase the amount of stored water for drought periods.

Governor Perry directed the TWDB in 2002 to develop a seawater desalination demonstration project. The TWDB selected three potential sites, in the Lower Rio Grande Valley – Brownsville, Corpus Christi and Freeport, this last being within Region H. The Freeport study recommends a 10-mgd demonstration facility be constructed, with the potential for future expansions up to 30-mgd. Similarly to the 2006 RWP, the Freeport Desalination Project was selected as a water management strategy in the 2011 RWP. Finally, the Brazos G Water Planning Group has studied several reservoirs in the middle and upper Brazos River Basin, and has modeled these sites using the Watershed Availability Model.

The technical memoranda reviewing potential water management strategies are included in Appendix 4B. Assessment of each of the potential management strategies conducted as a part of this study included an evaluation of cost, environmental impacts, impacts on other water resources, and additional factors as applicable. Discussions of necessary implementation activities associated with various strategies are also included in the technical memoranda. In order to assess the strategies on a comparable cost basis, a detailed set of unit costs was developed and applied to each alternative. A description of the costing methodology is contained within Appendix 4C.

4.3.2 Need for Interbasin Transfers

As can be seen by reviewing the current water supplies and potential water management strategies, Region H is highly dependent upon the interbasin transfer of water. Water is currently imported from Lake Livingston and the Trinity River to meet demands in Harris County, and from the Brazos River to meet demands in Galveston County. Future strategies recommend fully utilizing existing supplies in all basins, which will require transferring additional water from the Trinity Basin to the San Jacinto basin for Harris and Montgomery Counties. Most important of these in the near term is the Luce Bayou Transfer, which will move available water from the Trinity River into Lake Houston where it can be utilized by multiple entities. An additional interbasin conveyance may be required in order to facilitate the transfer of water from the Trinity Basin to SJRA customers in Montgomery County.

Under current law, amending a water right to allow the interbasin transfer of supply makes the water right junior to all other rights in the source basin, unless the water is diverted to a neighboring coastal basin. Because reliability is partially based on the seniority of a water right, this provision in the water code makes new interbasin transfers difficult to accomplish. However, water transferred from a river basin to the adjoining coastal basin is not subject to this interbasin transfer requirement. Therefore, transfers from the Brazos River to Galveston County or from the Trinity River to eastern Harris County are not at risk under this provision. However, a significant portion of the growth and demands to be met are in the San Jacinto basin. Some of the water identified to meet this demand is already permitted for interbasin transfer, including the TRA portion of Lake Livingston.

4.3.3 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.

The TCEQ requires that supplies used to meet municipal demands be firm (drought-of-record) yields, so none of the non-reliable supply may be assigned to meet future growth. It is generally more costly to transfer existing supply from the Trinity Basin than to develop new supply in-basin; therefore, the new in-basin projects with firm yields were recommended in the plan as being superior to interbasin transfers.

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. These results were developed based on information from the 2006 RWP. The results of the *Drought Management Study* are discussed in further detail in Chapter 6 of this RWP.

The shortages identified in the plan are based on future demands (based on projected growth) exceeding the firm (drought) yield of existing supplies. Except for some specific irrigation demands, the strategies recommended to meet these shortages also reflect estimated drought yields. Because Region H was able to address all projected municipal and manufacturing shortages through allocation of existing supplies, conservation, and development of new supplies, no unmet demands remain to be addressed through drought management strategies.

This does not preclude some WUG's 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.

Region H has sufficient supply available from existing sources and recommended strategies to meet near-term and long-term needs under projected drought of record conditions. In the counties with greatest projected demands, the groundwater use from the Gulf Coast aquifer is limited through Subsidence District regulations and not by aquifer productivity. While conjunctive use of the aquifer is not the recommended drought response, it remains as a short-term safety net while new surface supplies are developed.

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.

In the presence of emergency conditions, emergency transfers of surface water are granted by the Texas Commission on Environmental Quality during periods where an imminent threat to public health and safety exist, including multi-year droughts, spikes in demands, or failure of water supply systems where demands are unable to be met by available resources. Emergency transfers of water, however, are only granted on an interim basis not lasting more than 180 days, and are not a reliable source of additional supplies to meet increased demands. Emergency transfers should only be considered as temporary, and just as they will not provide new long term sources of water, they will not affect water-right holders over long term periods. As the regional water planning process considers supplies and demands over decadal periods, temporary emergency transfers of water were not considered. As all supplies allocated are considered available during drought of record (DOR) conditions, the need for additional supplies in the water planning process are due to unmet demands rather than temporary unavailability of supplies. If shortages are identified in a decade within the planning period, they are met with new supplies developed in a WMS.

4.3.4 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% reliable supplies are called "interruptible" supplies.

A Region H study conducted early during this round of planning (February 2009 report titled *Region H Water Planning Group Interruptible Supply Study*) evaluated the feasibility of using available interruptible surface water supplies as a substitute for existing firm surface water supplies for certain uses, notably irrigated agriculture. The goal of this study was to determine if there were additional firm supplies that could be made available to municipal and manufacturing users that were currently allocated to irrigation demands. For many reasons outlined in detail in the 2009 *Region H Water Planning Group Interruptible Supply Study*, the study concluded that there was little to no opportunity for this goal to be accomplished. The primary limitation on the use of interruptible supply was that, since there are not many irrigators using firm supplies, conversion to interruptible supply would not free a significant volume of firm water. Thus, offsets of irrigation demands on firm water supply cannot provide to other users such as municipal or industrial WUGs. However, the analysis of existing water rights revealed significant quantities of existing permitted interruptible water in the Brazos, San Jacinto–Brazos, San Jacinto and the Trinity Basin that could potentially be used to supply major agricultural irrigation demands. The largest quantity of interruptible supply is found in the Brazos Basin, primarily from rights held by GCWA, which could be utilized in both the Brazos and the San Jacinto – Brazos Basins through existing infrastructure. This new WMS (i.e. use of existing permitted interruptible water supplies for irrigated agricultural demands) has subsequently been adopted for the 2011 RWP as the recommended method to supply the agricultural demand for Brazoria County. This strategy also deserves further consideration in the next round of planning for Fort Bend County.

4.4 Strategy Evaluation and Selection

In evaluating the potential water management strategies, the RHWPG made three key assumptions. First, WUGs would continue to develop groundwater until it was fully utilized to its maximum availability. 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. 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 assumed that every municipal WUG with a projected shortage would utilize conservation before seeking out or increasing a WWP contract. Based on these assumptions, the projected shortage in 2060 is reduced from 1,236,335 acre-feet to 973,857 acre-feet (see *Table 4-2 and Figure 4-2*).

Figure 4-2
Remaining Shortages after Conservation and Expanded Groundwater Use

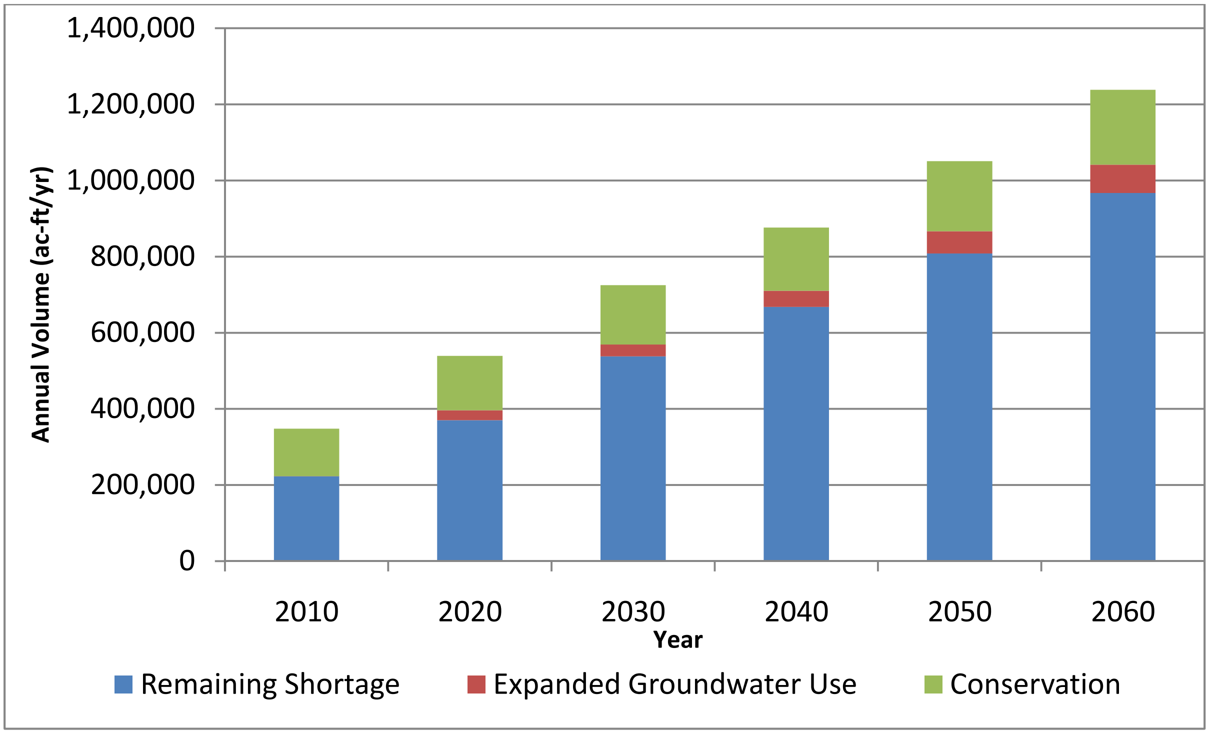


Table 4-2
Initial and Net Shortages by County (ac-ft/yr)

Austin	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Initial Shortage	0	-739	-1,240	-1,496	-1,635	-1,865
Expanded GW	0	739	1,240	1,496	1,635	1,865
Municipal Conservation	0	223	251	265	273	285
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	223	251	265	273	285
Brazoria						
Initial Shortage	-150,907	-186,760	-211,634	-238,588	-266,405	-299,199
Expanded GW	0	4,049	12,988	13,515	15,658	16,209
Municipal Conservation	1,476	2,610	2,978	3,249	3,567	3,918
Contract Expansions	7,750	7,750	7,750	7,750	7,750	7,750
Net Shortage	-141,681	-172,351	-187,918	-214,074	-239,430	-271,322
Chambers						
Initial Shortage	-42,520	-47,412	-50,831	-54,251	-57,612	-61,065
Expanded GW	0	577	681	796	905	1,010
Municipal Conservation	137	195	219	239	263	291
Contract Expansions	0	0	0	0	0	0
Net Shortage	-42,383	-46,640	-49,931	-53,216	-56,444	-59,764
Fort Bend						
Initial Shortage	-86	-11,410	-52,608	-84,380	-123,623	-178,948
Expanded GW	0	6,886	3,423	3,813	4,378	5,052
Municipal Conservation	1,435	7,077	10,277	12,253	14,678	17,497
Contract Expansions	0	367	1,295	1,226	1,225	1,016
Net Shortage	1,349	2,920	-37,613	-67,088	-103,342	-155,383
Galveston						
Initial Shortage	-16,307	-16,466	-17,787	-18,738	-19,884	-21,276
Expanded GW	0	811	1,352	1,350	1,352	1,352
Municipal Conservation	768	846	886	896	903	914
Contract Expansions	0	25,630	25,630	25,630	25,630	25,630
Net Shortage	-15,539	10,821	10,081	9,138	8,001	6,620
Harris						
Initial Shortage	-51,413	-194,925	-270,301	-323,711	-375,414	-458,509
Expanded GW	0	15,481	27,659	27,693	27,727	27,560
Municipal Conservation	37,292	46,836	51,902	56,748	61,656	66,947
Contract Expansions	0	108,852	66,039	51,840	42,538	31,971
Net Shortage	-14,121	-23,756	-124,701	-187,430	-243,493	-332,031

Leon	2010	2020	2030	2040	2050	2060
Initial Shortage	0	-376	-614	-707	-779	-908
Expanded GW	0	376	614	707	779	908
Municipal Conservation	0	126	140	124	107	116
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	126	140	124	107	116

Liberty						
Initial Shortage	-11,846	-15,150	-18,703	-22,561	-27,093	-32,408
Expanded GW	0	2,545	4,606	6,831	9,431	12,589
Municipal Conservation	0	539	641	744	868	995
Contract Expansions	0	0	0	0	0	0
Net Shortage	-11,846	-12,066	-13,456	-14,986	-16,794	-18,824

Madison						
Initial Shortage	-1	-130	-228	-239	-323	-450
Expanded GW	0	130	228	239	323	450
Municipal Conservation	1	91	110	112	116	119
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	91	110	112	116	119

Montgomery						
Initial Shortage	-17,728	-47,619	-69,513	-81,350	-120,398	-165,162
Expanded GW	0	5,615	4,471	5,614	9,034	11,820
Municipal Conservation	4,460	6,007	7,384	8,838	10,795	13,089
Contract Expansions	0	0	0	0	0	0
Net Shortage	-13,268	-35,997	-57,658	-66,898	-100,569	-140,253

Polk						
Initial Shortage	0	-117	-205	-272	-384	-513
Expanded GW	0	117	205	272	384	513
Municipal Conservation	0	158	173	180	187	198
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	158	173	180	187	198

San Jacinto						
Initial Shortage	0	-300	-533	-695	-793	-869
Expanded GW	0	542	928	984	1,007	1,060
Municipal Conservation	19	148	163	174	181	184
Contract Expansions	0	0	0	0	0	0
Net Shortage	19	390	558	463	395	375

Trinity						
Initial Shortage	0	0	0	0	0	0
Expanded GW	0	36	36	21	0	0
Municipal Conservation	0	2	1	0	0	0
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	38	37	21	0	0

Walker	2010	2020	2030	2040	2050	2060
Initial Shortage	0	-815	-1,655	-1,973	-2,384	-2,853
Expanded GW	0	816	1,651	1,963	2,374	2,843
Municipal Conservation	0	68	74	89	90	92
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	69	70	79	80	82
Waller						
Initial Shortage	-82	-1,926	-2,940	-4,579	-8,177	-12,355
Expanded GW	0	1,447	2,231	3,644	5,382	7,431
Municipal Conservation	17	392	497	592	708	849
Contract Expansions	0	0	0	0	0	0
Net Shortage	-65	-87	-212	-343	-2,087	-4,075
Region H Total						
Initial Shortage	-290,890	-524,137	-698,776	-833,518	-1,004,872	-1,236,335
Expanded GW	0	40,159	62,297	68,916	80,337	90,617
Municipal Conservation	45,605	65,318	75,696	84,503	94,392	105,494
Contract Expansions	7,750	142,599	100,714	86,446	77,143	66,367
Net Shortage	-237,535	-276,061	-460,069	-593,653	-753,000	-973,857

4.4.1 Evaluation of Water Management Strategies

Potential water management strategies (WMSs) were compared using a screening table (See Table 4A-3 in Appendix 4A), with the required environmental assessments summarized in Table 4A-4. The comparison table summarized project yield, capital, O&M, and unit water costs, impacts on wetlands habitats and B&E flows, and impacts on landform. Evaluation criteria included cost, yield, location, water quality, environmental land and habitats, local preference, institutional constraints or risk of non-implementation, impacts on environmental flows and impacts on other water management strategies. In each of the evaluation categories, the WMS was rated positively (+1), neutral (0) or negatively (-1), using evaluation criteria summarized in *Table 4-3*, below. As would be expected, water conservation and full use of existing supplies rated the highest of the potential strategies. Direct wastewater reuse for industry also rated highly. Although direct reuse is more costly than using existing supply, it is less expensive than developing a new freshwater source, and has fewer environmental impacts. Contractual transfers of water, Allens Creek, GCWA Off-channel Reservoir, Brazoria Off-channel Reservoir, Fort Bend Off-channel Reservoir, Freeport Desalination, Brazos Saltwater Barrier, and indirect reuse were all rated positively. All of the above WMSs were rated positively in the cost-benefit-impact analysis. Certain WMSs (i.e., the inter-basin transfer of supply from east Texas and the Millican Reservoir) were rated negatively due to the significant habitat and environmental flow impacts these projects entail.

The combined effects of WMSs were considered through the use of the TCEQ Water Availability Model, described in Section 4.6 and Appendix 4D. For this modeling scenario, the recommended WMSs from the 2006 Regional Water Plans were incorporated into the model. As described in detail in Section 4.6, the cumulative effect of the current State Water Plan on Galveston Bay was a slight decrease in freshwater inflows after 2010, with flows rising after 2040. Results of this modeling, combined with modeling from the 1st biennium of the 2011 RWP, indicate that these changes are predominantly due to upstream Region C WMSs (reduced return flows due to Region C reuse) rather than WMSs within Region H. Additional modeling was carried out to determine impacts of new WMS on environmental flows. Results of this modeling can be found in Appendix 4E.

Table 4-3
WMS Rating Criteria

	Rating Criteria		
Category	**-1**	**0**	**1**
Cost	>$200/ac-ft	<$200/ac-ft	<$100/ac-ft
Yield	Size is too small or too large for need	Size is flexible or meets needs	Size can be adjusted to optimum
Location	IBT required, long distance or outside Region H.	No IBT required. Conveyance required.	No IBT required. Relatively near demand.
Water Quality	Quality of supply is reduced.	No known water quality issues.	Existing water quality problems are reduced.
Environmental Land & Habitat	Significant environmental issues and opposition.	Environmental impacts can be mitigated. Limited concerns.	Limited or no known impacts.
Local Preference	No local support. Significant opposition.	Some local support. Limited opposition.	Widespread local support. Multi-use benefits likely.
Institutional Constraints / Risk of Implementability	Permits opposed. Significant property required.	Permits expected with minimal problems. Property available.	Permits issued. Facilities or land owned. Water available.
Impacts on Environmental Flows	Reduces instream or B&E flows.	No impact.	Increases instream or B&E flows.
Impacts on Other Management Strategies	Negative impact.	No impact.	Positive impact.

4.4.2 Water Conservation

Water loss audits were available and considered (see Chapter 1) by the Planning Group; the Group, however, did not opt to use this information in developing WMS. They did, however, elect to use a specific methodology for conservation, as detailed in Chapter 6. The water loss audits performed by water utilities in the region showed a high level of inaccuracy in the water loss estimates, suggesting that utilities in the region should refine their water accounting procedures for future audits. For this reason, a unique methodology for developing potential conservation savings was developed. Conservation was applied to WUGs (as described in Chapter 6) before supplies were given. This decreased WUG demands, minimizing water management strategy water that was required to meet potential shortages.

The RHWPG advocates water conservation for all water users in the Region, noting that “the least expensive water you can get is the water you already have.” Some conservation will be realized through low-flow water fixture laws (embedded in the demand estimates), and from new energy-efficient clothes washers, but more savings can be achieved. Every water user group and provider is encouraged to establish an aggressive water conservation goal. The Water Conservation Implementation Task Force established by the 78th Texas Legislature recommended a goal of reducing demand by 1% each year to achieve an average demand of 140-gpcd. Since the median municipal water demand in this region is 135-gpcd, and since conservation programs are voluntary and they require an investment of time and resources to implement, this plan only reflects water conservation as a water management strategy for water user groups with projected shortages and for those that specifically asked to reflect their program in the plan tables. These savings are conservatively estimated at 5.5 to 7 percent of total demand, based on current best management practices that are producing results. Conservation was applied as a WMS to all municipal and irrigation WUGS with shortages as well as to those with water conservation plans.

4.4.3 Selection of Water Management Strategies

To facilitate the strategy selection process, water needs and potential WMSs were grouped and evaluated on a county-by-county basis. Efforts were then made to select the best-rated WMSs to meet the needs in those counties. In Austin, Leon, Liberty, Madison, Polk, Trinity, and Walker Counties, a combination of water conservation and existing supply expansion was sufficient to meet the projected shortages. Several large WMSs, (BRA System Operations, Allens Creek Reservoir, Off-Channel Reservoirs) were required to meet the needs of Fort Bend and Brazoria Counties. In Harris County several new WMSs were required to meet projected demands, including direct and indirect reuse, expansion of TRA contracts for supply from Lake Livingston, and a new reservoir (Allens Creek Reservoir) in the Brazos basin. In Montgomery County, the transfer of Trinity Basin supply facilitated the full use of existing supplies, which, along with use of interim strategies and reuse, were sufficient to meet the projected shortages. A summary is provided in *Table 4-4*, below, and shown in more detail in Table 4A-5 and 4A-6 in Appendix A.

Some WMSs from the 2006 Region H Water Plan were replaced with new WMSs as a result of this selection process. Little River (off-channel) Reservoir and Non-municipal contractual transfers are no longer required to meet identified shortages and were not recommended for selection in the 2011 RWP.

Many of the recommended WMSs are required to provide the conveyance and treatment of existing or proposed future strategies to the location of the projected shortage, but do not create new or additional supply alone. The Luce Bayou Transfer is a conveyance project that would be used in conjunction with Expanding Current Contracts, New Contracts from Existing Supply, and TRA to Houston contract expansions. The Brazos Saltwater Barrier would protect current water right holders in the lower Brazos from saltwater migration during periods of low flows and increased future diversions (i.e., full utilization of authorized diversions). Some of the recommended water rights applications produce no firm yield, specifically the Houston/SJRA joint permit application for interruptible supply from the San Jacinto River. It is included to allow the applicants to develop operational plans for conjunctive use of these local supplies with firm supplies transferred from the Trinity River. While this permit would reduce flows into Upper Galveston Bay, the affects would be mitigated by wastewater return flows back into the source streams. The offset Trinity River supplies would remain in-basin and flow into Trinity Bay, where the historic freshwater inflow demand is the greatest. The Brazoria County Interruptible Supplies for Irrigation strategy is by definition not firm. Finally, there is no new yield associated with any of the infrastructure-only strategies.

There were no water quality concerns with any of the recommended WMS. That is, conventional water treatment would provide supply acceptable for the typical WUG needs, unless the strategy itself recommended a specific water quality improvement. These strategies included direct reuse of wastewater, which required filtration and reverse osmosis treatment, and the Brazos saltwater barrier, which protects the quality of existing supply at current diversion points.

Table 4-4
Recommended Water Management Strategies

WMS	Max Project Volume (ac-ft/yr)	WWP Capital Cost $	WUG Capital Cost $	Starting Decade
Conservation Strategies:				
Industrial Conservation	TBD	$0	TBD	2010
Irrigation Conservation	77,881	$0	$757,436	2010
Municipal Conservation	105,494	$0	$0	2010
Contractual Strategies:				
Expand/Increase Current Contracts	142,599	$0	See Contracts	2010
New Contracts from Existing Supplies	83,558	$0	See Contracts	2010
Reallocation of Existing Supplies	N/A	$0	See Contracts	2010
TRA to SJRA Contract	76,476	$302,781,597	See Contracts	2040
TRA to Houston Contract	123,524	See Luce Bayou	See Contracts	2030
WUG-Level Contracts[1]	N/A	$0	$2,390,273,157	2010
WWP Contracts	N/A	$0	$0	2010
Groundwater Strategies:				
Expanded Use of Groundwater	90,617	$0	$165,928,999	2010
Interim Strategies	45,512	$0	$86,701,535	2010
New Groundwater Wells for Livestock	41	$0	$18,635	2020
Groundwater Reduction Plans:				
CHCRWA GRP	4,806	See CHCRWA Trans.	$0	2010
COH GRP	TBD	See COH Treatment	$58,235,873	2010
City of Missouri City GRP	17,562	$92,070,990	$6,618,706	2010
Fort Bend MUD 25 GRP	589	$0	$776,145	2020
Fort Bend WCID 2 GRP	5,753	$24,828,857	$0	2020
NFBWA GRP[2]	106,402	See NFBWA Trans.	$1,638,063	2020
NHCRWA GRP[2]	117,755	See NHCRWA Trans.	$17,814,585	2010
Pecan Grove GRP	1,700	$0	$15,960,000	2020
Richmond/Rosenberg GRP	7,500	$117,220,150	$0	2020
River Plantation GRP	368	$0	$484,926	2010
SJRA WRAP[3]	129,010	$900,000,000	$217,856,853	2020
Sugar Land GRP	9,796	$161,360,049	$6,360,101	2020
WHCRWA GRP[2]	78,839	See WHCRWA Trans	$35,268,970	2010
Infrastructure Strategies:				
CHCRWA Transmission Line	4,806	TBD	N/A	2010
CHCRWA Internal Distribution	4,806	TBD	N/A	2010
CLCND West Chambers System	2,800	$20,380,000	See Contracts	2020
COH Distribution Expansion	TBD	$261,040,000	N/A	2010
COH Treatment Expansion	Varies by decade	$2,045,672,161	N/A	2010
Harris County MUD 50 WTP	632	$0	$6,131,600	2020

Huntsville WTP	11,200	$61,023,906	$0	2010
LLWSSSC Surface Water Project	954	$0	$3,087,974	2010
Luce Bayou Transfer	450,000	$253,916,914	$0	2020
NFBWA Internal Distribution	106,402	$225,000,000	N/A	2020
NFBWA Shared Transmission Line	71,876	$213,000,000	N/A	2020
NHCRWA Internal 2010 Distribution	34,714	$153,149,640	N/A	2010
NHCRWA Internal 2020 Distribution	91,167	$345,292,192	N/A	2020
NHCRWA Internal 2030 Distribution	117,755	$37,439,584	N/A	2030
NHCRWA Transmission 2010	34,714	$80,690,624	N/A	2010
NHCRWA Transmission 2020	91,167	$172,558,512	N/A	2020
NHCRWA Transmission 2030	117,755	$0	N/A	2030
Pearland SWTP	13,420	$0	$265,000,000	TBD
Sealy GW Treatment Expansion	888	$0	$6,450,000	2020
WHCRWA Internal Distribution	78,839	$552,472,000	N/A	2010
WHCRWA Transmission Line	78,839	$290,084,193	N/A	2010
Reservoir Strategies:				
Allens Creek Reservoir	99,650	$222,752,400	See Contracts	2020
Brazoria County Off-channel Reservoir	24,100	$173,898,602	See Contracts	2060
Dow Off-channel Reservoir	21,800	$124,468,000	See Contracts	2020
Fort Bend County Off-channel Reservoir	46,000	$202,514,788	See Contracts	2050
GCWA Off-channel Reservoir	39,500	$197,448,012	See Contracts	2030
Reuse Strategies:				
Fulshear Reuse	430	$0	$566,625	TBD
Houston Indirect Reuse	128,801	$0	$721,822,850	2040
Montgomery MUD 8/9 Indirect Reuse	1,120	$0	$12,245,687	2016
NHCRWA Indirect Reuse	16,300	$0	$66,778,694	2040
Wastewater Reuse for Industry	67,200	$332,051,761	$0	2060
Wastewater Reclamation for Mun. Irrigation	36,388	$0	$48,043,249	2030
Permit Strategies:				
BRA System Operations Permit	25,400	TBD	See Contracts	2020
Houston Bayous Permit*	0	$20,956,000	$0	2020
Other Strategies:				
Brazoria Co. Interruptible Supplies for Irr.	104,977	$0	$0	2010
Freeport Desalination Plant	33,600	$255,699,000	See Contracts	2050
Brazos Saltwater Barrier	N/A	$44,470,739	$0	2030

1. WUG-level costs for a number of WMS are indicated as “See Contracts”. The WUG-level costs for these strategies will be infrastructure costs associated with implementing *future* contracts from WWPs. For simplification, these costs are collectively represented under the “WUG-Level Contracts” WMS, as common infrastructure from a WUG may treat or transmit water from multiple WMS.
2. Yield value includes surface water transmission volume and is therefore not additional yield.
3. Includes supply volume of TRA to SJRA Contract
4. The Houston Bayous Permit has not yet been approved by TCEQ.

4.4.4 Alternative Water Management Strategies

Although all of the recommended WMSs are feasible, it is not a certainty that all will be implemented, and those that are implemented may be of a different capacity or on a different schedule than that reflected in this plan. Several alternative WMS are available to Region H, either through increasing the capacity of recommended strategies or by total replacement with another WMS. Alternative WMSs are potentially feasible strategies that should receive first consideration if additional supply is needed for any reason, including the unavailability of the recommended WMS or additional needs beyond the projected shortage. These alternative WMSs are summarized in *Table 4-5* and described below. Alternative WMSs are also included in the screening and environmental impacts tables (4A-3 and 4A-4) in Appendix 4A and are described in technical memoranda in Appendix 4B.

Table 4-5
Alternative WMS Available to Region H

Strategy	WUG(s)	County	Basin	Yield ac-ft/yr	Could Replace
Montgomery MUD 8/9 Desal	MUN, MFR	Montgomery	San Jacinto	2,240	Portion of Surface Water Conversion
Sabine to Region H Transfer	All	Brazoria, Fort Bend, Galveston, Jasper	San Jacinto, San Jacinto-Brazos, Brazos, Brazos-Colorado	486,500	One or more WMS in the lower Brazos Basin
Little River Off-Channel Res.	All	Brazoria, Fort Bend	San Jacinto-Brazos, Brazos, Brazos-Colorado	27,225	Portion of WMS in the lower Brazos Basin

Montgomery MUDs 8 and 9 are currently investigating desalination of brackish groundwater as an alternative WMS for their future needs. Indirect reuse is the recommended initial strategy for these WUGs, and participation with the San Jacinto River Authority in their groundwater reduction plan for Montgomery County is counted in this plan for additional supply. However, brackish desalination was selected as an acceptable alternative WMS in the event that these WUGs decide that it is feasible to incorporate it into their future plans. Montgomery MUDs 8&9 also are pursuing other alternatives to participation in the San Jacinto River Authority groundwater reduction plan, whether or not brackish desalination is implemented.

Two major projects were also selected as alternative WMSs. The largest is the Sabine to Region H transfer which could replace a number of projects in the lower Brazos basin if necessary. This strategy would require considerable infrastructure development including large river diversion pumping stations, canals, and pipelines to divert existing supplies currently unused in the Sabine and Neches River Basins within existing reservoirs. Contracts for use of these supplies would require negotiation between multiple parties, additional permitting for interbasin transfers, and use of some existing infrastructure to allow phasing of the development of the required conveyance infrastructure. This WMS has the advantage of using existing supplies, but requires significant investment for new infrastructure and has a large annual cost for energy and operation of the required facilities.

The development of the Little River Off-Channel Reservoir within the Brazos Basin could serve as an alternative to a portion of one or more projects in the lower Brazos basin. The Little River Off-Channel Reservoir alternative requires significant advance planning and permitting, and cannot be implemented as quickly as the system operation WMS.

4.4.5 Alternative Strategies for Increased Fort Bend County Population

As noted in the Region H resolution presented in Appendix 2B of Chapter 2 of this RWP, the Regional Planning Group has expressed concern over the TWDB methodology adopted for population projections as applied to Fort Bend County. The Group expresses its appreciation to the TWDB for recognizing that the region is seeing increased demands for water and has experienced significant population growth at a rate greater than expected in the approved 2006 Region H Plan. The Group believes that population for the County will exceed the TWDB projected values; however, the nature of the deadlines for RWP development precluded challenging these projections.

The TWDB utilized Method 2 (Revised Slope Projections) for development of the Fort Bend County population projection. The Region H Group recommends the use of Method 3 (Compounding Growth). Decadal population values for both methods are shown in Table 4-6 below.

Table 4-6
Fort Bend County Population Projection Methodology

Method	2010	2020	2030	2040	2050	2060
Method 2 Population	545,883	702,441	893,875	1,090,710	1,348,851	1,643,825
Method 3 Population	553,056	711,671	905,621	1,105,041	1,366,575	1,665,424
Difference in Pop.	7,173	9,230	11,745	14,332	17,724	21,599
Additional Demand (ac-ft/yr)	1,459	1,895	2,309	2,758	3,320	3,966

A per-capita demand was determined by dividing adopted municipal demands by adopted Method 2 population, this value decreased from 0.2 acre-feet per capita per year in 2010 to 0.18 acre-feet per capita per year in 2060 due to TWDB conservation. These per-capita demands were then multiplied by the difference in population between the two methods to determine the estimated additional demand associated with Method 3. The additional demand resulting from Method 3 ranged from 1,459 acre-feet in 2010 to 3,966 acre-feet in 2060. Many of the municipal WUGs in Fort Bend County are shown to have substantial surplus availability through the planning period especially in earlier decades (approximately 40,000 acre-feet per year in 2010). Subsequent to 2010, there is also additional water available from major WMS, including remaining Allens Creek Reservoir yield from 2020 through 2040.. The BRA System Operations permit is estimated to be available in order to meet conversions in Fort Bend County beginning in 2015. As such, existing supplies and proposed WMS should adequately meet Fort Bend County demands for either Method 2 or Method 3 population projections.

4.4.6 Conveyance and Contract Strategies

Several of the recommended strategies do not increase yield or develop new supplies for future use, but rather are included in the recommended plan as necessary for implementation of other strategies or to establish the right to use existing supplies where the demand is creating the shortage. These strategies consist primarily of contractual agreements between WWPs, contractual agreements between WWPs and WUGs, and transmission and treatment infrastructure. For previous RWPs, supplies of water and costs associated with producing those new supplies were in many cases allocated directly at the WUG level even though the anticipated ownership and operation was expected to be provided by WWPs. For the 2011 RWP, costs for infrastructure are now reflected at the WWP level for major infrastructure projects sponsored by the WWP (transmission lines, large-scale treatment, etc), while costs for WUG-level strategies only are shown for individual WUGs. Contract and conveyance strategies do not produce additional yield; volumes of water shown associated with contract or conveyance strategies are generated by another WMS.

4.4.7 Future Water Management Strategies

As in the 2006 RWP, some of the strategies considered were not recommended for inclusion in this plan, but should be reconsidered in future plans as the population and water demands of Region H increase in future decades. These future strategies include both new and existing water sources.

The transfer of existing supplies from East Texas currently remains a potential source of water for Region H. Toledo Bend and Sam Rayburn reservoirs have significant amounts of water which are not currently contracted to other entities, and the cost and impacts of transferring this supply compares favorably against the cost and impacts of developing other future supplies, especially of this large magnitude. Other regions within the state are also evaluating these same available supplies for inclusion in their RWPs, including primarily the Dallas Fort Worth Metroplex area, which did include some future supply from this area in their 2006 RWP.

A substantial portion of projected needs shown in the 2011 Regional Water Plan occur in the Brazos River Basin and adjoining San Jacinto-Brazos Coastal Basin. At the same time, the Brazos River Basin has limited potential for development of new supplies such as large-scale reuse, which could meet a significant proportion of projected needs in the San Jacinto Basin. The Regional Water Planning Group considered the possibility of the above transfer of supplies from East Texas as a possible solution to meet needs in the lower Brazos Basin, but concluded that the most appropriate solution would be development of new in-basin supplies. Pursuant to this, there is a need to increase in-basin surface water supplies by developing storage to convert a portion of the interruptible supply in the lower Brazos to firm supply. The recommended solution for the 2011 RWP includes the development of multiple off-channel reservoirs (OCRs), including the Brazoria County, Fort Bend County, Dow, and GCWA OCRs. These water management strategies, while potentially able to meet shortages, have received only preliminary study; these potential WMS, along with the Millican Reservoir and other on-channel impoundments, will require further consideration and study in future planning cycles.

4.5 Strategy Allocation

Water management strategies were allocated on a county by county basis. The Conservation strategies and Expanded Use of Groundwater were allocated directly to WUGs prior to the selection of new supply strategies, as shown in *Table 4-2*. New supply strategies were associated with the sponsoring WWP as discussed in the technical memoranda, and then allocated to individual WUGs. The details of these allocations are shown on Table 4A-7. Contracts from WWPs to WUGs which would be necessary to transfer WMS supplies from source to user are shown in Table 4A-8 in Appendix 4A.

Shortages were met through a series of steps linking supply and demand through a potential chain of suppliers and infrastructure. WUGs with shortages were assigned a WWP where appropriate, based on existing and proposed infrastructure and service areas. In some cases, WWPs assigned to a WUG were met by higher level WWPs. Major water management strategies were associated with a higher level WWP sponsor, and the available supply associated with the strategy was attributed to the WWP in order to properly allocate down its supply chain to meet the needs of WUGs through new contracts.

Infrastructure costs were estimated for all of the potential and selected WMS, using the cost estimating methods detailed in Appendix 4C. WWP-level costs, typically for reservoir or large-scale regional infrastructure development, are shown in Table 4C-1. WUG level costs for reuse, additional groundwater pumping capacity, and surface water-receiving infrastructure are included in Table 4C-2. Please see the respective technical memoranda in Appendix 4B for explanation of the costs associated with each management strategy.

4.6 Impacts of the 2006 State Water Plan on Galveston Bay Inflows

Efforts in the 1st biennium of planning for the 2011 RWP included analysis of impacts of 2006 SWP strategies on Galveston bay and estuary (B&E) inflows as well as instream flows. The 1st biennium *Environmental Flows Study* examined B&E and instream flow effects of WMS modeled individually, as well as together, for a projected year 2060 condition. The study found that impacts of individual strategies on B&E flow were minor with the exception of large volumes of water moved by interbasin transfers (IBT). Predominant observed changes in instream flow were from increased flows due to IBTs and increased return flows from groundwater-based effluent, although reservoir and system operations did reduce flow at some locations.

Due to the complex interactions among strategies in the 1st biennium study, it was anticipated that WMS may result in varied impacts on B&E flows throughout the planning horizon. This is especially of concern due to timing of certain strategies (reuse and IBTs) occurring in different decades. The end result could be a worst-case scenario for B&E flows sooner than 2060. In order to study this possibility, additional modeling of 2006 recommended WMSs was carried out using decadal models rather than a Year 2060 condition.

Water usage as a result of demand (not allocation) from each Region H WUG was linked to each supply source and water right, including future Region G management strategies. This anticipated water usage was used to create a future condition for the years 2010, 2020, 2030, 2040, 2050, and 2060 for each basin from the TWDB Run 8 models. Trinity River Basin models, including upstream Region C demands and strategies, were received from TWDB and the appropriate diversions and return flows for each WMS were added to the models; Region G water management strategies were not modeled or studied. Where possible, reservoir storage was adjusted over time to account for sedimentation. Model results indicated that the greatest levels of median B&E inflow occur in 2010, and median flows decline through 2040 before beginning to increase again. This pattern is driven primarily by reduced return flows due to upstream reuse in Region C. Results of decadal modeling are discussed in greater detail in Appendix 4D. Additional modeling assessment was performed for a number of the new WMS not recommended in the 2006 RWP. The impacts of new individual WMS as detailed in the 2011 Region H RWP are not anticipated to create major impacts to B&E flows, nor to substantially reduce low (10th percentile) flows at critical stream segments. Whether these strategies would have an additive effect when implemented together is unknown; based on the results of the 1st biennium Environmental Flows Study, it is possible that greater impacts would be realized with when the projects are operating simultaneously. More study would be required to determine if this is the case for new WMS. Model results are discussed in greater detail in Appendix 4E.

4.7 Socio-Economic Impacts of Not Meeting Demands

Region H was able to address every projected water need through a combination of conservation, allocation of existing supply and development of new water supplies. However, the regional planning guidelines in 31 TAC 357 require that the social and economic impacts of not meeting demands be estimated and considered. The TWDB Water Use and Projection Section has performed social and economic impacts modeling for Region H at the request of the Regional Water Planning Group. Model analyses examined the potential impacts of failures to meet projected shortages as identified by the Group. Point estimates were made for 1-year drought at 10-year intervals. Multiple impacts of unmet needs were examined, including the repercussions to sales, income, and tax revenue for the Region, as well changes to population, school enrollment, and jobs. Study results indicate income losses of approximately $3.2 billion in 2010 and $18.2 billion in 2060 if needs are unmet during a 1-year drought period. Lost tax revenues for unmet needs are estimated as $326 million in 2010 and over $2 billion in 2060 (Figure 4-3). Failure to meet needs during drought conditions is projected by the study to result in the loss of jobs, population, and school enrollment. A more description of the impact, model assumptions, and tabulated model results is presented in Appendix 4F.

Figure 4-3
Projected Income Impacts of Unmet needs During Drought Conditions

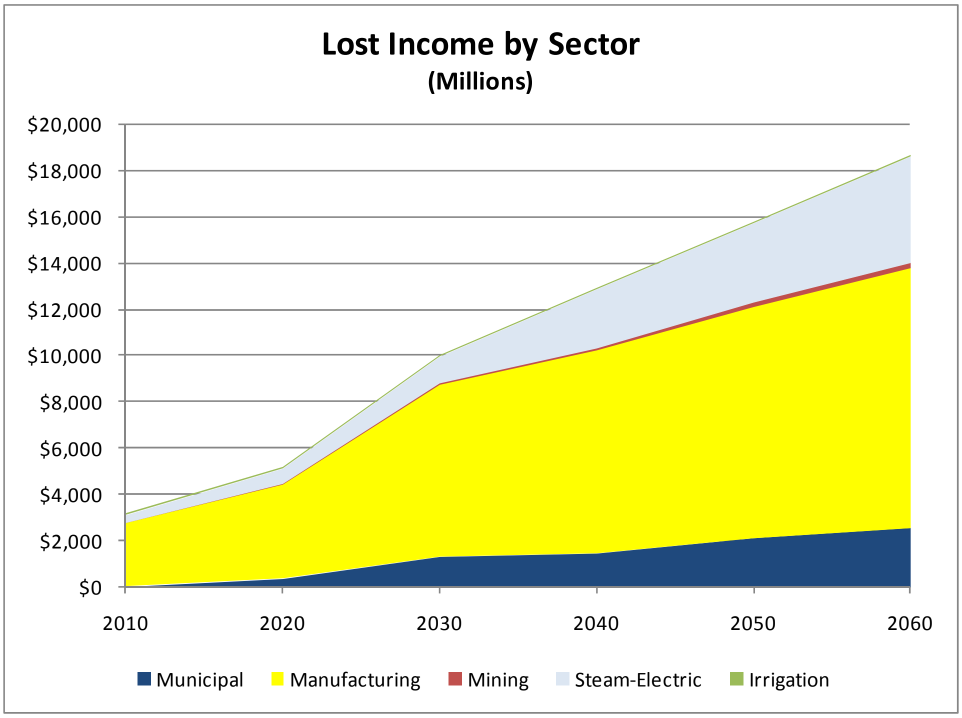


Figure 4-4
Projected Tax Impacts of Unmet needs During Drought Conditions

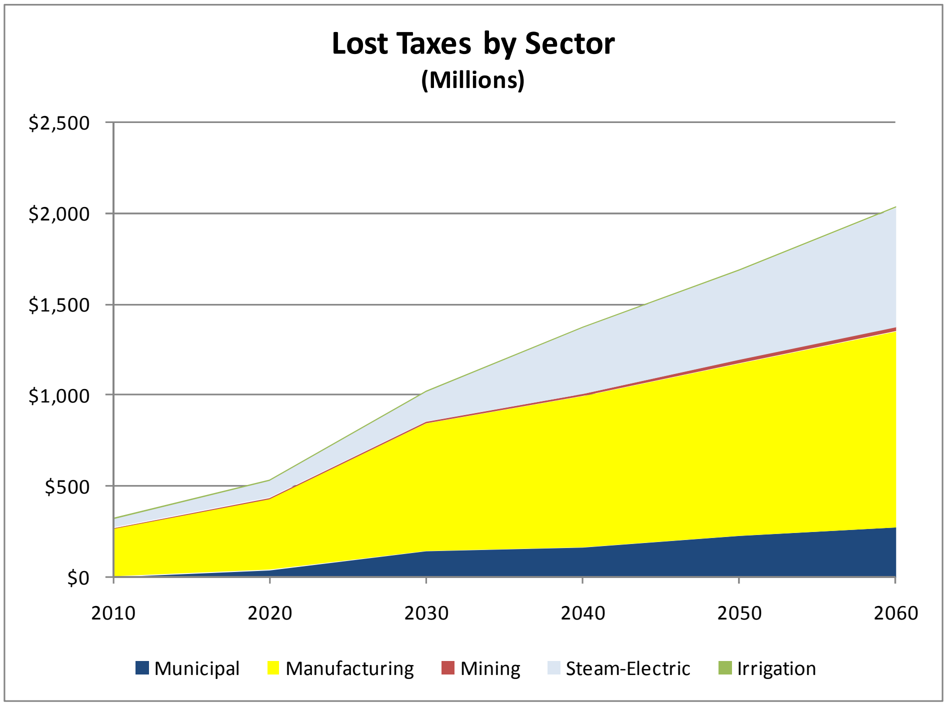
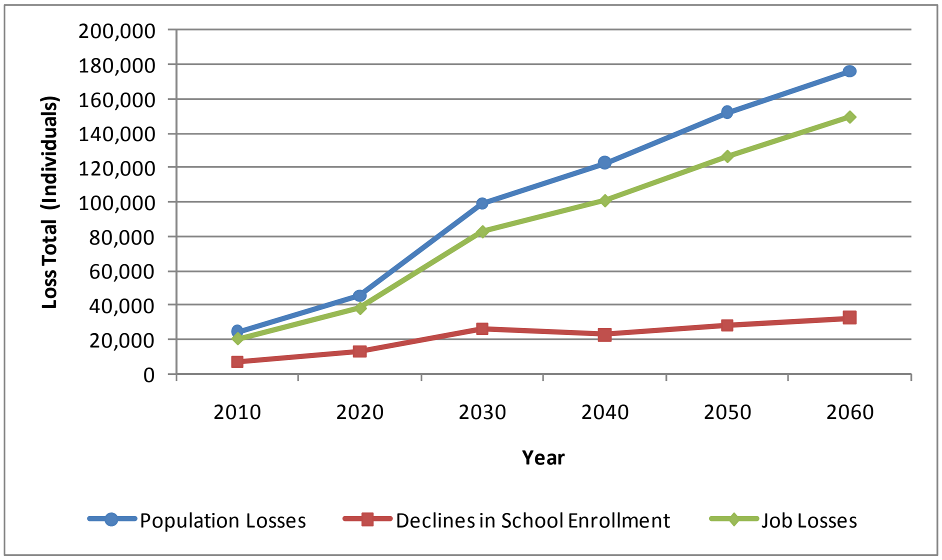


Figure 4-5
Projected Social Impacts of Unmet needs During Drought Conditions



Appendix 4A

Water Management Strategy Tables

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Region H
Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
BELLVILLE	BRAZOS	AUSTIN	080048000	08004800000812	MUN	0	-285	-472	-568	-618	-697
COUNTY-OTHER	BRAZOS	AUSTIN	080757008	08075700800812	MUN	0	0	0	0	0	0
COUNTY-OTHER	BRAZOS-COLORADO	AUSTIN	080757008	08075700800813	MUN	0	-26	-45	-53	-57	-66
COUNTY-OTHER	COLORADO	AUSTIN	080757008	08075700800814	MUN	0	-3	-5	-5	-6	-7
IRRIGATION	BRAZOS	AUSTIN	081004008	08100400800812	IRR	0	0	0	0	0	0
IRRIGATION	BRAZOS-COLORADO	AUSTIN	081004008	08100400800813	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	AUSTIN	081005008	08100500800812	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS-COLORADO	AUSTIN	081005008	08100500800813	IRR	0	0	0	0	0	0
LIVESTOCK	COLORADO	AUSTIN	081005008	08100500800814	IRR	0	0	0	0	0	0
MANUFACTURING	BRAZOS	AUSTIN	081001008	08100100800812	MFR	0	-19	-36	-51	-64	-85
MANUFACTURING	BRAZOS-COLORADO	AUSTIN	081001008	08100100800813	MFR	0	-4	-7	-11	-14	-18
MINING	BRAZOS	AUSTIN	081003008	08100300800812	MIN	0	-4	-7	-9	-11	-13
MINING	BRAZOS-COLORADO	AUSTIN	081003008	08100300800813	MIN	0	0	0	0	-1	-1
MINING	COLORADO	AUSTIN	081003008	08100300800814	MIN	0	-1	-1	-2	-2	-2
SAN FELIPE	BRAZOS	AUSTIN	080954000	08095400000812	MUN	0	-21	-35	-43	-46	-52
SEALY	BRAZOS	AUSTIN	080549000	08054900000812	MUN	0	-360	-608	-725	-785	-888
WALLIS	BRAZOS-COLORADO	AUSTIN	080630000	08063000000813	MUN	0	-16	-24	-29	-31	-36
ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	080013000	08001300002011	MUN	0	-170	-317	-434	-620	-847
ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	080018000	08001800002011	MUN	-278	-285	-303	-309	-367	-454
BAILEY'S PRAIRIE	SAN JACINTO-BRAZOS	BRAZORIA	080817000	08081700002011	MUN	0	-3	-5	-7	-10	-15
BAILEY'S PRAIRIE	BRAZOS	BRAZORIA	080817000	08081700002012	MUN	0	0	0	-1	-2	-2
BRAZORIA	BRAZOS	BRAZORIA	080072000	08007200002012	MUN	8	9	10	12	12	11
BRAZORIA	BRAZOS-COLORADO	BRAZORIA	080072000	08007200002013	MUN	25	28	32	39	38	34
BRAZORIA COUNTY MUD #1	SAN JACINTO-BRAZOS	BRAZORIA	084030000	08403000002011	MUN	0	-372	-745	-1069	-1429	-1806
BRAZORIA COUNTY MUD #2	BRAZOS	BRAZORIA	084031000	08403100002012	MUN	0	-475	-935	-1347	-1794	-2261
BRAZORIA COUNTY MUD #3	SAN JACINTO-BRAZOS	BRAZORIA	084032000	08403200002011	MUN	0	-269	-536	-769	-1028	-1299
BRAZORIA COUNTY MUD #4	SAN JACINTO-BRAZOS	BRAZORIA	084033000	08403300002011	MUN	0	0	0	0	0	0
BRAZORIA COUNTY MUD #5	SAN JACINTO-BRAZOS	BRAZORIA	084034000	08403400002011	MUN	0	0	0	0	0	0
BROOKSIDE VILLAGE	SAN JACINTO-BRAZOS	BRAZORIA	080078000	08007800002011	MUN	0	-30	-57	-82	-112	-147
CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	080118000	08011800002011	MUN	-34	-67	-118	-144	-202	-278
COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	MUN	-5289	-6254	-7449	-8446	-9623	-10931
COUNTY-OTHER	BRAZOS	BRAZORIA	080757020	08075702002012	MUN	-7	-123	-132	-138	-147	-157
COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	MUN	-1987	-2242	-2499	-2705	-2968	-3267
DANBURY	SAN JACINTO-BRAZOS	BRAZORIA	080693000	08069300002011	MUN	0	-11	-20	-27	-39	-54
FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	080217000	08021700002011	MUN	11	-270	-563	-819	-1112	-1449
FREEPORT	BRAZOS	BRAZORIA	080217000	08021700002012	MUN	1	-18	-31	-40	-49	-57
HILLCREST	SAN JACINTO-BRAZOS	BRAZORIA	080881000	08088100002011	MUN	0	-1	-1	-2	-5	-8
HOLIDAY LAKES	SAN JACINTO-BRAZOS	BRAZORIA	080779000	08077900002011	MUN	0	0	0	0	0	-2
IOWA COLONY	SAN JACINTO-BRAZOS	BRAZORIA	080885000	08088500002011	MUN	0	-10	-18	-27	-37	-48
IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	IRR	-100180	-89120	-84878	-82321	-82321	-82321
IRRIGATION	BRAZOS	BRAZORIA	081004020	08100402002012	IRR	-2336	-1966	-1825	-1739	-1739	-1739
IRRIGATION	BRAZOS-COLORADO	BRAZORIA	081004020	08100402002013	IRR	-771	-771	-771	-771	-771	-771
JONES CREEK	BRAZOS-COLORADO	BRAZORIA	080308000	08030800002013	MUN	0	0	0	0	0	0
LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	080338000	08033800002011	MUN	-999	-1316	-1595	-1867	-2194	-2579
LIVESTOCK	SAN JACINTO-BRAZOS	BRAZORIA	081005020	08100502002011	IRR	0	-40	0	0	0	0
LIVESTOCK	BRAZOS	BRAZORIA	081005020	08100502002012	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS-COLORADO	BRAZORIA	081005020	08100502002013	IRR	0	0	0	0	0	0
MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	MFR	3029	-1241	-5020	-8833	-12180	-16280
MANUFACTURING	BRAZOS	BRAZORIA	081001020	08100102002012	MFR	-38936	-80493	-100362	-120378	-138163	-159612
MANUFACTURING	BRAZOS-COLORADO	BRAZORIA	081001020	08100102002013	MFR	10170	10118	10012	9905	9811	9696
MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	080721000	08072100002011	MUN	0	-102	-99	-96	-94	-94
MINING	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	MIN	0	-108	-162	-216	-269	-319
MINING	BRAZOS	BRAZORIA	081003020	08100302002012	MIN	0	-119	-136	-154	-171	-187
MINING	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	MIN	0	-564	-728	-888	-1050	-1202
ORBIT SYSTEMS INC	BRAZOS-COLORADO	BRAZORIA	084294000	08429400002013	MUN	0	-8	-16	-24	-32	-41
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	BRAZORIA	084294000	08429400002011	MUN	0	-65	-128	-189	-252	-326
OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	080730000	08073000002011	MUN	-34	-56	-78	-97	-119	-145
PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	MUN	3687	771	-1792	-4223	-6943	-9777
RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	080501000	08050100002011	MUN	-56	-69	-78	-85	-101	-123
SOUTHWEST UTILITIES	SAN JACINTO-BRAZOS	BRAZORIA	084343000	08434300002011	MUN	0	-2	-4	-6	-8	-12
SURFSIDE BEACH	BRAZOS	BRAZORIA	080967000	08096700002012	MUN	0	-21	-41	-60	-80	-103
SWEENY	BRAZOS-COLORADO	BRAZORIA	080590000	08059000002013	MUN	0	-30	-57	-78	-111	-151

Region H
Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
VARNER CREEK UD	BRAZOS	BRAZORIA	084370000	08437000002012	MUN	0	-69	-135	-197	-263	-335
WEST COLUMBIA	BRAZOS	BRAZORIA	080640000	08064000002012	MUN	0	0	0	0	0	0
WEST COLUMBIA	BRAZOS-COLORADO	BRAZORIA	080640000	08064000002013	MUN	0	0	0	0	0	0
ANAHUAC	NECHES-TRINITY	CHAMBERS	080015000	08001500003607	MUN	584	566	550	539	522	504
ANAHUAC	TRINITY	CHAMBERS	080015000	08001500003608	MUN	168	163	159	156	152	146
BAYTOWN	TRINITY-SAN JACINTO	CHAMBERS	080042000	08004200003609	MUN	272	287	295	301	295	282
BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	MUN	-193	-280	-357	-425	-498	-572
BEACH CITY	TRINITY	CHAMBERS	080822000	08082200003608	MUN	-32	-44	-55	-65	-75	-86
COUNTY-OTHER	NECHES-TRINITY	CHAMBERS	080757036	08075703603607	MUN	-3	-3	-3	-2	-2	-2
COUNTY-OTHER	TRINITY	CHAMBERS	080757036	08075703603608	MUN	-207	-200	-193	-185	-180	-178
COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	080757036	08075703603609	MUN	-113	-110	-108	-107	-105	-106
IRRIGATION	NECHES-TRINITY	CHAMBERS	081004036	08100403603607	IRR	37189	36917	36731	36530	36298	36026
IRRIGATION	TRINITY	CHAMBERS	081004036	08100403603608	IRR	-27053	-27277	-27411	-27534	-27652	-27753
IRRIGATION	TRINITY-SAN JACINTO	CHAMBERS	081004036	08100403603609	IRR	948	927	890	857	827	797
LIVESTOCK	NECHES-TRINITY	CHAMBERS	081005036	08100503603607	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY	CHAMBERS	081005036	08100503603608	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY-SAN JACINTO	CHAMBERS	081005036	08100503603609	IRR	0	0	0	0	0	0
MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	081001036	08100103603609	MFR	-8264	-9421	-10449	-11473	-12394	-13584
MINING	NECHES-TRINITY	CHAMBERS	081003036	08100303603607	MIN	-104	-157	-190	-221	-253	-281
MINING	TRINITY	CHAMBERS	081003036	08100303603608	MIN	-4344	-6691	-8121	-9524	-10915	-12131
MINING	TRINITY-SAN JACINTO	CHAMBERS	081003036	08100303603609	MIN	-1260	-1970	-2402	-2927	-3490	-4056
MONT BELVIEU	TRINITY	CHAMBERS	080413000	08041300003608	MUN	-553	-754	-939	-1099	-1266	-1437
MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	MUN	-220	-314	-400	-476	-554	-634
OLD RIVER-WINFREE	TRINITY	CHAMBERS	080727000	08072700003608	MUN	-174	-191	-203	-213	-228	-245
STEAM ELECTRIC POWER	TRINITY-SAN JACINTO	CHAMBERS	081002036	08100203603609	PWR	26895	27482	26970	26345	25581	24634
TRINITY BAY CONSERVATION DISTRI	NECHES-TRINITY	CHAMBERS	084362000	08436200003607	MUN	1536	1319	1134	983	844	690
TRINITY BAY CONSERVATION DISTRI	TRINITY	CHAMBERS	084362000	08436200003608	MUN	702	604	517	449	386	316
ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	080998000	08099800007911	MUN	0	-130	-284	-324	-376	-432
BEASLEY	BRAZOS	FORT BEND	081012000	08101200007912	MUN	0	-1	-2	-4	-6	-8
BEASLEY	BRAZOS-COLORADO	FORT BEND	081012000	08101200007913	MUN	0	-11	-24	-38	-58	-82
COUNTY-OTHER	SAN JACINTO	FORT BEND	080757079	08075707907910	MUN	0	-28	-70	-571	-1867	-3339
COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	MUN	73	-66	-150	-3888	-12148	-21323
COUNTY-OTHER	BRAZOS	FORT BEND	080757079	08075707907912	MUN	0	-331	-2913	-7713	-17306	-28713
COUNTY-OTHER	BRAZOS-COLORADO	FORT BEND	080757079	08075707907913	MUN	0	0	0	0	0	0
FAIRCHILDS	BRAZOS	FORT BEND	081019000	08101900007912	MUN	0	-154	-390	-527	-711	-922
FIRST COLONY MUD #9	BRAZOS	FORT BEND	084113000	08411300007912	MUN	0	-427	-880	-921	-972	-1022
FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	084117000	08411700007912	MUN	0	-288	-576	-574	-574	-574
FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	084118000	08411800007912	MUN	0	-173	-344	-343	-343	-343
FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	084119000	08411900007912	MUN	0	-232	-463	-461	-461	-461
FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MUN	0	-605	-1210	-1210	-1211	-1211
FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	MUN	0	-667	-1805	-2599	-3673	-4900
FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	084126000	08412600007912	MUN	0	-246	-490	-488	-488	-488
FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	084127000	08412700007912	MUN	0	-180	-360	-360	-360	-360
FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	084128000	08412800007912	MUN	0	-144	-286	-286	-286	-286
FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	084129000	08412900007912	MUN	0	-310	-809	-1135	-1568	-2062
FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	080869000	08086900007911	MUN	0	-52	-131	-176	-235	-306
FULSHEAR	BRAZOS	FORT BEND	080869000	08086900007912	MUN	0	-80	-201	-270	-362	-469
HOUSTON	SAN JACINTO	FORT BEND	080285000	08028500007910	MUN	0	0	0	0	0	-527
HOUSTON	SAN JACINTO-BRAZOS	FORT BEND	080285000	08028500007911	MUN	0	0	0	0	0	-370
IRRIGATION	SAN JACINTO	FORT BEND	081004079	08100407907910	IRR	0	0	0	0	0	0
IRRIGATION	SAN JACINTO-BRAZOS	FORT BEND	081004079	08100407907911	IRR	0	0	0	0	0	0
IRRIGATION	BRAZOS	FORT BEND	081004079	08100407907912	IRR	0	0	0	0	0	0
IRRIGATION	BRAZOS-COLORADO	FORT BEND	081004079	08100407907913	IRR	0	0	0	0	0	0
KATY	SAN JACINTO	FORT BEND	080312000	08031200007910	MUN	-86	-262	-387	-500	-648	-822
LIVESTOCK	SAN JACINTO	FORT BEND	081005079	08100507907910	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO-BRAZOS	FORT BEND	081005079	08100507907911	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	FORT BEND	081005079	08100507907912	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS-COLORADO	FORT BEND	081005079	08100507907913	IRR	0	0	0	0	0	0
MANUFACTURING	SAN JACINTO	FORT BEND	081001079	08100107907910	MFR	0	-623	-1292	-1354	-1396	-1282
MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	081001079	08100107907911	MFR	1000	-148	-1382	-1498	-1574	-1351
MANUFACTURING	BRAZOS	FORT BEND	081001079	08100107907912	MFR	400	11	-406	-445	-471	-396
MEADOWS	SAN JACINTO	FORT BEND	080792000	08079200007910	MUN	0	-558	-1103	-1090	-1085	-1085

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	080792000	08079200007911	MUN	0	-55	-110	-109	-108	-108
MINING	SAN JACINTO	FORT BEND	081003079	08100307907910	MIN	0	-77	-165	-168	-171	-173
MINING	SAN JACINTO-BRAZOS	FORT BEND	081003079	08100307907911	MIN	0	-86	-703	-717	-729	-739
MINING	BRAZOS	FORT BEND	081003079	08100307907912	MIN	0	-189	-383	-389	-396	-401
MINING	BRAZOS-COLORADO	FORT BEND	081003079	08100307907913	MIN	0	-4	-4	-6	-7	-9
MISSOURI CITY	SAN JACINTO	FORT BEND	080409000	08040900007910	MUN	1559	606	-722	-1362	-1843	-2898
MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MUN	6944	2633	-3379	-6272	-8447	-13226
MISSOURI CITY	BRAZOS	FORT BEND	080409000	08040900007912	MUN	210	94	-68	-146	-204	-333
NEEDVILLE	BRAZOS	FORT BEND	080428000	08042800007912	MUN	0	-43	-97	-152	-229	-320
NEEDVILLE	BRAZOS-COLORADO	FORT BEND	080428000	08042800007913	MUN	0	-53	-118	-185	-277	-387
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	MUN	0	-5	-11	-13	-15	-18
PECAN GROVE MUD #1	BRAZOS	FORT BEND	084299000	08429900007912	MUN	2450	1754	1047	1018	945	847
PECAN GROVE MUD #1	SAN JACINTO-BRAZOS	FORT BEND	084299000	08429900007911	MUN	651	466	278	271	251	225
PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	MUN	0	-166	-326	-320	-318	-318
PLEAK	BRAZOS	FORT BEND	081053000	08105300007912	MUN	0	-99	-223	-348	-516	-709
RICHMOND	BRAZOS	FORT BEND	080500000	08050000007912	MUN	3000	2303	1342	917	191	-611
ROSENBERG	BRAZOS	FORT BEND	080518000	08051800007912	MUN	4500	2579	-259	-1829	-3964	-6498
SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	084334000	08433400007911	MUN	0	-364	-727	-723	-723	-723
SIMONTON	BRAZOS	FORT BEND	081062000	08106200007912	MUN	0	-78	-173	-270	-397	-548
STAFFORD	SAN JACINTO	FORT BEND	080577000	08057700007910	MUN	1155	1047	849	727	554	356
STAFFORD	SAN JACINTO-BRAZOS	FORT BEND	080577000	08057700007911	MUN	4838	4393	3563	3051	2323	1491
STEAM ELECTRIC POWER	BRAZOS	FORT BEND	081002079	08100207907912	PWR	57001	54981	43474	29445	12345	-8500
SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	MUN	6972	2932	-1316	-1276	-1276	-2176
SUGAR LAND	BRAZOS	FORT BEND	080585000	08058500007912	MUN	5082	2124	-985	-956	-956	-956
SUGAR LAND	SAN JACINTO	FORT BEND	080585000	08058500007910	MUN	509	213	-99	-96	-96	-96
WHCRWA	SAN JACINTO	FORT BEND	088002000	08800200007910	MUN	1238	-190	-1686	-2269	-2813	-3345
NFBWA	BRAZOS	FORT BEND	NFBWA	NFBWA07912	MUN	0	16	-942	-1960	-3472	-5383
NFBWA	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	MUN	0	2033	-9386	-13549	-15261	-15807
NFBWA	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	MUN	0	-4242	-14668	-24317	-32959	-41144
KENDLETON	BRAZOS-COLORADO	FORT BEND	KENDLETON	KENDLETON07913	MUN	0	-43	-100	-173	-267	-388
BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	084012000	08401200008411	MUN	821	801	804	813	816	811
BAYOU VISTA	SAN JACINTO-BRAZOS	GALVESTON	080759000	08075900008411	MUN	133	104	91	87	84	80
BOLIVAR PENINSULAR SUD	NECHES-TRINITY	GALVESTON	084027000	08402700008407	MUN	4426	4298	4209	4148	4088	4027
CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	MUN	-99	-104	-106	-104	-104	-106
COUNTY-OTHER	NECHES-TRINITY	GALVESTON	080757084	08075708408407	MUN	1	1	0	1	1	0
COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	080757084	08075708408411	MUN	17764	17899	17987	18037	18064	18078
DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	MUN	-685	-1016	-1186	-1220	-1257	-1299
FRIENDSWOOD	SAN JACINTO-BRAZOS	GALVESTON	080219000	08021900008411	MUN	2179	2024	1972	2012	2002	1974
GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	080227000	08022700008411	MUN	9732	9904	10077	10251	10366	10366
GALVESTON COUNTY MUD #1	SAN JACINTO-BRAZOS	GALVESTON	084135000	08413500008411	MUN	146	164	177	185	193	194
GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	MUN	559	530	514	510	506	502
HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	MUN	891	889	894	908	911	908
IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	081004084	08100408408411	IRR	-9180	-9180	-9180	-9180	-9180	-9180
JAMAICA BEACH	SAN JACINTO-BRAZOS	GALVESTON	080886000	08088600008411	MUN	102	116	125	133	138	139
KEMAH	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	MUN	-186	-230	-256	-264	-268	-274
LA MARQUE	SAN JACINTO-BRAZOS	GALVESTON	080342000	08034200008411	MUN	1262	1304	1345	1386	1414	1414
LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	MUN	-3309	-4085	-4506	-4583	-4672	-4779
LIVESTOCK	NECHES-TRINITY	GALVESTON	081005084	08100508408407	IRR	-14	-14	-14	-14	-14	-14
LIVESTOCK	SAN JACINTO-BRAZOS	GALVESTON	081005084	08100508408411	IRR	0	-10	-26	-26	-26	-25
MANUFACTURING	SAN JACINTO-BRAZOS	GALVESTON	081001084	08100108408411	MFR	31510	28185	25469	22823	20548	17024
MINING	NECHES-TRINITY	GALVESTON	081003084	08100308408407	MIN	-16	-23	-27	-30	-34	-38
MINING	SAN JACINTO-BRAZOS	GALVESTON	081003084	08100308408411	MIN	-15	-22	-25	-29	-32	-35
SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	MUN	1490	1452	1442	1446	1445	1438
SANTA FE	SAN JACINTO-BRAZOS	GALVESTON	080743000	08074300008411	MUN	265	263	270	294	298	294
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	081002084	08100208408411	PWR	-2803	-1782	-2461	-3288	-4297	-5526
TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	080602000	08060200008411	MUN	6209	6292	6395	6513	6591	6587
TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	MUN	196	157	136	128	123	118
BAYTOWN	TRINITY-SAN JACINTO	HARRIS	080042000	08004200010109	MUN	4790	4717	4600	4510	4272	3958
BAYTOWN	SAN JACINTO	HARRIS	080042000	08004200010110	MUN	283	279	272	267	253	234
BELLAIRE	SAN JACINTO	HARRIS	080046000	08004600010110	MUN	-1677	-1936	-2197	-2470	-2760	-3074
BLUE BELL MANOR UTILITY COMPAN	SAN JACINTO	HARRIS	084026000	08402600010110	MUN	-172	-394	-444	-437	-432	-432
BRITMOORE UTILITIES	SAN JACINTO	HARRIS	084036000	08403600010110	MUN	-141	-385	-501	-580	-658	-739

Region H
Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	080085000	08008500010110	MUN	-568	-558	-548	-538	-535	-535
CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	084043000	08404300010110	MUN	-135	-371	-488	-569	-648	-731
CHIMNEY HILL MUD	SAN JACINTO	HARRIS	084053000	08405300010110	MUN	226	-26	-74	-68	-63	-63
CLEAR BROOK CITY MUD WOODMEA	SAN JACINTO	HARRIS	084063000	08406300010110	MUN	877	791	691	599	496	377
CONSUMERS WATER INC	SAN JACINTO	HARRIS	084072000	08407200010110	MUN	-120	-367	-522	-636	-766	-895
COUNTY-OTHER	TRINITY-SAN JACINTO	HARRIS	080757101	08075710110109	MUN	934	1411	1234	1861	2262	2586
COUNTY-OTHER	SAN JACINTO	HARRIS	080757101	08075710110110	MUN	3936	1565	-6122	-25351	-51644	-79434
COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	080757101	08075710110111	MUN	-203	258	-116	270	321	282
CROSBY MUD	SAN JACINTO	HARRIS	084078000	08407800010110	MUN	332	265	201	138	72	-8
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	HARRIS	084081000	08408100010110	MUN	-6	-19	-26	-32	-38	-44
DEER PARK	SAN JACINTO	HARRIS	080154000	08015400010110	MUN	18	9	20	12	-23	-70
DEER PARK	SAN JACINTO-BRAZOS	HARRIS	080154000	08015400010111	MUN	10	13	-29	-44	-99	-179
EL DORADO UD	SAN JACINTO	HARRIS	084101000	08410100010110	MUN	-139	-355	-435	-475	-518	-566
EL LAGO	SAN JACINTO-BRAZOS	HARRIS	080695000	08069500010111	MUN	-278	-299	-311	-319	-326	-337
FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	084132000	08413200010110	MUN	-102	-272	-350	-395	-444	-497
FRIENDSWOOD	SAN JACINTO-BRAZOS	HARRIS	080219000	08021900010111	MUN	795	684	637	638	628	615
GALENA PARK	SAN JACINTO	HARRIS	080226000	08022600010110	MUN	-100	-103	-114	-121	-154	-201
GREEN TRAILS MUD	SAN JACINTO	HARRIS	084143000	08414300010110	MUN	-275	-725	-926	-1044	-1164	-1288
HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	084149000	08414900010110	MUN	-50	-38	-27	-16	-8	-8
HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	084150000	08415000010110	MUN	-490	-439	-422	-380	-380	-380
HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	084151000	08415100010110	MUN	-124	-174	-219	-272	-322	-379
HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	084153000	08415300010110	MUN	-125	-329	-418	-469	-522	-581
HARRIS COUNTY MUD #119 INWOOD	SAN JACINTO	HARRIS	084154000	08415400010110	MUN	-263	-643	-719	-704	-696	-696
HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	084157000	08415700010110	MUN	-526	-1523	-2063	-2470	-2869	-3285
HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	084159000	08415900010110	MUN	-382	-887	-1007	-1000	-1000	-1000
HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	084160000	08416000010110	MUN	-236	-710	-982	-1198	-1424	-1649
HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	084161000	08416100010110	MUN	-368	-1168	-1685	-2112	-2550	-2985
HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	084162000	08416200010110	MUN	-203	-581	-779	-927	-1070	-1226
HARRIS COUNTY MUD #158	SAN JACINTO	HARRIS	084165000	08416500010110	MUN	265	-7	-60	-48	-48	-48
HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	084170000	08417000010110	MUN	-185	-519	-691	-817	-940	-1072
HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	084174000	08417400010110	MUN	-241	-679	-906	-1072	-1235	-1409
HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	084179000	08417900010110	MUN	-188	-543	-629	-627	-627	-627
HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	084182000	08418200010110	MUN	-425	-982	-1122	-1118	-1118	-1118
HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	084183000	08418300010110	MUN	-251	-575	-646	-641	-641	-641
HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	084184000	08418400010110	MUN	-196	-449	-502	-491	-484	-484
HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	084185000	08418500010110	MUN	374	102	3	-32	-74	-121
HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	084186000	08418600010110	MUN	-710	-1161	-1583	-2015	-2435	-2888
HARRIS COUNTY MUD #55	SAN JACINTO-BRAZOS	HARRIS	084187000	08418700010111	MUN	3426	2853	2738	2777	2803	2803
HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	084189000	08418900010110	MUN	-138	-197	-250	-307	-370	-442
HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	084190000	08419000010110	MUN	-175	-444	-549	-600	-653	-708
HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	084191000	08419100010110	MUN	-128	-339	-433	-488	-545	-608
HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	084193000	08419300010110	MUN	450	-101	-346	-487	-637	-803
HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	084195000	08419500010110	MUN	-226	-525	-598	-590	-594	-594
HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	084196000	08419600010110	MUN	-362	-411	-454	-492	-554	-629
HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	084197000	08419700010110	MUN	-275	-387	-476	-579	-692	-820
HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	084198000	08419800010110	MUN	-544	-602	-654	-709	-769	-836
HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	084199000	08419900010110	MUN	-89	-203	-227	-222	-219	-219
HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	084200000	08420000010110	MUN	-232	-234	-236	-234	-241	-251
HEDWIG VILLAGE	SAN JACINTO	HARRIS	080269000	08026900010110	MUN	-504	-505	-506	-507	-510	-516
HILSHIRE VILLAGE	SAN JACINTO	HARRIS	081025000	08102500010110	MUN	60	-15	-31	-29	-29	-29
HOUSTON	SAN JACINTO	HARRIS	080285000	08028500010110	MUN	0	-7398	-12460	-12460	-12460	-46805
HOUSTON	SAN JACINTO-BRAZOS	HARRIS	080285000	08028500010111	MUN	0	-207	-339	-339	-339	-2253
HUMBLE	SAN JACINTO	HARRIS	080289000	08028900010110	MUN	-1052	-2796	-3517	-3918	-4335	-4776
HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	080290000	08029000010110	MUN	-1059	-1169	-1276	-1378	-1491	-1612
IRRIGATION	TRINITY-SAN JACINTO	HARRIS	081004101	08100410110109	IRR	1355	1355	1355	1355	1355	1355
IRRIGATION	SAN JACINTO	HARRIS	081004101	08100410110110	IRR	1476	1476	1476	1476	1476	1476
JACINTO CITY	SAN JACINTO	HARRIS	080301000	08030100010110	MUN	79	34	-30	-75	-146	-232
JERSEY VILLAGE	SAN JACINTO	HARRIS	080709000	08070900010110	MUN	364	-476	-896	-1190	-1479	-1782
KATY	SAN JACINTO	HARRIS	080312000	08031200010110	MUN	-959	-2707	-3635	-4321	-4993	-5695
LA PORTE	SAN JACINTO-BRAZOS	HARRIS	080346000	08034600010111	MUN	3658	3323	2944	2615	2218	1773
LA PORTE	SAN JACINTO	HARRIS	080346000	08034600010110	MUN	208	193	167	162	141	118
LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	080350000	08035000010111	MUN	-17	-17	-17	-17	-18	-18

Region H
Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
LIVESTOCK	TRINITY-SAN JACINTO	HARRIS	081005101	08100510110109	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	HARRIS	081005101	08100510110110	IRR	39	0	42	42	42	42
LIVESTOCK	SAN JACINTO-BRAZOS	HARRIS	081005101	08100510110111	IRR	0	0	0	0	0	0
LONGHORN TOWN UD	SAN JACINTO	HARRIS	084235000	08423500010110	MUN	-179	-600	-890	-1146	-1400	-1653
MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	081001101	08100110110109	MFR	-23008	-28282	-32767	-36739	-39712	-38220
MANUFACTURING	SAN JACINTO	HARRIS	081001101	08100110110110	MFR	159761	141132	125320	111299	100804	106072
MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	MFR	-4487	-9348	-13508	-17178	-19923	-18546
MASON CREEK UD	SAN JACINTO	HARRIS	084247000	08424700010110	MUN	-706	-1625	-1833	-1817	-1809	-1809
MINING	SAN JACINTO	HARRIS	081003101	08100310110110	MIN	-140	-289	-382	-475	-570	-653
MINING	SAN JACINTO-BRAZOS	HARRIS	081003101	08100310110111	MIN	-3	-6	-8	-10	-11	-13
MISSOURI CITY	SAN JACINTO	HARRIS	080409000	08040900010110	MUN	959	454	-181	-450	-696	-1024
NASSAU BAY	SAN JACINTO-BRAZOS	HARRIS	080424000	08042400010111	MUN	1259	1271	1284	1298	1308	1308
NHCRWA	SAN JACINTO	HARRIS	088000000	08800000010110	MUN	-105	-61118	-87517	-96184	-99696	-103906
NORTH BELT UD	SAN JACINTO	HARRIS	084275000	08427500010110	MUN	-139	-420	-585	-717	-856	-994
NORTH GREEN MUD	SAN JACINTO	HARRIS	084279000	08427900010110	MUN	-105	-265	-324	-347	-373	-402
NORTHWEST HARRIS COUNTY MUD #	SAN JACINTO	HARRIS	084286000	08428600010110	MUN	-176	-510	-698	-830	-977	-1123
NORTHWEST PARK MUD	SAN JACINTO	HARRIS	084287000	08428700010110	MUN	-846	-2396	-2742	-2687	-2661	-2661
PARKWAY UD	SAN JACINTO	HARRIS	084298000	08429800010110	MUN	-242	-237	-230	-224	-220	-222
PASADENA	SAN JACINTO	HARRIS	080456000	08045600010110	MUN	15746	14295	12977	11585	10062	8353
PASADENA	SAN JACINTO-BRAZOS	HARRIS	080456000	08045600010111	MUN	3449	3044	2674	2285	1858	1380
PEARLAND	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	MUN	227	129	56	-21	-104	-185
PINE TRAILS UTILITY	SAN JACINTO	HARRIS	084302000	08430200010110	MUN	-271	-340	-402	-469	-542	-624
PINEY POINT VILLAGE	SAN JACINTO	HARRIS	080468000	08046800010110	MUN	-773	-817	-861	-903	-953	-1009
ROLLING FORK PUD	SAN JACINTO	HARRIS	084411000	08441100010110	MUN	-212	-510	-602	-626	-655	-688
SEABROOK	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	MUN	-1262	-1678	-2077	-2502	-2923	-3366
SHOREACRES	SAN JACINTO-BRAZOS	HARRIS	080558000	08055800010111	MUN	222	209	197	187	189	189
SOUTH HOUSTON	SAN JACINTO	HARRIS	080569000	08056900010110	MUN	2369	2264	2129	2026	1882	1715
SOUTHSIDE PLACE	SAN JACINTO	HARRIS	080572000	08057200010110	MUN	-6	-33	-58	-82	-110	-140
SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	084343000	08434300010110	MUN	-213	-556	-706	-786	-874	-971
SPRING VALLEY	SAN JACINTO	HARRIS	080575000	08057500010110	MUN	-266	-640	-755	-783	-819	-860
STAFFORD	SAN JACINTO	HARRIS	080577000	08057700010110	MUN	188	62	47	34	24	16
STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	081002101	08100210110110	PWR	7085	-8216	-12036	-16693	-22369	-29287
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	PWR	-400	-1333	-1566	-1849	-2195	-2617
SUNBELT FWSD	SAN JACINTO	HARRIS	084350000	08435000010110	MUN	-861	-3173	-4252	-4993	-5719	-6484
TAYLOR LAKE VILLAGE	SAN JACINTO-BRAZOS	HARRIS	080751000	08075100010111	MUN	913	930	946	963	969	969
TOMBALL	SAN JACINTO	HARRIS	080608000	08060800010110	MUN	-786	-2311	-3074	-4066	-4794	-5862
TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	084355000	08435500010110	MUN	-424	-963	-1091	-1071	-1071	-1071
WALLER	SAN JACINTO	HARRIS	080629000	08062900010110	MUN	-7	-79	-123	-158	-193	-229
WEBSTER	SAN JACINTO-BRAZOS	HARRIS	080635000	08063500010111	MUN	6835	6155	5480	4820	4142	3466
WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	084387000	08438700010110	MUN	-169	-393	-449	-439	-433	-433
WEST UNIVERSITY PL.	SAN JACINTO	HARRIS	080643000	08064300010110	MUN	-428	-602	-765	-918	-1107	-1316
WHCRWA	SAN JACINTO	HARRIS	088002000	08800200010110	MUN	1179	-27927	-39610	-44206	-45691	-46446
WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	084398000	08439800010110	MUN	-199	-456	-512	-502	-496	-496
WINDFERN FOREST UD	SAN JACINTO	HARRIS	084401000	08440100010110	MUN	-174	-653	-741	-733	-733	-733
WOODCREEK MUD	SAN JACINTO	HARRIS	084404000	08440400010110	MUN	-187	-570	-799	-984	-1174	-1364
NFBWA	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	MUN	0	-501	-793	-922	-995	-1013
CHCRWA	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	MUN	984	-2128	-2771	-2771	-2771	-2771
BUFFALO	TRINITY	LEON	080083000	08008300014508	MUN	0	-36	-53	-49	-44	-47
CENTERVILLE	TRINITY	LEON	080105000	08010500014508	MUN	0	-14	-21	-18	-16	-17
COUNTY-OTHER	TRINITY	LEON	080757145	08075714514508	MUN	0	-20	-24	-15	-8	-11
COUNTY-OTHER	BRAZOS	LEON	080757145	08075714514512	MUN	0	-21	-26	-17	-10	-13
FLO COMMUNITY WSC	TRINITY	LEON	084114000	08411400014508	MUN	0	-107	-160	-156	-141	-149
IRRIGATION	TRINITY	LEON	081004145	08100414514508	IRR	0	0	0	0	0	0
JEWETT	TRINITY	LEON	080887000	08088700014508	MUN	0	-26	-41	-40	-37	-39
JEWETT	BRAZOS	LEON	080887000	08088700014512	MUN	0	-9	-13	-13	-12	-13
LIVESTOCK	TRINITY	LEON	081005145	08100514514508	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	LEON	081005145	08100514514512	IRR	0	0	0	0	0	0
MANUFACTURING	TRINITY	LEON	081001145	08100114514508	MFR	0	-128	-253	-379	-493	-599
MINING	TRINITY	LEON	081003145	08100314514508	MIN	0	0	0	0	0	0
MINING	BRAZOS	LEON	081003145	08100314514512	MIN	0	0	0	0	0	0
NORMANGEE	TRINITY	LEON	080927000	08092700014508	MUN	0	-11	-16	-14	-13	-14
NORMANGEE	BRAZOS	LEON	080927000	08092700014512	MUN	0	-4	-7	-6	-5	-6

Region H

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
AMES	TRINITY	LIBERTY	080676000	08067600014608	MUN	0	-22	-42	-60	-84	-113
CLEVELAND	SAN JACINTO	LIBERTY	080116000	08011600014610	MUN	0	-24	-51	-75	-123	-188
COUNTY-OTHER	NECHES	LIBERTY	080757146	08075714614606	MUN	0	-25	-49	-74	-101	-134
COUNTY-OTHER	NECHES-TRINITY	LIBERTY	080757146	08075714614607	MUN	0	-1	-3	-5	-7	-9
COUNTY-OTHER	TRINITY	LIBERTY	080757146	08075714614608	MUN	0	-329	-654	-999	-1370	-1841
COUNTY-OTHER	TRINITY-SAN JACINTO	LIBERTY	080757146	08075714614609	MUN	0	-30	-60	-90	-123	-163
COUNTY-OTHER	SAN JACINTO	LIBERTY	080757146	08075714614610	MUN	0	-210	-413	-624	-851	-1133
DAISETTA	NECHES	LIBERTY	080149000	08014900014606	MUN	0	-1	-2	-3	-4	-7
DAISETTA	TRINITY	LIBERTY	080149000	08014900014608	MUN	0	-2	-3	-4	-7	-11
DAYTON	TRINITY	LIBERTY	080152000	08015200014608	MUN	0	-424	-816	-1187	-1618	-2118
HARDIN	TRINITY	LIBERTY	080878000	08087800014608	MUN	0	-19	-36	-55	-75	-99
HARDIN WSC	TRINITY	LIBERTY	084148000	08414800014608	MUN	0	-102	-200	-298	-406	-532
IRRIGATION	NECHES	LIBERTY	081004146	08100414614606	IRR	-805	-805	-805	-805	-805	-805
IRRIGATION	NECHES-TRINITY	LIBERTY	081004146	08100414614607	IRR	11355	11313	11282	11250	11213	11171
IRRIGATION	TRINITY	LIBERTY	081004146	08100414614608	IRR	1424	-558	-2009	-3599	-5484	-7618
IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	081004146	08100414614609	IRR	-11041	-11081	-11116	-11151	-11189	-11217
IRRIGATION	SAN JACINTO	LIBERTY	081004146	08100414614610	IRR	0	0	0	0	0	0
KENEFICK	TRINITY	LIBERTY	081033000	08103300014608	MUN	0	-18	-34	-50	-68	-89
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	LIBERTY	084226000	08422600014608	MUN	72	63	56	51	45	35
LIBERTY	TRINITY	LIBERTY	080356000	08035600014608	MUN	0	-18	-23	-34	-69	-119
LIVESTOCK	NECHES	LIBERTY	081005146	08100514614606	IRR	0	0	0	0	0	0
LIVESTOCK	NECHES-TRINITY	LIBERTY	081005146	08100514614607	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY	LIBERTY	081005146	08100514614608	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY-SAN JACINTO	LIBERTY	081005146	08100514614609	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	LIBERTY	081005146	08100514614610	IRR	0	0	0	0	0	0
MANUFACTURING	TRINITY	LIBERTY	081001146	08100114614608	MFR	0	-12	-23	-35	-46	-55
MANUFACTURING	SAN JACINTO	LIBERTY	081001146	08100114614610	MFR	0	-60	-121	-183	-239	-288
MERCY WSC	SAN JACINTO	LIBERTY	084253000	08425300014610	MUN	0	-13	-25	-38	-51	-67
MINING	NECHES	LIBERTY	081003146	08100314614606	MIN	0	0	0	0	0	-1
MINING	NECHES-TRINITY	LIBERTY	081003146	08100314614607	MIN	0	0	0	-1	0	0
MINING	TRINITY	LIBERTY	081003146	08100314614608	MIN	0	-57	-109	-157	-211	-268
MINING	TRINITY-SAN JACINTO	LIBERTY	081003146	08100314614609	MIN	0	-10	-15	-20	-25	-30
MINING	SAN JACINTO	LIBERTY	081003146	08100314614610	MIN	0	0	0	0	-1	-1
PLUM GROVE	SAN JACINTO	LIBERTY	081054000	08105400014610	MUN	0	-35	-66	-99	-136	-178
SOUTHWEST UTILITIES	SAN JACINTO	LIBERTY	084343000	08434300014610	MUN	0	-2	-4	-6	-9	-12
STEAM ELECTRIC POWER	TRINITY	LIBERTY	081002146	08100214614608	PWR	0	-1278	-1995	-2869	-3934	-5233
WEST HARDIN WSC	NECHES	LIBERTY	084383000	08438300014606	MUN	0	-6	-13	-18	-25	-34
COUNTY-OTHER	TRINITY	MADISON	080757157	08075715715708	MUN	1	-61	-106	-69	-100	-165
COUNTY-OTHER	BRAZOS	MADISON	080757157	08075715715712	MUN	0	-4	-7	-9	-12	-16
IRRIGATION	TRINITY	MADISON	081004157	08100415715708	IRR	0	0	0	0	0	0
LIVESTOCK	TRINITY	MADISON	081005157	08100515715708	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	MADISON	081005157	08100515715712	IRR	0	0	0	0	0	0
MADISONVILLE	TRINITY	MADISON	080382000	08038200015708	MUN	0	-34	-56	-75	-100	-127
MANUFACTURING	TRINITY	MADISON	081001157	08100115715708	MFR	0	-29	-56	-83	-107	-138
MINING	TRINITY	MADISON	081003157	08100315715708	MIN	0	0	0	0	0	0
MINING	BRAZOS	MADISON	081003157	08100315715712	MIN	0	0	0	0	0	0
NORMANGEE	TRINITY	MADISON	080927000	08092700015708	MUN	-1	-2	-3	-3	-4	-4
CONROE	SAN JACINTO	MONTGOMERY	080130000	08013000017010	MUN	-2584	-6181	-9761	-10193	-16483	-23761
CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	084072000	08407200017010	MUN	-51	-103	-161	-226	-319	-430
COUNTY-OTHER	SAN JACINTO	MONTGOMERY	080757170	08075717017010	MUN	-5261	-11516	-20786	-33264	-50557	-71563
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	MONTGOMERY	084081000	08408100017010	MUN	-139	-299	-495	-743	-1122	-1564
CUT AND SHOOT	SAN JACINTO	MONTGOMERY	080854000	08085400017010	MUN	-48	-99	-150	-149	-236	-338
EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	084098000	08409800017010	MUN	-108	-234	-385	-418	-720	-1070
H M W SUD	SAN JACINTO	MONTGOMERY	084147000	08414700017010	MUN	-390	-790	-1200	-1186	-1888	-2692
HOUSTON	SAN JACINTO	MONTGOMERY	080285000	08028500017010	MUN	-12	-75	-197	-338	-526	-748
IRRIGATION	SAN JACINTO	MONTGOMERY	081004170	08100417017010	IRR	865	852	845	840	835	832
LIVESTOCK	SAN JACINTO	MONTGOMERY	081005170	08100517017010	IRR	393	293	239	199	161	132
MAGNOLIA	SAN JACINTO	MONTGOMERY	080907000	08090700017010	MUN	-101	-266	-463	-678	-966	-1308
MANUFACTURING	SAN JACINTO	MONTGOMERY	081001170	08100117017010	MFR	-469	-988	-1384	-1756	-2129	-2504
MINING	SAN JACINTO	MONTGOMERY	081003170	08100317017010	MIN	-110	-216	-279	-331	-382	-425
MONTGOMERY COUNTY MUD #18	SAN JACINTO	MONTGOMERY	084261000	08426100017010	MUN	-430	-1007	-2080	-2551	-4352	-6446
MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	084262000	08426200017010	MUN	-105	-192	-236	-190	-245	-285

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	084263000	08426300017010	MUN	-193	-464	-703	-692	-827	-927
MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	084264000	08426400017010	MUN	-182	-461	-757	-743	-912	-1042
MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	084265000	08426500017010	MUN	-128	-234	-289	-328	-367	-399
MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	084266000	08426600017010	MUN	-111	-214	-297	-270	-401	-544
MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	084267000	08426700017010	MUN	-225	-411	-509	-407	-523	-610
MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	084268000	08426800017010	MUN	-114	-220	-306	-397	-515	-653
NEW CANEY MUD	SAN JACINTO	MONTGOMERY	084272000	08427200017010	MUN	-335	-699	-1144	-1648	-2389	-3321
OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	080726000	08072600017010	MUN	-156	-317	-471	-456	-714	-1005
PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	080732000	08073200017010	MUN	-150	-289	-373	-318	-427	-520
PATTON VILLAGE	SAN JACINTO	MONTGOMERY	080734000	08073400017010	MUN	-20	-37	-53	-70	-92	-122
POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	084305000	08430500017010	MUN	-168	-385	-739	-1198	-1815	-2532
PORTER WSC	SAN JACINTO	MONTGOMERY	084307000	08430700017010	MUN	-446	-914	-1431	-2038	-2257	-2449
RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	084312000	08431200017010	MUN	-530	-971	-1194	-975	-1254	-1460
RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	084322000	08432200017010	MUN	-191	-349	-432	-489	-545	-592
ROMAN FOREST	SAN JACINTO	MONTGOMERY	080801000	08080100017010	MUN	-125	-421	-774	-1151	-1657	-2262
SHENANDOAH	SAN JACINTO	MONTGOMERY	080745000	08074500017010	MUN	-401	-858	-1239	-1164	-1761	-2426
SOUTHERN MONTGOMERY COUNTY	SAN JACINTO	MONTGOMERY	084339000	08433900017010	MUN	-436	-1018	-1271	-1069	-1391	-1657
SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	084343000	08434300017010	MUN	-58	-119	-187	-263	-368	-497
SPLENDORA	SAN JACINTO	MONTGOMERY	080962000	08096200017010	MUN	-43	-95	-157	-239	-358	-496
SPRING CREEK UD	SAN JACINTO	MONTGOMERY	084344000	08434400017010	MUN	-123	-260	-420	-438	-750	-1120
STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	084347000	08434700017010	MUN	-170	-383	-477	-382	-492	-574
STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	081002170	08100217017010	PWR	6683	3189	1739	-27	-2181	-4809
THE WOODLANDS	SAN JACINTO	MONTGOMERY	088001000	08800100017010	MUN	-3368	-15302	-16776	-12063	-15437	-17975
WILLIS	SAN JACINTO	MONTGOMERY	080655000	08065500017010	MUN	-130	-275	-429	-438	-712	-1038
WOODBRANCH	SAN JACINTO	MONTGOMERY	080807000	08080700017010	MUN	-42	-85	-119	-152	-193	-243
MONTGOMERY	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	MUN	-57	-827	-1306	-1779	-1931	-2450
STAGECOACH	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	MUN	-18	-45	-83	-133	-204	-305
COUNTY-OTHER	TRINITY	POLK	080757187	08075718718708	MUN	20	-71	-124	-174	-260	-356
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	POLK	084226000	08422600018708	MUN	591	523	474	454	417	367
LIVESTOCK	TRINITY	POLK	081005187	08100518718708	IRR	0	0	0	0	0	0
LIVINGSTON	TRINITY	POLK	080362000	08036200018708	MUN	3464	3084	2799	2595	2389	2178
MINING	TRINITY	POLK	081003187	08100318718708	MIN	0	-2	-3	-4	-5	-6
ONALASKA	TRINITY	POLK	080933000	08093300018708	MUN	0	-40	-71	-92	-113	-136
ONALASKA WSC	TRINITY	POLK	084293000	08429300018708	MUN	0	-4	-7	-2	-6	-15
TRINITY RURAL WSC	TRINITY	POLK	084363000	08436300018708	MUN	18	20	23	24	29	30
COLDSPRING	TRINITY	SAN JACINTO	080122000	08012200020408	MUN	0	-23	-42	-53	-59	-62
COLDSPRING	SAN JACINTO	SAN JACINTO	080122000	08012200020410	MUN	0	-7	-12	-15	-16	-17
COUNTY-OTHER	TRINITY	SAN JACINTO	080757204	08075720420408	MUN	1402	1361	1344	1403	1438	1385
COUNTY-OTHER	SAN JACINTO	SAN JACINTO	080757204	08075720420410	MUN	0	-106	-184	-223	-246	-261
IRRIGATION	TRINITY	SAN JACINTO	081004204	08100420420408	IRR	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY &	SAN JACINTO	SAN JACINTO	084226000	08422600020410	MUN	63	51	41	37	33	29
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	SAN JACINTO	084226000	08422600020408	MUN	137	111	90	81	73	63
LIVESTOCK	TRINITY	SAN JACINTO	081005204	08100520420408	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	SAN JACINTO	081005204	08100520420410	IRR	0	0	0	0	0	0
MANUFACTURING	SAN JACINTO	SAN JACINTO	081001204	08100120420410	MFR	0	-4	-8	-12	-15	-20
MERCY WSC	SAN JACINTO	SAN JACINTO	084253000	08425300020410	MUN	0	-66	-117	-149	-166	-175
MINING	TRINITY	SAN JACINTO	081003204	08100320420408	MIN	0	0	0	0	0	0
MINING	SAN JACINTO	SAN JACINTO	081003204	08100320420410	MIN	0	0	0	0	0	0
POINT BLANK	TRINITY	SAN JACINTO	081056000	08105600020408	MUN	0	-11	-19	-23	-26	-27
RIVERSIDE WSC	TRINITY	SAN JACINTO	084323000	08432300020408	MUN	0	-29	-58	-110	-142	-177
SAN JACINTO WSC	TRINITY	SAN JACINTO	084328000	08432800020408	MUN	280	212	158	125	109	99
SHEPHERD	TRINITY	SAN JACINTO	080746000	08074600020408	MUN	0	-54	-93	-110	-123	-130
COUNTY-OTHER	TRINITY	TRINITY	080757228	08075722822808	MUN	3927	3881	3876	3898	3929	3938
GROVETON	TRINITY	TRINITY	080255000	08025500022808	MUN	0	0	0	0	0	0
IRRIGATION	TRINITY	TRINITY	081004228	08100422822808	IRR	290	290	290	290	290	290
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	TRINITY	084226000	08422600022808	MUN	72	66	63	59	54	50
LIVESTOCK	TRINITY	TRINITY	081005228	08100522822808	IRR	0	0	0	0	0	0
MINING	TRINITY	TRINITY	081003228	08100322822808	MIN	0	0	0	0	0	0
TRINITY	TRINITY	TRINITY	080610000	08061000022808	MUN	370	368	370	370	370	370
TRINITY RURAL WSC	TRINITY	TRINITY	084363000	08436300022808	MUN	848	828	826	836	841	847
CONSOLIDATED WSC	TRINITY	WALKER	084071000	08407100023608	MUN	0	-1	-1	0	0	0
COUNTY-OTHER	TRINITY	WALKER	080757236	08075723623608	MUN	193	832	776	702	581	439

Table 4A-1: WUG Surplus or Shortage

wug_name	wug_basin	wug_county	wug_id	wug_id+c+b	TYPE	SHORT 2010	SHORT 2020	SHORT 2030	SHORT 2040	SHORT 2050	SHORT 2060
COUNTY-OTHER	SAN JACINTO	WALKER	080757236	08075723623610	MUN	959	319	376	450	571	713
HUNTSVILLE	TRINITY	WALKER	080292000	08029200023608	MUN	2820	2524	2469	2469	2456	2437
HUNTSVILLE	SAN JACINTO	WALKER	080292000	08029200023610	MUN	14179	12938	12806	12954	12998	12994
IRRIGATION	TRINITY	WALKER	081004236	08100423623608	IRR	0	0	0	0	0	0
IRRIGATION	SAN JACINTO	WALKER	081004236	08100423623610	IRR	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY &	TRINITY	WALKER	084226000	08422600023608	MUN	19	17	16	16	15	15
LIVESTOCK	TRINITY	WALKER	081005236	08100523623608	IRR	0	0	0	0	0	0
LIVESTOCK	SAN JACINTO	WALKER	081005236	08100523623610	IRR	0	0	0	0	0	0
MANUFACTURING	TRINITY	WALKER	081001236	08100123623608	MFR	0	-627	-1324	-1515	-1817	-2155
MANUFACTURING	SAN JACINTO	WALKER	081001236	08100123623610	MFR	0	-92	-176	-262	-337	-416
MINING	TRINITY	WALKER	081003236	08100323623608	MIN	0	0	0	0	0	0
MINING	SAN JACINTO	WALKER	081003236	08100323623610	MIN	0	0	0	0	0	0
NEW WAVERLY	SAN JACINTO	WALKER	080926000	08092600023610	MUN	0	-17	-25	-18	-17	-17
RIVERSIDE WSC	TRINITY	WALKER	084323000	08432300023608	MUN	0	0	-10	-59	-82	-119
TRINITY RURAL WSC	TRINITY	WALKER	084363000	08436300023608	MUN	67	68	68	69	73	76
WALKER COUNTY RURAL WSC	TRINITY	WALKER	084372000	08437200023608	MUN	0	-78	-119	-119	-131	-146
BROOKSHIRE	BRAZOS	WALLER	080077000	08007700023712	MUN	0	-174	-366	-581	-844	-1159
COUNTY-OTHER	SAN JACINTO	WALLER	080757237	08075723723710	MUN	0	-172	-386	-594	-888	-1225
COUNTY-OTHER	BRAZOS	WALLER	080757237	08075723723712	MUN	0	-23	-70	-109	-184	-269
HEMPSTEAD	BRAZOS	WALLER	080271000	08027100023712	MUN	0	-595	-1237	-1970	-2837	-3856
IRRIGATION	SAN JACINTO	WALLER	081004237	08100423723710	IRR	0	-474	0	-13	-1592	-3398
IRRIGATION	BRAZOS	WALLER	081004237	08100423723712	IRR	0	0	0	0	0	0
KATY	SAN JACINTO	WALLER	080312000	08031200023710	MUN	-82	-284	-444	-612	-809	-1041
LIVESTOCK	SAN JACINTO	WALLER	081005237	08100523723710	IRR	0	0	0	0	0	0
LIVESTOCK	BRAZOS	WALLER	081005237	08100523723712	IRR	0	0	0	0	0	0
MANUFACTURING	SAN JACINTO	WALLER	081001237	08100123723710	MFR	0	-10	-19	-27	-36	-44
MANUFACTURING	BRAZOS	WALLER	081001237	08100123723712	MFR	0	-2	-4	-7	-8	-11
MINING	SAN JACINTO	WALLER	081003237	08100323723710	MIN	0	0	0	0	0	0
MINING	BRAZOS	WALLER	081003237	08100323723712	MIN	0	0	0	0	0	0
PINE ISLAND	BRAZOS	WALLER	080938000	08093800023712	MUN	0	-29	-60	-93	-137	-188
PRAIRIE VIEW	BRAZOS	WALLER	080485000	08048500023712	MUN	0	-82	-178	-289	-429	-597
PRAIRIE VIEW	SAN JACINTO	WALLER	080485000	08048500023710	MUN	0	-9	-20	-32	-47	-66
WALLER	SAN JACINTO	WALLER	080629000	08062900023710	MUN	0	-72	-156	-252	-366	-501

Region H

Table 4A-2: WWP Needs by Type, Basin, and County

WWP	Demand Type	Basin	County	Need 2010	Need 2020	Need 2030	Need 2040	Need 2050	Need 2060
BAYTOWN AREA WATER AUTHORITY	MUNICIPAL	SAN JACINTO	HARRIS	0	26	262	398	535	692
BRAZOS RIVER AUTHORITY	MANUFACTURING	BRAZOS	BRAZORIA	0	47499	29570	49592	67501	88950
BRAZOS RIVER AUTHORITY	MANUFACTURING	BRAZOS	FORT BEND	0	0	406	445	471	396
BRAZOS RIVER AUTHORITY	MANUFACTURING	SAN JACINTO	FORT BEND	0	623	1292	1354	1396	1282
BRAZOS RIVER AUTHORITY	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	0	0	0	1615	4484	8140
BRAZOS RIVER AUTHORITY	MINING	BRAZOS	BRAZORIA	0	119	136	154	171	187
BRAZOS RIVER AUTHORITY	MINING	BRAZOS	FORT BEND	0	189	383	389	396	401
BRAZOS RIVER AUTHORITY	MINING	BRAZOS-COLORADO	BRAZORIA	0	431	546	662	807	956
BRAZOS RIVER AUTHORITY	MINING	SAN JACINTO	FORT BEND	0	77	165	168	171	173
BRAZOS RIVER AUTHORITY	MINING	SAN JACINTO-BRAZOS	BRAZORIA	0	73	103	146	195	244
BRAZOS RIVER AUTHORITY	MUNICIPAL	BRAZOS	FORT BEND	0	378	1514	5408	13823	23930
BRAZOS RIVER AUTHORITY	MUNICIPAL	SAN JACINTO	FORT BEND	0	23	61	471	1532	2737
BRAZOS RIVER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	4	1035	1904	9209	17827
BRAZOSPORT WATER AUTHORITY	MANUFACTURING	BRAZOS	BRAZORIA	326	252	130	124	0	0
BRAZOSPORT WATER AUTHORITY	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	0	291	4	6	0	0
BRAZOSPORT WATER AUTHORITY	MUNICIPAL	BRAZOS	BRAZORIA	0	116	124	129	137	146
BRAZOSPORT WATER AUTHORITY	MUNICIPAL	BRAZOS-COLORADO	BRAZORIA	1752	1852	2005	2109	2293	2508
BRAZOSPORT WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	BRAZORIA	5672	4802	5611	6939	8503	10531
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	IRRIGATION	TRINITY	CHAMBERS	20376	20600	20734	20857	20975	21076
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	MUNICIPAL	TRINITY	CHAMBERS	0	1084	1245	1387	1538	1695
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	MUNICIPAL	TRINITY-SAN JACINTO	CHAMBERS	0	607	733	848	973	1109
CHCRWA	MUNICIPAL	SAN JACINTO	HARRIS	0	1771	2414	2431	2431	2431
CITY OF HOUSTON	IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	6657	6697	6732	6767	6805	5742
CITY OF HOUSTON	MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	4487	8862	12609	17178	19923	18546
CITY OF HOUSTON	MINING	SAN JACINTO	HARRIS	140	274	358	455	546	629
CITY OF HOUSTON	MINING	SAN JACINTO-BRAZOS	HARRIS	3	5	7	9	10	12
CITY OF HOUSTON	MUNICIPAL	SAN JACINTO	HARRIS	11722	27736	34266	47533	77507	106375
CITY OF HOUSTON	MUNICIPAL	SAN JACINTO	MONTGOMERY	0	62	173	305	481	689
CITY OF HOUSTON	MUNICIPAL	SAN JACINTO-BRAZOS	BRAZORIA	0	0	201	294	325	0
CITY OF HOUSTON	MUNICIPAL	SAN JACINTO-BRAZOS	HARRIS	203	0	64	0	4	319
CITY OF HOUSTON	STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	0	5957	9395	16693	22369	26650
CITY OF HOUSTON	STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	400	1239	1449	1849	2195	2617
CITY OF PASADENA	MUNICIPAL	SAN JACINTO	HARRIS	508	557	600	659	709	772
CITY OF PASADENA	MUNICIPAL	SAN JACINTO-BRAZOS	HARRIS	1357	1721	2065	2494	2870	3296
FORT BEND CO. WCID 1	MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	0	148	824	940	1016	1016
FORT BEND COUNTY WCID #2	MUNICIPAL	SAN JACINTO	FORT BEND	0	447	993	993	993	993
FORT BEND COUNTY WCID #2	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	44	99	99	99	99
GALVESTON COUNTY WCID #1	MUNICIPAL	SAN JACINTO-BRAZOS	GALVESTON	0	799	959	990	1025	1064
GULF COAST WATER AUTHORITY	IRRIGATION	BRAZOS	BRAZORIA	1754	1384	1243	1157	1157	1157
GULF COAST WATER AUTHORITY	IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	82741	71681	62691	62777	62970	64614
GULF COAST WATER AUTHORITY	IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	6788	6788	6788	6788	6788	6788
GULF COAST WATER AUTHORITY	MANUFACTURING	BRAZOS	BRAZORIA	13694	13694	51614	51614	51614	51614
GULF COAST WATER AUTHORITY	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	0	0	1580	1580	1580	1580
GULF COAST WATER AUTHORITY	MINING	SAN JACINTO-BRAZOS	FORT BEND	0	86	703	717	729	739
GULF COAST WATER AUTHORITY	MINING	SAN JACINTO-BRAZOS	GALVESTON	0	21	24	28	31	34
GULF COAST WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	BRAZORIA	0	49	682	2321	4540	7429
GULF COAST WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	0	0	1950	1950	1950
GULF COAST WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	GALVESTON	0	3780	4156	4235	4323	4429
GULF COAST WATER AUTHORITY	MUNICIPAL	SAN JACINTO-BRAZOS	HARRIS	0	15	15	15	63	146
GULF COAST WATER AUTHORITY	STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	0	1381	1992	2819	3828	5057
LOWER NECHES VALLEY AUTHORITY	MINING	NECHES-TRINITY	GALVESTON	16	23	26	29	33	37
MISSOURI CITY	MUNICIPAL	BRAZOS	FORT BEND	0	514	1720	1906	2029	2218
MISSOURI CITY	MUNICIPAL	SAN JACINTO	FORT BEND	0	0	722	1362	1794	2517
MISSOURI CITY	MUNICIPAL	SAN JACINTO	HARRIS	0	0	181	450	696	862
MISSOURI CITY	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	782	5188	8586	10482	14053
NFBWA	MUNICIPAL	BRAZOS	FORT BEND	0	0	892	1905	3389	5281
NFBWA	MUNICIPAL	SAN JACINTO	FORT BEND	0	0	7700	11775	13327	13887
NFBWA	MUNICIPAL	SAN JACINTO	HARRIS	0	444	732	865	926	939
NFBWA	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	4348	12962	22321	30384	38218
NHCRWA	MUNICIPAL	SAN JACINTO	HARRIS	761	56453	84636	92814	97227	102615
NORTH CHANNEL WATER AUTHORITY	MUNICIPAL	SAN JACINTO	HARRIS	1954	2392	2869	3511	4157	4912
NRG	STEAM ELECTRIC POWER	BRAZOS	FORT BEND	0	0	0	0	0	8500
RICHMOND-ROSENBERG	MUNICIPAL	BRAZOS	FORT BEND	0	0	0	1091	3060	5645
SAN JACINTO RIVER AUTHORITY	MANUFACTURING	SAN JACINTO	MONTGOMERY	0	988	1384	1756	2129	2504
SAN JACINTO RIVER AUTHORITY	MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	23008	27754	31791	35763	38736	37244
SAN JACINTO RIVER AUTHORITY	MINING	SAN JACINTO	MONTGOMERY	0	216	279	331	382	425
SAN JACINTO RIVER AUTHORITY	MUNICIPAL	SAN JACINTO	HARRIS	0	0	5299	15769	15784	17605
SAN JACINTO RIVER AUTHORITY	MUNICIPAL	SAN JACINTO	MONTGOMERY	0	39868	56724	61475	89620	122824
SAN JACINTO RIVER AUTHORITY	STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	0	0	0	0	1593	4307
SUGAR LAND	MUNICIPAL	BRAZOS	FORT BEND	0	1280	4338	4677	4675	4515
SUGAR LAND	MUNICIPAL	SAN JACINTO	FORT BEND	0	0	35	35	35	35
SUGAR LAND	MUNICIPAL	SAN JACINTO-BRAZOS	FORT BEND	0	162	794	1228	1504	2404
THE DOW CHEMICAL CO.	MANUFACTURING	BRAZOS	BRAZORIA	0	19048	19048	19048	19048	19048
THE DOW CHEMICAL CO.	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	0	950	2752	2752	2752	2752
TRINITY RIVER AUTHORITY	IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	0	0	0	0	0	1091
TRINITY RIVER AUTHORITY	MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	8264	9230	10252	11284	12240	13445
TRINITY RIVER AUTHORITY	MINING	TRINITY	CHAMBERS	4344	6494	7816	9116	10411	11550
TRINITY RIVER AUTHORITY	MINING	TRINITY-SAN JACINTO	CHAMBERS	1215	1359	1904	2488	3081	3677
WHCRWA	MUNICIPAL	SAN JACINTO	FORT BEND	68	238	1801	2472	3091	3747
WHCRWA	MUNICIPAL	SAN JACINTO	HARRIS	2355	31360	44848	51011	53259	55373
WHCRWA	MUNICIPAL	SAN JACINTO	WALLER	65	258	409	566	751	968

Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
Screening Factor Weight:																					
Conservation Strategies																					
Industrial Conservation	Manufacturing	Reduce water demand through selected BMPs	All	No	No impact	None	Strategy reduces the demand for additional water supply, but also reduces return flows from existing sources.	Reducesreturn flows from current sources, but the rate of savings does not compenstae for the rate of growth in the largest counties.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure. Reductions in return flows off-set by increase in overall demand.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect on existing supply sources.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Irrigation Conservation	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	Various	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Brazoria County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	Brazos, Brazos-Colorado	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Chambers County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	Trinity	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Galveston County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	San Jacinto - Brazos	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Liberty County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	Trinity	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Waller County	Irrigation	Reduce irrigation losses through land leveling, point irrigation	San Jacinto	No	Reduces losses that feed small streams	None	Strategy reduces the demand for additional water supply, but also reduces run-off and seepage losses from existing irrigation.	No significant effect on bay and estuary flows.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	NA - Does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Reducing water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows off fields, as well as reducing water fowl habitat.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Municipal Conservation	Multiple	Reduce demand through various methods	All	No	No impact	None	Strategy reduces the demand for additional water supply, but also reduces per-capita return flows from existing groundwater use.	Reduces per capita return flows from groundwater, but the rate of savings does not compenstae for the rate of population growth.	NA - does not require the construction of new infrastructure.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure. Reductions in return flows off-set by increase in population and total demand.	NA - does not require the construction of new infrastructure.	Reducing per capita water demand provides a positive effect. Although instream flows potentially could be reduced due to less return flows.	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Contractual Strategies																					
Expand/ Increase Current Contracts	Multiple	Increase existing contracts to meet customer demands	Multiple	Yes	Reduced streamflows due to use of currently unused supplies	None	Reduces in-stream flows in all basins due to full use of existing water supplies.	Return flows (typically equal to 60% of diversion) will off-set increased diversions. Houston and SJRA use will result in return flows to Upper Galveston Bay vice Trinity Bay (if left unused).	NA - does not require the construction of new infrastructure beyond expansion of existing plants.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure, but full use of permits will affect riparian habitat.	NA - does not require the development of new infrastructure sites.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
New Contracts from Existing Supply	Multiple	Create new contracts from existing unallocated supplies	Multiple	Yes	Reduced streamflows due to use of currently unused supplies	None	Reduces in-stream flows in all basins due to full use of existing water supplies.	Return flows (typically equal to 60% of diversion) will off-set increased diversions. Houston and SJRA use will result in return flows to Upper Galveston Bay vice Trinity Bay (if left unused).	NA - does not require the construction of new infrastructure beyond expansion of existing plants.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure, but full use of permits will affect riparian habitat.	NA - does not require the development of new infrastructure sites.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Reallocation of Existing Supply	Multiple	Reallocate surplus water to WUGs with shortages	Multiple	Yes	Altered location of return flows	None	Reduces in-stream flows in all basins due to full use of existing water supplies.	Return flows (typically equal to 60% of diversion) will off-set increased diversions. Houston and SJRA use will result in return flows to Upper Galveston Bay vice Trinity Bay (if left unused).	NA - does not require the construction of new infrastructure beyond expansion of existing plants.	NA - does not require the construction of new infrastructure.	Does not require the construction of new infrastructure, but full use of permits will affect riparian habitat.	NA - does not require the development of new infrastructure sites.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
TRA to SJRA contract	TRA / SJRA	Sell uncommitted supply to SJRA.	Trinity to San Jacinto	Yes	Potential introduction of invasive species	Requires construction of new conveyance.	Transfers unused supply from the Trinity to the San Jacinto River basin, resulting in decreased flows below Lake Livingston.	Return flows (typically equal to 60% of diversion) will return to Upper Galveston Bay vice Trinity Bay.	Increased diversion from Lake Livingston will increase lake-level fluctuations and reduce flows in the lower Trinity. No new construction impacts are associated with this strategy.	No new construction impacts are associated with this strategy. Lake level fluctuations will affect wetlands along the shoreline and tributaries.	Potential impact to Wood Stork and Alligator Snapping Turtle habitat through reduced flows in lower Trinity River.	Potential impacts along conveyance route	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
TRA to Houston Contract	TRA / Houston	Sell uncommitted supply to Houston	Trinity to San Jacinto	Yes	Potential introduction of invasive species	Unknown	Transfers unused supply from the Trinity to the San Jacinto River basin, resulting in decreased flows below Lake Livingston.	Return flows (typically equal to 60% of diversion) will return to Upper Galveston Bay vice Trinity Bay.	Increased diversion from Lake Livingston will increase lake-level fluctuations and reduce flows in the lower Trinity. No new construction impacts are associated with this strategy.	No new construction impacts are associated with this strategy. Lake level fluctuations will affect wetlands along the shoreline and tributaries.	Potential impact to Wood Stork and Alligator Snapping Turtle habitat through reduced flows in lower Trinity River.	NA - does not require the construction of new infrastructure.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
WUG Level Contracts	Multiple WUGs	Contracts from WWPs to WUGs	All	Yes (source-dependent)	None - impacts associated with yield-creating WMS or infrastructure	None	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
WWP Contracts	Multiple WWPs	Contracts between WWPs	All	Yes (source-dependent)	None - impacts associated with yield-creating WMS or infrastructure	None	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Groundwater Strategies																					

Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
Expanded Use of Groundwater	Multiple	Increase groundwater use, to the sustainable or permitted yield.	All	No	Uses existing supply, return flows remain in basin of origin.	New wells may require some land clearing.	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Interim Strategies	Brazoria, Chambers, Galveston, Harris, and Montgomery Counties	Temporary groundwater use in excess of available supply	Multiple	No	Potential for subsidence and excess drawdown	New wells may require some land clearing.	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
New Groundwater Wells for Livestock	Multiple	Added well capacity to facilitate expaned pumping or interim groundwater use	All	No	None - impacts associated with yield-creating WMS or infrastructure	New wells may require some land clearing.	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Groundwater Reduction Plans																					
CHCRWA GRP	CHCRWA	Conversion of CHCRWA to surface water.	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
COH GRP	COH	Conversion of portions of COH service area to surface water	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Transfers unused supply from the Trinity to the San Jacinto River basin, resulting in decreased flows below Lake Livingston.	Return flows (typically equal to 60% of diversion) will return to Upper Galveston Bay vice Trinity Bay.	Increased diversion from Lake Livingston will increase lake-level fluctuations and reduce flows in the lower Trinity. No new construction impacts are associated with this strategy.	No new construction impacts are associated with this strategy. Lake level fluctuations will affect wetlands along the shoreline and tributaries.	Potential impact to Wood Stork and Alligator Snapping Turtle habitat through reduced flows in lower Trinity River.	NA - does not require the construction of new infrastructure.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Missouri City GRP	Missouri City	Conversion of Missouri City and surrounding area to surface water. Also includes Aquifer Storage and Recovery.	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Fort Bend County MUD 25 GRP	Fort Bend MUD 25	A combination of reuse and surface water to allow for groundwater reduction.	Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Fort Bend County WCID No. 2 GRP	Fort Bend County WCID No. 2	Surface water conversion	San Jacinto, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NFBWA GRP	NFBWA	Conversion of NFBWA to surface water. Also includes reuse and major water supply infrastructure.	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NHCRWA GRP	NHCRWA	Conversion of NHCRWA to surface water. Also includes major water supply infrastructure.	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Pecan Grove GRP	Pecan Grove	Conversion of Pecan Grove to surface water. Also includes reuse	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Richmond-Rosenberg GRP	Richmond, Rosenberg	Conversion of Richmond-Rosenberg to surface water.	Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
River Plantation GRP	River Plantation MUD	Entering into GRP with River Plantation CC golf course to provide additional WWTP effluent for irrigation purposes	San Jacinto	No	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	none	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	All return flows remain in Galveston Bay watershed.	TBD. Impacts expected to be minimal	TBD. Impacts expected to be minimal	TBD. Impacts expected to be minimal	Site surveys must be conducted for each individual well site.	TBD	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
SJRA WRAP	Montgomery County	Conversion of Montgomery County to surface water. Also includes reuse and major water supply infrastructure.	San Jacinto	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Sugar Land GRP	Sugar Land	Conversion of Sugar Land and surrounding area to surface water. Also includes reuse.	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay

Region H
Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
WHCRWA GRP	WHCRWA	Conversion of WHCRWA to surface water. Also includes reuse and major water supply infrastructure.	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Infrastructure Strategies																					
CHCRWA Transmission	CHCRWA	Transmission capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
CHCRWA Distribution	CHCRWA	Distribution capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to streams in all basins.	Full utilization of groundwater reduces potential for transfer from Trinity Basin, leaving flows into Trinity Bay.	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NFBWA Shared Transmission Line	NFBWA	Transmission capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NFBWA Internal Distribution	NFBWA	Distribution capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NHCRWA Transmission	NHCRWA	Transmission capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NHCRWA Internal Distribution	NHCRWA	Distribution capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
WHCRWA Transmission	WHCRWA	Transmission capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
WHCRWA Internal Distribution	WHCRWA	Distribution capacity development	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	Groundwater return flows contribute to increased instream flows	Groundwater return flows will contribute to increased B&E flows	Site surveys must be conducted for each individual well site.	Groundwater wells can usually be located outside of wetlands, near the point of use.	Groundwater wells should be sited to avoid or minimize impact on habitats.	Site surveys must be conducted for each individual well site.	N/A - uses supply allocated for this use in the 2001 plan	N/A – does not divert surface water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
West Chambers County Supply System	CLCND	Develop a surface water supply system to meet demands in western Chambers County with water from the Trinity basin.	Sabine to San Jacinto	Yes (previously permitted)	Potential introduction of invasive species	Conveyance requires extensive canal construction	Will reduce instream flows to convey water to the west	Return flows will be returned to Galveston Bay	Potential impact to habitat along transmission system alignment	Potential impact to wetlands along transmission system alignment	Potential impact to T&E species along transmission system alignment	Potential impact to cultural resources along transmission system alignment			2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
COH Treatment Expansion	Houston	Increasing capacity in COH treatment facilities infrastructure.	Trinity-San Jacinto, San Jacinto, San Jacinto-Brazos, Brazos	No	Footprint of facilities largely already developed.	Footprint of facilities largely already developed	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
COH Distribution Expansion	Houston	Distrubution expansion for WWP	San Jacinto	No	Footprint of facilities largely already developed.	Footprint of facilities largely already developed	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat along transmission corridor.	Potential impact to habitat along transmission corridor.	Potential impact to habitat along transmission corridor.	Potential impact to cultural resources along transmission corridor.	N/A	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed	Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Huntsville WTP	Huntsville	WTP construction to utilize existing contracts	Trinity, San Jacinto	No	Potential impact to habitat on site	Land required for facility construction	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	Chapter 5 details the impacts of management strategies on water quality, and provides	Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Harris County MUD 50 SWTP	Harris MUD 50	Treat surface water from SJRA for municipal use.	San Jacinto	No	Potential impact to habitat on site	Land required for facility construction	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
LLWSSSC Surface Water Project	Lake Livingston Water Supply and Sewer Service Company	Expansion of SWTP to meet municipal demands	Trinity	No	Potential impact to habitat on site	Land required for facility expansion	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Luce Bayou	COH	Development of a conveyance fro the Trinity River to Lake Houston	Trinity to San Jacinto	Yes (previously permitted)	Potential introduction of invasive species	Conveyance requires extensive canal construction	Reduces flow in the Trinity River below Liberty.	Return flows (typically equal to 60% of diversion) will return to Upper Galveston Bay vice Trinity Bay.	Conveyance requires 23.6 miles of canal. Blending supply in Lake Houston may affect lake habitat.	Potential impact due to diversion structure. Potential wetland impacts due to project.	Potential impact to White-faced Ibis, Wood Stork and Alligator Snapping Turtle habitat through reduced flows in lower Trinity River. Increased flow in Luce Bayou may impact Creek Chubsucker habitat.	Privately owned ranches and farms along Luce Bayou. Pump station study identified historic homestead, which was studied and cataloged at the time of the original permit.			2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 desiginates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay

Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
Sealy GW Treatment Expansion	Sealy	Expansion of a SWTP	Brazos	No	Potential impact to habitat on site	Land required for facility construction	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Pearland SWTP	Pearland	Installation of a SWTP	San Jacinto	No	Potential impact to habitat on site	Land required for facility construction	Low probability of significant impacts	Low probability of significant impacts	Potential impact to habitat on SWTP site	Potential impact to wetlands on SWTP site	Potential impact to T&E species on site	Potential impact to cultural resources on SWTP site	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Reservoir Strategies																					
Allens Creek Reservoir	BRA / Houston	New reservoir in Austin County	Brazos	No	Wetlands and bottomland hardwoods impacted	Innundates 7,000 acres	Diverts peak flows. When base flow is above median, diversions cannot reduce it below media. When base flow is above 25th percentile, diversions cannot reduce it below 25th percentile. Below 25th percentile, diversions cannot reduce it below a 7Q2.	Divert peak flows, reducing magnitude of storm flush.	Innundates 7,000 acres	Sire specific study ongoing. Potential impact from 700 to 1700 wetland acres, based upon initial studies.	Austin County is habitat for White-faced Ibis, Wood Stork and Houston Toad.	Site located near the town of Wallis. A detailed site survey must be conducted.	0	Reservoir modeled using minimum in-stream flow requirement.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Little River Off-Channel Reservoir	BRA	New reservoir in Milam County	Brazos	No	Potential impact on terrestrial species habitats	Innundates 4400 acres	The project would promote a minor reduction in instream flows, but as a percentage of total flow the difference would be minor.	Will have substantial impacts on the instream biological community at the proposed reservoir site. However, there would be minimal impacts in the Little River diversion site. 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.	Would innundate 4,343 acres; Projected wildlife habitat that will be impacted includes 2,215 acres of Mixed Grassland, 1,839 acres of Post Oak Woods, and 289 acres of Mixed Riparian Woods/Forest.	0	The species that could occur within the vicinity of the site include Houston toad, bald eagle interior least tern, piping plover, and whooping crane, and Navasota ladies'-tresses.	31 archeological sites have been documented within the general vicinity of the proposed reservoir. 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.	0	Water potentially available for impoundment estimated using the Brazos G WAM; Firm yield computed subject to the reservoir and Little River diversion having to pass inflows to meet CCEFN instream flow requirements	Regional G Draft RPP Technical Evaluations of WMS, 4B.13.5	Regional G Draft RPP Technical Evaluations of WMS, 4B.13.5	Regional G Draft RPP Technical Evaluations of WMS, 4B.13.5	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	The project is expected to have negligible impacts to the stream flow and water quality in the Little River and Brazos River.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Brazoria County Off-Channel Reservoir	Brazoria County	New reservoir in Brazoria County	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,000 acres	The project would promote a minor reduction in instream flows, but as a percentage of total flow the difference would be minor.	Not likely to significantly impact bay and estuary inflows.	TBD	TBD	Potential for multiple threatened and endangered species to be located within the vicinity of the proposed project site.	Cultural Resources survey will be required to determine impacts to cultural resources in the area	Lower streamflows, declining water quality, and reduced inflows to reservoirs.	Water potentially available for impoundment estimated using the Brazos G WAM; Firm yield computed subject to diversion having to pass inflows to meet CCEFN instream flow requirements	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Fort Bend County Off-Channel Reservoir	Fort Bend County	New reservoir in Fort Bend County	Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,000 acres	The project would promote a minor reduction in instream flows, but as a percentage of total flow the difference would be minor.	Not likely to significantly impact bay and estuary inflows.	TBD	TBD	Potential for multiple threatened and endangered species to be located within the vicinity of the proposed project site.	Cultural Resources survey will be required to determine impacts to cultural resources in the area	Lower streamflows, declining water quality, and reduced inflows to reservoirs.	Water potentially available for impoundment estimated using the Brazos G WAM; Firm yield computed subject to diversion having to pass inflows to meet CCEFN instream flow requirements	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
GCWA Off-Channel Reservoirs	GCWA	Use storage to enhance the yield of existing GCWA rights	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,000 acres	The project would promote a minor reduction in instream flows, but as a percentage of total flow the difference would be minor.	Not likely to significantly impact bay and estuary inflows.	Project would innundate approximatly 2,900 acres habitat in the area to be investigated further.	Project would innundate approximatly 2,900 acres habitat in the area to be investigated further.	Potential for multiple threatened and endangered species to be located within the vicinity of the proposed project site.	Cultural Resources survey will be required to determine impacts to cultural resources in the area	Lower streamflows, declining water quality, and reduced inflows to reservoirs.	Water potentially available for impoundment estimated using the Brazos G WAM; Firm yield computed subject to the reservoir and diversion having to pass inflows to meet CCEFN instream flow requirements	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Reuse Strategies																					
Fulshear Reuse	Fulshear	Development of a direct reuse system to provide reclaimed water to Fulshear and surrounding communities.	Brazos, San Jacinto-Brazos	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Houston Indirect Wastewater Reuse	Houston	Reuse wastewater from all city WWTP's in lieu of Trinity Supply.	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	All return flows remain in Galveston Bay watershed. Reuse of supplies in San Jacinto Basin reduces potential need for transfer from Trinity Basin.	Permit applications point out the urbanized watershed	Permit applications state that potential diversion points will have minimal impacts on wetlands adjacent to streams.	Permit applications are silent on this issue	NA	N/A	SJRA permit addresses flows using existing downstream diversion point. Other applications are silent on this issue.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Montgomery County MUDs 8/9 Reuse	Montgomery MUDs 8/9	Reuse water from Montgomery County MUDs 8/9	San Jacinto	No	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	none	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	All return flows remain in Galveston Bay watershed.	TBD. Impacts expected to be minimal	TBD. Impacts expected to be minimal	TBD. Impacts expected to be minimal	TBD	TBD		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
NHCRWA Indirect Wastewater Reuse	NHCRWA	Reuse wastewater from member WWTP's in lieu of purchasing additional supply.	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	All return flows remain in Galveston Bay watershed. Reuse of supplies in San Jacinto Basin reduces potential need for transfer from Trinity Basin.	Majority of the needed infrastructure will be constructed in urbanized areas. Therefore, the impact to wildlife habitat will be limited.	Majority of the needed infrastructure will be constructed in urbanized areas. Therefore, the impact to wetlands will be limited.	Potential impact to Creek Chubsucker and Alligator Snapping Turtle habitat through reduced wastewtaer return flows.	NA	N/A	SJRA permit addresses flows using existing downstream diversion point. Other applications are silent on this issue.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Wastewater Reclamation for Industry	Houston, Manufacturing	Deliver treated waterwater to industry for use in lieu of Trinity River supply.	San Jacinto	No	Minimal change in habitat	None	Reduces municipal return flows into Sims and Buffalo Bayous. Manufacturign return flows into the ship channel will not be affected.	Reuse water is intended to off-set supply transferred from Lake Livingston, leaving the inflows for Trinity Bay vice Upper Galveston Bay	Sims and Buffalo Bayous will realize reduced freshwater flows due to reuse. Central treatment facility may impact up to 15 acres of undeveloped land.	4 new pipeline crossings may impact 6 acres (assumed 1.5 acres each).	Potential impact to Wood Stork and Alligator Snapping Turtle habitat through reduced wastewtaer return flows.	Project is within an industrial area, but site studies must still be conducted for new facilities.	0	NA - strategy does not require a new reservoir or water right.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay

Region H
Table 4A-4: Water Management Strategy Environmental Impacts

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Instream Flows	Bay and Estuary Inflows	Wildlife Habitat	Wetlands	Threatened and Endangered Species	Cultural Resources	Evaluation of Impacts of Water Management Strategies on Threats to Natural Resources	Use of Environmental Planning Criteria or Site-Specific Information on Environmental Flow Needs	Description of Regional Planning Area	Description of Water Sources, including Major Springs	Description of Natural Resources (Animal, Vegetable, or Mineral)	Identification of Water Quality Problems	Identification of Threats to Natural Resources	Recommendations for Ecologically Unique River and Stream Segments	Recommendations that are Needed and Desirable to Protect Natural Resources
Wastewater Reclamation for Municipal Irrigation	County-Other and Authorities in Brazoria, Fort Bend, Harris, and Montgomery Counties	Reuse for municipal irrigation	Multiple	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	None	Instream flows potentially decreased due to wastewater reuse. However, indirect reuse potentially has less negative impacts on instream flows than direct reuse.	Potential to reduce return flows in specific basin of use.	Permit applications point out the urbanized watershed	Permit applications state that potential diversion points will have minimal impacts on wetlands adjacent to streams.	Permit applications are silent on this issue	NA	N/A		2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Permit Strategies																					
BRA System Operations Permit	BRA	Use peak flows, when available, and systems management to reduce the use of water stored under other permits.	Brazos	No	Harvests peak flows through system management, positive affect on below-median flows	New pump stations may be required.	Diverts from streamflows when above median flow, reducing peaks. Releases from storage when below median flows, increasing the flows above diversion points.	Reduces peak flushing effects due to diversions above median flows. Flows below median are minimally affected.	Application points to the deferred or eliminated need for Little River Reservoir	Application points to the deferred or eliminated need for Little River Reservoir. New diversion points must be assessed as needed.	None discussed in permit application. Deferring Little River Reservoir reduces overall basin impact.	Application points to the deferred or eliminated need for Little River Reservoir	N/A	TCEQ Draft permit has been granted	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Houston Bayous Permit	Houston	Use peak flows, when available, to reduce the use of water stored under other permits.	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	Permit applications refer to capturing peak flows. Model includes current Lake Houston instream flow requirement	Permit applications refer to capturing peak flows. Model includes current Lake Houston instream flow requirement	Permit applications point out the urbanized watershed	Permit applications state that potential diversion points will have minimal impacts on wetlands adjacent to streams.	Permit applications are silent on this issue	N/A - Does not recommend new diversion point	N/A	SJRA permit addresses flows using existing downstream diversion point. Other applications are silent on this issue.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Other Strategies																					
Brazoria County Interruptible Supplies for Irrigation	GCWA	Use of interruptible portion of GCWA water right for irrigation	San Jacinto-Brazos	No	Reduced flows in Brazos River due to increased diversion	None	Use of interruptible supplies will decrease instream flows														
Brazos Salt Water Barrier	BRA / DOW	Prevent the seasonal migration of the saltwater wedge upstream to protect existing diversion points.	Brazos	No	Will influence flood plain response to major storms.	New structure in river channel	Structure will create a pool during low-flow periods, but river flows should spill at the same rate as before the structure.	The structure will be designed not to impound seasonal low flows.	The structure will fill [TBD] acreas. Access road will require [TBD] acres. The introduction of the barrier may impact migratory fish species.	The structure will affect [TBD] acres of river bottomlands.	Potential habitat impacts to Black Rail, White-faced Ibis, Wood Stork, Diamondback Terrapin and Corkwood.	Siting study is required to identify any cultural resources being impacted. Site will be above Sea Center Texas hatchery.	Strategy reduces the influence of saltwater migration upstream to protect freshwater diversion points. This reduces the need for replacement supplies.	NA - strategy will not impound water	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Freeport Desalination	BRA / DOW	Desalinate seawater for industrial and municipal use.	Brazos, San Jacinto-Brazos	No	Offsets some use of Brazos basin flows.	New facility may require some land clearing.	Displacemnet of water that is currently diverted to meet municipal demands.	Saline water release is made into Dow discharge canal that empties directly into the Gulf of Mexico.	As many as 530 acres of property impacted by the installation of delivery lines, some of which follow existing easements.	Same as wildlife impact potential.	Unknown. Will require assessment before implementation of the strategy.	Will require study before implementation of the strategy.	Will require study before implementation of the strategy.	Will require study before implementation of the strategy.	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay
Montgomery County MUD 8/9 Brackish Desal	Montgomery County MUDs 8 and 9	Development of a brackish groundwater desalination facility that would supplement existing wells, reducing dependence on fresh water formations of the Gulf Coast Aquifer.	San Jacinto	No	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Sabine to Region H Transfer	Harris / Montgomery Counties	Transfer existing supply from Toledo Bend Reservoir to Region H.	Sabine to San Jacinto	Yes	Potential introduction of invasive species / Reduction of freshwater inflows to Sabine Lake	TBD	Displacement of water from Lake Livingston and reduced use of Livingston water in lower basin will result in reduced flow between the lake and the IBT discharge point on the Trinity.	Inflows to Sabine Lake could potentially be impacted.	Nearly entire Neches-Trinity segment is within Priority 3, 5, and 6 designated bottomland hardwood.	Wetlands would be affected in the majority of areas crossed by new canal segments.	Route would potentially impact the Bald Eagle, Brown Pelican, Houston Toad, Interior Least Tern, Louisians Pike Snake, Navasota Ladies'-tresses, Northern Scarlet Snake, Red-cockaded Woodpecker, and Smooth Green Snake.	Private proerty along the transfer route, especially in sections of entirely new canal or pipeline. The segment between Lake Livingston and the San Jacinto River passes through the Sam Houston National Forest.	0	0	2011 Regional Plan, Chapter 1	2011 Regional Plan, Chapters 1 and 3	2011 Regional Plan, Chapters 1 and 7	2011 Regional Plan Chapter 5 details the impacts of management strategies on water quality, and provides TCEQ 303(d) listed imnpaired waters within the Region.	2011 Regional Plan, Chapter 3 refers to protecting inflows to the Galveston Bay estuary. Chapter 8 designates unique stream segments for habitat protection.	2011 Regional Plan, Chapter 8	2011 Regional Plan, Chapter 3, Target Inflows for Galveston Bay

Region H
Table 4A-3: Water Management Strategy Screening

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Strategy Capital Cost ($)	Average Annual Cost of Water ($/ac-ft)	Major WMS	Earliest Potential Starting Decade	Firm Yield (ac-ft/yr)	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Cost	Yield	Location	Water Quality	Environment	Local Preference	Institutional Constraints / Risk of Implementability	Impacts on Water Resources	Impacts on Other Management Strategies		Total of Screening Factors	Selected as Part of 2001 Plan	Selected as Part of 2006 Plan
Screening Factor Weights:												1	1	1	1	1	1	1	1	1				
Conservation Strategies																								
Industrial Conservation	Manufacturing	Reduce water demand through selected BMPs	TBD	TBD		2010	TBD	All	No	No impact	None	0	0	1	0	0	0	1	0	1		3	No	No
Irrigation Conservation																								
Brazoria County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$1,850,200 annual cost, on-farm methods $198,200 capital cost, canal lining	$99		2010	18,792	Brazos, Brazos-Colorado	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Chambers County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$2,336,300 annual cost, on-farm methods $279,200 capital cost, canal lining	$98		2010	24,018	Trinity	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Fort Bend County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$509,900 annual cost, on-farm methods $56,500 capital cost, canal lining	$99		2010	5,198	Brazos, Brazos-Colorado, San Jacinto-Brazos	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Galveston County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$231,100 annual cost, on-farm methods $29,400 capital cost, canal lining	$98		2010	2,392	San Jacinto - Brazos	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Liberty County	Irrigation	Reduce irrigation losses through land leveling, point irrigation and canal lining	$2,089,800 annual cost, on-farm methods i $188,700 capital cost, canal lining	$100		2010	20,877	Trinity	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Waller County	Irrigation	Reduce irrigation losses through land leveling, point irrigation	$726,700 annual cost, on-farm methods	$110		2050	6,606	San Jacinto	No	Reduces losses that feed small streams	None	1	1	1	0	0	0	1	0	1		5	Yes	Yes
Municipal Conservation	Multiple	Reduce demand through various methods	From $9.9 to $22.8 million for allWUGs collectively	$202 (Sm Sys) $311 (Med Sys) $213 (Lg Sys)		2010	From 45,605 to 105,494	All	No	No impact	None	0	1	1	0	0	1	1	0	1		5	Yes	Yes
Contractual Strategies																								
Expand/ Increase Current Contracts	Multiple	Increase existing contracts to meet customer demands	At WUG level	System Rate		2010	Varies by contract. No new supply created	Multiple	Yes	Reduced streamflows due to use of currently unused supplies	None	1	0	1	0	0	1	1	0	1		5	Yes	Yes
New Contracts from Existing Supply	Multiple	Create new contracts from existing unallocated supplies	At WUG level	System Rate		2010	Varies by contract. No new supply created	Multiple	Yes	Reduced streamflows due to use of currently unused supplies	None	1	0	1	0	0	1	1	0	1		5		Yes
Reallocation of Existing Supply	Multiple	Reallocate surplus water to WUGs with shortages	At WUG level	System Rate		2010	Varies by contract. No new supply created	Multiple	Yes	Altered location of return flows	None	1	0	1	0	0	1	1	0	1		5	No	No
TRA to SJRA contract	TRA / SJRA	Sell uncommitted supply to SJRA.	$302,781,597	$687	Y	2040	76,476	Trinity to San Jacinto	Yes	Potential introduction of invasive species	Requires construction of new conveyance	0	1	0	0	0	0	0	-1	0		0	No	Yes
TRA to Houston Contract	TRA / Houston	Sell uncommitted supply to Houston	None - Infrastructure cost already reflected under Luce Bayou WMS	None - Infrastructure cost already reflected under Luce Bayou WMS	Y	2030	123,524	Trinity to San Jacinto	Yes	Potential introduction of invasive species via Luce Bayou conveyance.	Unknown	1	1	0	0	0	1	1	-1	0		3	Yes	Yes
WUG Level Contracts	Multiple WUGs	Contracts from WWPs to WUGs. Includes contracts for volumes created under other yield-producing WMS	WUG-specific infrastructure	Contract Rate		2010	Varies by contract. No new supply created	All	Yes (source-dependent)	None - impacts associated with yield-creating WMS or infrastructure	None	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
WWP Contracts	Multiple WWPs	Contracts between WWPs. Includes contracts for volumes created under other yield-producing WMS	N/A - cost associated with WWP infrastructure projects	Contract Rate		2010	Varies by contract. No new supply created	All	Yes (source-dependent)	None - impacts associated with yield-creating WMS or infrastructure	None	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Groundwater Strategies																								
Expanded Use of Groundwater	Multiple	Increase groundwater use, to the sustainable or permitted yield.	$589,500 per 1 mgd well. $165,928,999 total capital cost for WUG infrastructure	$205		2010	90,617	All	No	Uses existing supply, return flows remain in basin of origin.	New wells may require some land clearing.	0	1	1	1	0	1	0	0	0		4	Yes	
Interim Strategies	Brazoria, Chambers, Galveston, Harris, and Montgomery Counties	Temporary groundwater use in excess of available supply	$589,500 per 1 mgd well. $86,701,535 total capital cost for WUG infrastructure	$788	Y	2010	NA - temporary use of 45,512 ac-fy/yr	Multiple	No	Potential for subsidence and excess drawdown	New wells may require some land clearing.	1	1	1	0	-1	1	0	1	0		4	No	No
New Groundwater Wells for Livestock	Multiple	Added well capacity to facilitate expaned pumping or interim groundwater use	$18,635	$37		2010	41	San Jacinto-Brazos, Neches-Trinity	No	None - impacts associated with yield-creating WMS or infrastructure	New wells may require some land clearing.	0	NA	1	1	0	1	0	0	0		3	No	Yes
Groundwater Reduction Plans																								

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Strategy Capital Cost ($)	Average Annual Cost of Water ($/ac-ft)	Major WMS	Earliest Potential Starting Decade	Firm Yield (ac-ft/yr)	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Decision Matrix Factors (High, Medium, Low): Cost	Yield	Location	Water Quality	Environment	Local Preference	Institutional Constraints / Risk of Implementability	Impacts on Water Resources	Impacts on Other Management Strategies		Total of Screening Factors	Selected as Part of 2001 Plan	Selected as Part of 2006 Plan
Screening Factor Weight:												1	1	1	1	1	1	1	1	1				
CHCRWA GRP	CHCRWA	Conversion of CHCRWA to surface water.	TBD	TBD		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0			2	No	No
COH GRP	COH	Conversion of portions of COH service area to surface water	See COH Treatment Expansion and Distribution Expansion	See COH Treatment Expansion and Distribution Expansion		2010	NA	Multiple		Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0				No	No
Missouri City GRP	Missouri City	Conversion of Missouri City and surrounding area to surface water. Also includes Aquifer Storage and Recovery.	$92,070,990 capital cost to WWP, $8,397,800 infrastructure cost to participating WUGs	$378 per ac-ft (WWP cost only - excludes infrastructure cost of customer WUGs / GRP participation)		2020 (2013)	4,790 (new supply from reuse + ASR)	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0			1	No	No
Fort Bend County MUD 25 GRP	Fort Bend MUD 25	A combination of reuse and surface water to allow for groundwater reduction.	$766,100 capital cost (estimated as $564 per acre-foot construction cost based on Wastewater Reuse for Municipal Irrigation WMS).	$499 for infrastructure - does not include customer contract rate		2020 (2013)	589 (Reuse)	Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0			1	No	No
Fort Bend County WCID No. 2 GRP	Fort Bend County WCID No. 2	Surface water conversion	$24,828,857	$353		2020 (2013)	NA	San Jacinto, San Jacinto-Brazos	No	Potential disturbance due to construction.	due to transmission line construction. Land required for plant	-1	0	1	0	0	1	0	0			1	No	No
NFBWA GRP	NFBWA	Conversion of NFBWA to surface water. Also includes reuse and major water supply infrastructure.	$1,638,000 infrastructure cost to WUGS. WWP infrastructure detailed seperately.	See inf. Cost		2020 (2013)	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0	0		2	No	No
NHCRWA GRP	NHCRWA	Conversion of NHCRWA to surface water. Also includes major water supply infrastructure.	$17,814,600 infrastructure cost to WUGS. WWP infrastructure detailed seperately.	See inf. Cost		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0	0		2	No	Yes
Pecan Grove GRP	Pecan Grove	Conversion of Pecan Grove to surface water. Also includes reuse	$15,960,000	$865		2020 (2013)	NA	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0			1	No	No
Richmond-Rosenberg GRP	Richmond, Rosenberg	Conversion of Richmond-Rosenberg to surface water.	$117,220,150 capital cost for WWP	NA - existing contract		2020 (2015)	NA	Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0			2	No	No
River Plantation GRP	River Plantation	Entering into GRP with River Plantation CC golf course to provide additional WWTP effluent for irrigation purposes	$484,926	495		2010	NA	San Jacinto	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	0	0	1	0	0	1	0	0			2	No	No
SJRA WRAP	Montgomery County	Conversion of Montgomery County to surface water. Also includes reuse and major water supply infrastructure.	$900,000,000 capital cost for WWP. $217,856,853 infrastructure cost for participating WUGs.	$649. (WWP cost only - excludes infrastructure cost of customer WUGs / GRP participation)		2020 (2015)	NA	San Jacinto	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0	0		1	No	No
Sugar Land GRP	Sugar Land	Conversion of Sugar Land and surrounding area to surface water. Also includes reuse.	$161,360,000 capital cost for WWP. $6,360,100 infrastructure cost for participating WUGs.	$1,234. (WWP cost only - excludes infrastructure cost of customer WUGs / GRP participation)		2020 (2013)	NA	Brazos, San Jacinto-Brazos	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0	0		1	No	No
WHCRWA GRP	WHCRWA	Conversion of WHCRWA to surface water. Also includes reuse and major water supply infrastructure.	$35,269,000 infrastructure cost for participating WUGs. WWP infrastructure detailed seperately.	See WHCRWA Transmission and WHCRWA Internal Distribution.		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion		0	1	0	0	1	0	0	0		2		Yes
Infrastructure Strategies																								
CHCRWA Transmission	CHCRWA	Transmission capacity development	TBD	TBD		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant		0	1	0	0	1	0	0			2	No	No
CHCRWA Distribution	CHCRWA	Distribution capacity development	TBD	TBD		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant		0	1	0	0	1	0	0			2	No	No
NFBWA Shared Transmission Line	NFBWA	Transmission capacity development	$213,000,000 capital cost	$150		2020 (2013)	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	0	0	1	0	0	1	0	0	0		2	No	No

Table 4A-3: Water Management Strategy Screening

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Strategy Capital Cost ($)	Average Annual Cost of Water ($/ac-ft)	Major WMS	Earliest Potential Starting Decade	Firm Yield (ac-ft/yr)	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Decision Matrix Factors (High, Medium, Low) Cost	Yield	Location	Water Quality	Environment	Local Preference	Institutional Constraints / Risk of Implementability	Impacts on Water Resources	Impacts on Other Management Strategies		Total of Screening Factors	Selected as Part of 2001 Plan	Selected as Part of 2006 Plan
Screening Factor Weight:												1	1	1	1	1	1	1	1	1				
NFBWA Internal Distribution	NFBWA	Distribution capacity development	$225,000,000 capital cost	$85		2020 (2013)	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	1	0	1	0	0	1	0	0	0		3	No	No
NHCRWA Transmission	NHCRWA	Transmission capacity development	$253,249,100 capital cost	$106		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	due to transmission line construction. Land required for plant construction/expansion	0	0	1	0	0	1	0	0	0		2	No	No
NHCRWA Internal Distribution	NHCRWA	Distribution capacity development	$535,881,400 capital cost	$222		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0	0		1	No	No
WHCRWA Transmission	WHCRWA	Transmission capacity development	$290,084,200 capital cost	$178		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	due to transmission line construction. Land required for plant construction/expansion	0	0	1	0	0	1	0	0	0		2	No	No
WHCRWA Internal Distribution	WHCRWA	Distribution capacity development	$552,472,000 capital cost	$338		2010	NA	Multiple	Yes (previously permitted)	Potential disturbance due to construction.	due to transmission line construction. Land required for plant construction/expansion	-1	0	1	0	0	1	0	0	0		1	No	No
West Chambers County Supply System	CLCND	Develop a surface water supply system to meet demands in western Chambers County with water from the Trinity basin.	$20,380,000	$408		2020	NA	Sabine to San Jacinto	Yes (previously permitted)	Potential introduction of invasive species		-1	0	1	0	0	1	0	0	0		1	No	No
COH Treatment Expansion	Houston	Increasing capacity in COH treatment facilities infrastructure.	$2,045,672,200 capital cost	$1,003		Various	NA	Trinity-San Jacinto, San Jacinto, San Jacinto-Brazos, Brazos	No	Footprint of facilities largely already developed.	Footprint of facilities largely already developed.	-1	1	1	0	0	1	0	0	1		3	No	No
COH Distribution Expansion	Houston	Distrubution expansion for WWP	$261,040,000	TBD		2010 (2011)	NA	San Jacinto	No	Footprint of facilities largely already developed.	largely already developed.		1	0	0	0	1	0	0	1		3	No	No
Huntsville WTP	Huntsville	WTP construction to utilize existing contracts	$61,023,900 capital cost (estimated using Region H standard cost assumptions).	$587		2010	NA	Trinity, San Jacinto	No	Potential disturbance due to construction.	Temporary disturbance due to transmission line construction. Land required for plant construction/expansion	-1	1	1	0	0	1	0	0	0		2	No	No
LLWSSSC Surface Water Project	Lake Livingston Water Supply and Sewer Service Company	Expansion of SWTP to meet municipal demands	$3,087,974	$373		2010	NA	Trinity	No	Potential disturbance due to construction.	Land required for facility construction	-1	1	1	0	0	1	0	-1	0		1	No	No
Harris County MUD 50 SWTP	Harris MUD 50	Treat surface water from SJRA for municipal use.	$6,131,600	$736		2020	NA	San Jacinto	No	Potential disturbance due to construction.	Land required for facility construction	-1	1	1	0	0	1	0	-1	0		1	No	No
Luce Bayou	COH	Development of a conveyance from the Trinity River to Lake Houston	$253,917,000 capital cost	$91		2020	NA	Trinity to San Jacinto	Yes (previously permitted)	Potential introduction of invasive species	Conveyance requires extensive canal construction	1	0	1	0	-1	1	-1	-1	0		0	Yes	Yes
Sealy GW Treatment Expansion	Sealy	Expansion of a SWTP	$6,450,000	$966		2020	NA	Brazos	No	Potential disturbance due to construction.	Land required for facility construction	-1	1	1	0	0	1	0	-1	0		1	No	No
Pearland SWTP	Pearland	Installation of a SWTP	$265,000,000	$848		2010	NA	San Jacinto - Brazos	No	Potential disturbance due to construction.	Land required for facility construction	-1	1	1	0	0	1	0	-1	0		1	No	No
Reservoir Strategies																								
Allens Creek Reservoir	BRA / Houston	New reservoir in Austin County	$222,752,400	$197	Y	2020	99,650	Brazos	No	Wetlands and bottomland hardwoods impacted	Innundates 7,000 acres	0	0	1	1	-1	1	0	-1	1		2	Yes	Yes
Bedias Reservoir	SJRA	New Reservoir in Madison/Grimes Counties	$247,241,628	$237	Y	2030	90,700	Trinity	No	7,300 acres of bottomland hardwoods	Innundates 27,400 acres	0	0	0	0	-1	0	-1	-1	-1		-4	Yes	No
Little River Reservoir	BRA / GCWA	New reservoir in Milam County	$556,520,000	$328	Y	2040	119,000	Brazos	No	Listed and endangered species habitat	Innundates 35,600 acres	-1	0	0	0	-1	-1	-1	-1	0		-5	Yes	No
Little River Off-Channel Reservoir	BRA	New reservoir in Milam County	$137,356,000	$436	Y	2040	27,255	Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,400 acres	-1	-1	0	0	0	0	0	-1	1		-2	No	Yes
Brazoria Off-Channel Reservoir	Brazoria County	New reservoir in Brazoria County	$173,898,602	$1,206	Y	2030	24,000	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 3,200 acres	-1	1	1	0	0	1	0	-1	0		1	No	No
Fort Bend Off-Channel Reservoir	Fort Bend County	New reservoir in Fort Bend County	$202,514,788	1893 (based on allocated volume)	Y	2030	46,000	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 3,000 acres	-1	1	1	0	0	1	0	-1	0		1	No	No
GCWA Off-Channel Reservoirs	GCWA	Use storage to enhance the yield of existing GCWA rights	$197,448,012	$827	Y	2030	39,530	San Jacinto - Brazos	No	Potential impact on terrestrial species habitats	Innundates 4,000 acres	-1	1	1	0	0	1	0	-1	0		1	No	No
Lower Lake Creek Reservoir	SJRA	New reservoir in Montgomery County	$480,777,860	$583	Y	2040	67,200	San Jacinto	No	Inundates about 13,100 acres including 2,200 acres of bottomland hardwoods, 7,000 acres of oak, hickory, and pine forest, and 1,800 acres of shrubland and grasses. Some Endangered Species Identified	There are about 2,200 acres of bottomland hardwoods, 7,000 acres of oak, hickory, pine forest, and 1,800 acres of shrubland and grasses.	-1	1	0	0	-1	0	-1	-1	1		-2	No	No
Millican Reservoir (Panther Creek Dam)	BRA	New reservoir in Brazos, Madison, Leon, and Robertson Counties	$1,159,907,000	$1,241 (allocated portion only - for fully-utilized reservoir, unit cost is $424 per acre-foot)	Y	2040	194,500	Brazos	No	Some endangered species have been identified. Innundates 71,000 acres. Approximately 17,000 acres of mixed bottomland hardwoods. Probable high environmental impacts.	Innundates 71,000 acres. Approximately 17,000 acres of mixed bottomland hardwoods.	-1	0	-1	0	-1	0	-1	-1	0		-5	No	No

Region H
Table 4A-3: Water Management Strategy Screening

Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Strategy Capital Cost ($)	Average Annual Cost of Water ($/ac-ft)	Major WMS	Earliest Potential Starting Decade	Firm Yield (ac-ft/yr)	Basin	Interbasin Transfer (Yes/No)	Impacts on Habitat / Stream / B&E Flows	Impacts on Landform	Decision Matrix Factors (High, Medium, Low): Cost	Yield	Location	Water Quality	Environment	Local Preference	Institutional Constraints / Risk of Implementability	Impacts on Water Resources	Impacts on Other Management Strategies		Total of Screening Factors	Selected as Part of 2001 Plan	Selected as Part of 2006 Plan
Screening Factor Weight:												1	1	1	1	1	1	1	1	1				
Millican-Bundic Reservoir	BRA	New reservoir in Brazos, Madison, Leon, and Robertson Counties	$720,224,000	$1,431	Y	2030	36,990	Brazos		Avoids Manning and Yegua lignite, avoids Kurten oil and gas field, avoids the Wilcox lignite in the upper river reaches and avoids significant bottomland hardwood population. Size of lake would be constrained by the Wilcox lignite, and inundation of marsh area upstream of Old San Antonio Road. Probable moderate to high environmental and instream flows impacts.	The inundation area impacts approximately and 9,210 acres of mixed Bottomland Hardwood Forest, 4,086 acres of Grasses/Forbs, and 1,334 acres of Post Oak Woods.	-1	0	-1	0	-1	0	-1	-1	0		-5	No	No
Reuse Strategies																								
Fulshear Reuse	Fulshear	Development of a direct reuse system to provide reclaimed water to Fulshear and surrounding communities.	$566,600 capital cost (estimated as $564 per acre-foot construction cost based on Wastewater Reuse for Municipal Irrigation WMS).	$502		2020	430	Brazos, San Jacinto-Brazos	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	None	-1	0	1	1	0	1	0	-1	0		1	No	No
Houston Indirect Wastewater Reuse	Houston	Reuse wastewater from all city WWTP's in lieu of Trinity Supply.	$721,822,900 infrastructure cost for participating WUGs.	$402 to $1,232 per ac-ft ($777 average)	Y	2020	Up to 490,223	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	0	1	1	0	0	0	-1	-1	1		1	Yes	Yes
Montgomery County MUDs 8/9 Reuse	Montgomery MUDs 8/9	Reuse water from Montgomery County MUDs 8/9	$12,245,700	$878 per acre-foot (based on allocated volume)		2020 (2016)	1,120 (max)	San Jacinto	No	This WMS willnot be permitted to negatively impact downstream rights.	none	-1	1	1	0	1	1	0	0	0		3	No	No
NHCRWA Indirect Wastewater Reuse	NHCRWA	Reuse wastewater from member WWTP's in lieu of purchasing additional supply.	$66,778,694	$702 per acre-foot allocated	Y	2010	Up to 157,000	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	0	1	1	0	0	0	-1	-1	1		1	Yes	Yes
Wastewater Reclamation for Industry	Houston, Manufacturing	Deliver treated waterwater to industry for use in lieu of Trinity River supply.	$332,051,761	$893	Y	2010	67,200	San Jacinto	No	Minimal change in habitat	None	-1	1	1	1	0	1	0	1	1		5	Yes	Yes
Wastewater Reclamation for Municipal Irrigation	County-Other and Authorities in Brazoria, Fort Bend, Harris, and Montgomery Counties	Reuse for municipal irrigation	$48,043,200 infrastructure cost for participating WUGs.	$539 average		2030	36,388 (in 2060)	Multiple	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	None	-1	0	1	1	0	1	0	-1	0		1	No	No
Permit Strategies																								
BRA System Operations Permit	BRA	Use peak flows, when available, and systems management to reduce the use of water stored under other permits.	TBD – based on system rate of $61 per acre-foot	TBD – based on system rate of $61 per acre-foot	Y	2020 (2015)	25,350 (Region H)	Brazos	No	Harvests peak flows through system management, positive affect on below-median flows	New pump stations may be required.	1	1	1	0	0	1	-1	0	0		3	Yes	Yes
Houston Bayous Permit	Houston	Use peak flows, when available, to reduce the use of water stored under other permits.	$20,956,000	System rate		NA	0	San Jacinto	No	Reduces return flows to Upper Galveston Bay, offset by reduced diversions from the Trinity Basin.	Size and location of diversion pump stations still TBD.	1	-1	1	0	-1	1	-1	0	0		0	Yes	Yes
Other Strategies																								
Brazoria County Interruptible Supplies for Irrigation	GCWA	Use of interruptible portion of GCWA water right for irrigation	NA	NA		2010	Non-firm 124,000 64,000 w/ GCWA off-channel)	Brazos, San Jacinto-Brazos	No	Reduced flows in Brazos River due to increased diversion	None	1	1	1	0	0	0	0	-1	0		2	NA	NA
Brazos Salt Water Barrier	BRA / DOW	Prevent the seasonal migration of the saltwater wedge upstream to protect existing diversion points.	$44,470,700	NA		2030	NA	Brazos	No	Will influence flood plain response to major storms.	New structure in river channel	0	-1	1	1	0	0	0	1	1		3	NA	Yes
Freeport Desalination	BRA / DOW	Desalinate seawater for industrial and municipal use.	$85,233,000 (11,200AF) - $255,699,000 (33,600AF)	$1,730 to $2,376	Y	2040	11,200 to 33,600	Brazos, San Jacinto-Brazos	No	Offsets some use of Brazos basin flows.	New facility may require some land clearing.	-1	1	1	1	0	0	0	0	0		2	No	Yes
Montgomery County MUD 8/9 Brackish Desal	Montgomery County MUDs 8 and 9	Development of a brackish groundwater desalination facility that would supplement existing wells, reducing dependence on fresh water formations of the Gulf Coast Aquifer.	TBD	TBD		2010 (2014)	Up to 2,240 acre-feet per year (average 2.0 MGD)	San Jacinto	No	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	No	No
Sabine to Region H Transfer	Harris / Montgomery Counties	Transfer existing supply from Toledo Bend Reservoir to Region H.	$760,813,320	Dependent on volume that would be allocated if selected as an alternative.	Y	2030	From 26,762 (2020) to 486,500 (2060)	Sabine to San Jacinto	Yes	Potential introduction of invasive species / Reduction of freshwater inflows to Sabine Lake	1398-acres	0	1	-1	0	-1	-1	-1	-1	1		-3	NA	No
Galveston County Desal	GCWA		TBD	TBD				San Jacinto-Brazos			Unknown	-1	0	1	1	0	0	0	0	0		1	No	No

Region H
Table 4A-5: Reccommended WMS by County (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Austin						
Initial Shortage	0	-739	-1,240	-1,496	-1,635	-1,865
Expanded GW	0	739	1,240	1,496	1,635	1,865
Municipal Conservation	0	223	251	265	273	285
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	223	251	265	273	285
Brazoria						
Initial Shortage	-150,907	-186,760	-211,634	-238,588	-266,405	-299,199
Expanded GW	0	4,049	12,988	13,515	15,658	16,209
Municipal Conservation	1,476	2,610	2,978	3,249	3,567	3,918
Contract Expansions	7,750	7,750	7,750	7,750	7,750	7,750
Net Shortage	-141,681	-172,351	-187,918	-214,074	-239,430	-271,322
Irrigation Conservation	18,792	18,792	18,792	18,792	18,792	18,792
Wastewater Reclamation for Mun. Irrigation	0	0	116	227	344	465
Brazoria Co. Interruptible Supplies for Irr.	98,189	86,759	64,000	64,000	64,000	64,000
Reallocate Existing Supply	13,694	13,694	13,895	13,988	14,019	13,694
Interim Strategies	24,916	0	0	0	0	0
GCWA Offchannel Reservoir	0	0	39,500	39,500	39,500	39,500
Allens Creek Lake/Reservoir	0	45,277	41,779	66,665	58,092	66,196
BRA System Operations Permit	0	3,010	3,010	3,010	3,010	3,010
Brazoria OCR	0	0	0	0	0	24,000
Freeport Desalination Plant	0	0	0	0	33,600	33,600
Dow Offchannel Reservoir	0	21,800	21,800	21,800	21,800	21,800
New Groundwater Wells for Livestock	0	27	27	27	27	27
Total after Recommendations	13,910	17,008	15,001	13,935	13,754	13,762
Chambers						
Initial Shortage	-42,520	-47,412	-50,831	-54,251	-57,612	-61,065
Expanded GW	0	577	681	796	905	1,010
Municipal Conservation	137	195	219	239	263	291
Contract Expansions	0	0	0	0	0	0
Net Shortage	-42,383	-46,640	-49,931	-53,216	-56,444	-59,764
Irrigation Conservation	24,018	24,018	24,018	24,018	24,018	24,018
CLCND W Chambers System	0	1,691	1,978	2,235	2,511	2,804
Reallocate Existing Supply	21,010	21,264	21,389	21,509	21,627	21,725
Interim Strategies	903	0	0	0	0	0
New Contract from Existing Supply	13,823	17,083	19,972	22,888	25,732	28,672
Total after Recommendations [1]	17,371	17,416	17,426	17,434	17,444	17,455

Region H
Table 4A-5: Reccommended WMS by County (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Fort Bend						
Initial Shortage	-86	-11,410	-52,608	-84,380	-123,623	-178,948
Expanded GW	0	6,886	3,423	3,813	4,378	5,052
Municipal Conservation	1,435	7,077	10,277	12,253	14,678	17,497
Contract Expansions	0	367	1,295	1,226	1,225	1,016
Net Shortage	1,349	2,920	-37,613	-67,088	-103,342	-155,383
Irrigation Conservation	5,197	5,197	5,197	5,197	5,197	5,197
WHCRWA GRP	0	0	0	0	0	0
NFBWA GRP	0	0	0	0	0	0
Sugar Land GRP	0	488	4,921	4,835	4,915	4,961
Missouri City GRP	0	4,401	4,401	4,401	4,401	4,401
Wastewater Reclamation for Mun. Irrigation	0	0	2,136	4,744	8,403	12,277
Fort Bend MUD 25 GRP	0	589	589	589	589	589
BRA System Operations Permit	0	3,611	15,860	22,340	22,340	22,340
Fort Bend OCR	0	0	0	0	90	45,943
Allens Creek Lake/Reservoir	0	0	0	6,605	25,864	16,145
TRA to Houston Contract	0	0	13,813	27,824	39,179	39,179
Reallocate Existing Supply	0	0	4,687	4,510	3,720	13,762
Fulshear Reuse	0	287	430	430	430	430
Industrial Conservation	0	558	558	558	558	558
Total after Recommendations	6,546	18,051	14,979	14,945	12,344	10,399
Galveston						
Initial Shortage	-16,307	-16,466	-17,787	-18,738	-19,884	-21,276
Expanded GW	0	811	1,352	1,350	1,352	1,352
Municipal Conservation	768	846	886	896	903	914
Contract Expansions	0	25,630	25,630	25,630	25,630	25,630
Net Shortage	-15,539	10,821	10,081	9,138	8,001	6,620
Irrigation Conservation	2,392	2,392	2,392	2,392	2,392	2,392
New Contract from Existing Supply	16	23	26	29	33	37
Interim Strategies	6,410	0	0	0	0	0
Allens Creek Lake/Reservoir	0	12,101	13,234	14,175	15,310	16,687
New Groundwater Wells for Livestock	0	14	14	14	14	14
Interruptible Supplies for Irr.	6,788	0	0	0	0	0
Total after Recommendations	67	25,351	25,747	25,748	25,750	25,750
Harris						
Initial Shortage	-51,413	-194,925	-270,301	-323,711	-375,414	-458,509
Expanded GW	0	15,481	27,659	27,693	27,727	27,560
Municipal Conservation	37,292	46,836	51,902	56,748	61,656	66,947
Contract Expansions	0	108,852	66,039	51,840	42,538	31,971
Net Shortage	-14,121	-23,756	-124,701	-187,430	-243,493	-332,031
New Contract from Existing Supply	23,008	31,264	38,732	54,777	54,805	54,849
NHCRWA GRP	0	0	0	0	0	0
WHCRWA GRP	-65	-258	-409	-566	-751	-968
COH GRP	0	0	0	0	0	0
Missouri City GRP	0	386	386	386	386	386
Wastewater Reclamation for Mun. Irrigation	0	0	3,268	6,616	10,027	13,431
Reallocate Existing Supply	18,253	15,276	7,308	19,232	30,220	96,881
Interim Strategies	15	0	0	0	0	0
Allens Creek Lake/Reservoir	0	15	83	336	384	622
TRA to Houston Contract	0	0	93,744	86,519	75,164	75,164
NHCRWA Indirect Reuse	0	0	0	7,300	16,300	16,300
Wastewater Reuse for Industry	0	0	0	0	0	67,200
Houston Indirect Reuse	0	0	0	66,420	114,679	128,801
Total after Recommendations	27,090	22,927	18,411	53,590	57,721	120,635

Region H
Table 4A-5: Reccommended WMS by County (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Leon						
Initial Shortage	0	-376	-614	-707	-779	-908
Expanded GW	0	376	614	707	779	908
Municipal Conservation	0	126	140	124	107	116
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	126	140	124	107	116
Total after Recommendations	0	126	140	124	107	116
Liberty						
Initial Shortage	-11,846	-15,142	-18,687	-22,539	-27,061	-32,363
Expanded GW	0	2,537	4,590	6,809	9,399	12,544
Municipal Conservation	0	539	641	744	868	995
Contract Expansions	0	0	0	0	0	0
Net Shortage	-11,846	-12,066	-13,456	-14,986	-16,794	-18,824
Irrigation Conservation	20,876	20,876	20,876	20,876	20,876	20,876
Reallocate Existing Supply	6,657	6,697	6,732	6,767	6,805	6,833
Total after Recommendations	15,687	15,507	14,152	12,657	10,887	8,885
Madison						
Initial Shortage	-1	-130	-228	-239	-323	-450
Expanded GW	0	130	228	239	323	450
Municipal Conservation	1	91	110	112	116	119
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	91	110	112	116	119
Total after Recommendations	0	91	110	112	116	119
Montgomery						
Initial Shortage	-17,728	-47,619	-69,513	-81,350	-120,398	-165,162
Expanded GW	0	5,615	4,471	5,614	9,034	11,820
Municipal Conservation	4,460	6,007	7,384	8,838	10,795	13,089
Contract Expansions	0	0	0	0	0	0
Net Shortage	-13,268	-35,997	-57,658	-66,898	-100,569	-140,253
MUD 8 AND 9 Reuse	0	657	816	1,120	1,120	1,120
Wastewater Reclamation for Mun. Irrigation	0	0	1,752	3,838	6,787	10,215
SJRA WRAP	0	36,377	55,538	54,582	53,581	52,534
Interim Strategies	13,268	0	0	0	0	0
TRA To SJRA Contract	0	0	0	7,935	39,096	76,476
Total after Recommendations	0	1,037	448	577	15	92
Polk						
Initial Shortage	0	-117	-205	-272	-384	-513
Expanded GW	0	117	205	272	384	513
Municipal Conservation	0	158	173	180	187	198
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	158	173	180	187	198
Total after Recommendations	0	158	173	180	187	198
San Jacinto						
Initial Shortage	0	-300	-533	-695	-793	-869
Expanded GW	0	542	928	984	1,007	1,060
Municipal Conservation	19	148	163	174	181	184
Contract Expansions	0	0	0	0	0	0
Net Shortage	19	390	558	463	395	375
Total after Recommendations	19	390	558	463	395	375

Region H
Table 4A-5: Reccommended WMS by County (ac-ft/yr)

	2010	2020	2030	2040	2050	2060
Trinity						
Initial Shortage	0	0	0	0	0	0
Expanded GW	0	36	36	21	0	0
Municipal Conservation	0	2	1	0	0	0
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	38	37	21	0	0
Total after Recommendations	0	38	37	21	0	0
Walker						
Initial Shortage	0	-815	-1,655	-1,973	-2,384	-2,853
Expanded GW	0	816	1,651	1,963	2,374	2,843
Municipal Conservation	0	68	74	89	90	92
Contract Expansions	0	0	0	0	0	0
Net Shortage	0	69	70	79	80	82
Total after Recommendations	0	69	70	79	80	82
Waller						
Initial Shortage	-82	-1,926	-2,940	-4,579	-8,177	-12,355
Expanded GW	0	1,447	2,231	3,644	5,382	7,431
Municipal Conservation	17	392	497	592	708	849
Contract Expansions	0	0	0	0	0	0
Net Shortage	-65	-87	-212	-343	-2,087	-4,075
Irrigation Conservation	0	0	0	0	6,606	6,606
WHCRWA GRP	65	258	409	566	751	968
Total after Recommendations	0	171	197	223	5,270	3,499

Notes:

[1]Lines for reallocation of existing supplies include only the positive portions of reallocations, as negative portions remove surplusses from some WUGs.
Shortage values reflect the sum of all WUG shortages without offsets for other WUG surplusses.

Region H
Table 4A-6: Decadal WMS Summary

WMS	Starting Decade	Project Volume (ac-ft/yr) 2010	2020	2030	2040	2050	2060	WWP Capital Cost ($) 2010	2020	2030	2040	2050	2060	WUG Capital Cost ($) 2010	2020	2030	2040	2050	2060
Conservation Strategies:																			
Industrial Conservation	2010							$0	$0	$0	$0	$0	$0						
Irrigation Conservation	2010	71,275	71,275	71,275	71,275	77,881	77,881	$0	$0	$0	$0	$0	$0	$752,268	$0	$0	$0	$1,153	$4,015
Municipal Conservation	2010	45,605	65,318	75,696	84,503	94,392	105,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Contractual Strategies:																			
Expand/Increase Current Contracts	2010	7,750	142,599	100,714	86,446	77,143	66,367	$0	$0	$0	$0	$0	$0			See WUG Contracts			
New Contracts from Existing Supplies	2010	36,847	48,370	58,730	77,694	80,570	83,558	$0	$0	$0	$0	$0	$0			See WUG Contracts			
Reallocation of Existing Supplies	2010							$0	$0	$0	$0	$0	$0			See WUG Contracts			
TRA to SJRA Contract	2040	0	0	0	7,935	39,096	76,476	$0	$0	$0	$302,781,597	$0	$0			See WUG Contracts			
TRA to Houston Contract	2030	0	0	116,738	123,524	123,524	123,524			See Luce Bayou						See WUG Contracts			
WUG-Level Contracts[1]	2010			N/A				$0	$0	$0	$0	$0	$0	$350,454,499	$671,560,117	$367,706,601	$368,720,609	$288,157,583	$343,673,748
WWP Contracts	2010			N/A				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Groundwater Strategies:																			
Expanded Use of Groundwater	2010	0	40,159	62,297	68,916	80,337	90,617	$0	$0	$0	$0	$0	$0	$0	$59,415,362	$40,583,127	$21,583,224	$21,103,733	$23,243,553
Interim Strategies	2010	45,512	0	0	0	0	0	$0	$0	$0	$0	$0	$0	$86,701,535	$0	$0	$0	$0	$0
New Groundwater Wells for Livestock	2020	0	41	41	41	41	41	$0	$0	$0	$0	$0	$0	$0	$18,635	$0	$0	$0	$0
Groundwater Reduction Plans:																			
CHCRWA GRP	2010	2,375	4,146	4,789	4,806	4,806	4,806			See CHCRWA Trans.				$0	$0	$0	$0	$0	$0
COH GRP	2010			TBD						See COH Treatment				$8,836,520	$17,799,888	$12,253,354	$7,276,113	$6,014,466	$6,055,532
City of Missouri City GRP	2010	0	5,182	9,431	13,149	13,149	17,562	$0	$51,260,490	$40,810,500	$0	$0	$0	$0	$2,358,074	$2,025,087	$1,630,399	$544,508	$60,638
Fort Bend MUD 25 GRP	2020 (2013)	0	589	589	589	589	589	$0	$0	$0	$0	$0	$0	$0	$776,145	$0	$0	$0	$0
Fort Bend WCID 2 GRP	2020 (2013)	0	2,296	5,753	5,753	5,753	5,753	$0	$10,631,491	$7,098,683	$7,098,683	$0	$0	$0	$0	$0	$0	$0	$0
NFBWA GRP[2]	2020 (2013)	35,009	61,021	70,363	84,943	96,103	106,402			See NFBWA Trans.				$0	$249,735	$358,017	$87,191	$533,359	$409,761
NHCRWA GRP[2]	2010	34,714	91,167	117,755	99,625	81,126	117,755			See NHCRWA Trans.				$1,780,852	$4,837,262	$2,797,086	$2,909,781	$2,373,851	$3,115,753
Pecan Grove GRP	2020 (2013)	866	866	1,731	1,731	1,731	1,731	$0	$0	$0	$0	$0	$0	$15,960,000	$0	$0	$0	$0	$0
Richmond/Rosenberg GRP	2020 (2013)	7,500	7,500	7,500	7,500	7,500	7,500	$0	$43,205,325	$29,963,475	$29,897,900	$0	$14,153,450	$0	$0	$0	$0	$0	$0
River Plantation GRP	2010	168	368	368	368	368	368	$0	$0	$0	$0	$0	$0	$221,379	$263,547	$0	$0	$0	$0
SJRA WRAP[3]	2020 (2013)	0	36,377	55,538	62,517	92,677	129,010	$0	$380,000,000	$180,000,000	$200,000,000	$140,000,000	$0	$0	$67,254,547	$53,629,599	$33,814,326	$31,902,735	$31,255,646
Sugar Land GRP	2020 (2013)	0	1,587	7,987	8,656	8,915	9,796	$0	$82,825,000	$78,535,049	$0	$0	$0	$0	$1,130,682	$2,868,604	$1,726,810	$574,465	$59,540
WHCRWA GRP[2]	2010	21,678	52,274	66,761	73,196	75,985	78,839			See WHCRWA Trans				$5,832,511	$11,987,019	$5,649,170	$3,774,316	$3,888,105	$4,137,849
Infrastructure Strategies:																			
CHCRWA Transmission Line	2010	2,375	4,146	4,789	4,806	4,806	4,806			TBD				N/A	N/A	N/A	N/A	N/A	N/A
CHCRWA Internal Distribution	2010	2,375	4,146	4,789	4,806	4,806	4,806			TBD				N/A	N/A	N/A	N/A	N/A	N/A
CLCND West Chambers System	2020 (2014)	0	1,700	2,000	2,200	2,500	2,800	$0	$20,380,000	$0	$0	$0	$0			See WUG Contracts			
COH Distribution Expansion	2010			TBD				$0	$229,390,000	$31,650,000	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
COH Treatment Expansion	2010			Varies by decade				$66,895,529	$975,979,521	$446,248,855	$223,261,769	$166,643,243	$166,643,243	N/A	N/A	N/A	N/A	N/A	N/A
Harris County MUD 50 WTP	2020 (2013)	560	560	560	560	588	632	$0	$0	$0	$0	$0	$0	$6,131,600	$0	$0	$0	$0	$0
Huntsville WTP	2010	11,200	11,200	11,200	11,200	11,200	11,200	$61,023,906	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LLWSSSC Surface Water Project	2010	954	954	954	954	954	954	$0	$0	$0	$0	$0	$0	$3,087,974	$0	$0	$0	$0	$0
Luce Bayou Transfer	2020	0	128,259	206,276	207,629	205,171	270,742	$0	$253,916,914	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NFBWA Internal Distribution	2020 (2013)	35,009	61,021	70,363	84,943	96,103	106,402	$74,000,000	$15,000,000	$106,000,000	$10,000,000	$10,000,000	$10,000,000	N/A	N/A	N/A	N/A	N/A	N/A
NFBWA Shared Transmission Line	2020 (2013)	0	21,878	39,405	52,595	62,606	71,876	$0	$14,000,000	$142,000,000	$57,000,000	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Internal 2010 Distribution	2010	34,714	34,714	34,714	34,714	34,714	34,714	$153,149,640	$0	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Internal 2020 Distribution	2020	0	91,167	91,167	91,167	91,167	91,167	$0	$345,292,192	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Internal 2030 Distribution	2030	0	0	117,755	117,755	117,755	117,755	$0	$0	$37,439,584	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Transmission 2010	2010	34,714	34,714	34,714	34,714	34,714	34,714	$80,690,624	$0	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Transmission 2020	2020	0	91,167	91,167	91,167	91,167	91,167	$0	$172,558,512	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
NHCRWA Transmission 2030	2030	0	0	117,755	117,755	117,755	117,755	$0	$0	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
Pearland SWTP	TBD	6,720	6,720	6,720	13,420	13,420	13,420	$0	$0	$0	$0	$0	$0	$46,500,000	$218,500,000	$0	$0	$0	$0
Sealy GW Treatment Expansion		0	360	360	360	360	888	$0	$0	$0	$0	$0	$0	$0	$6,450,000	$0	$0	$0	$0
WHCRWA Internal Distribution	2010	21,678	52,274	66,761	73,196	75,985	78,839	$135,309,000	$340,470,000	$76,693,000	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
WHCRWA Transmission Line	2010	21,678	52,274	66,761	73,196	75,985	78,839	$45,110,193	$244,974,000	$0	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
Reservoir Strategies:																			
Allens Creek Reservoir	2020	0	57,393	55,096	87,781	99,650	99,650	$0	$222,752,400	$0	$0	$0	$0			See WUG Contracts			
Brazoria County Off-channel Reservoir	2060	0	0	0	0	0	24,000	$0	$0	$0	$0	$0	$173,898,602			See WUG Contracts			
Dow Off-channel Reservoir	2020	0	21,800	21,800	21,800	21,800	21,800	$0	$124,468,000	$0	$0	$0	$0			See WUG Contracts			
Fort Bend County Off-channel Reservoir	2050	0	0	0	0	90	45,943	$0	$0	$0	$0	$202,514,788	$0			See WUG Contracts			
GCWA Off-channel Reservoir	2030	0	0	39,500	39,500	39,500	39,500	$0	$0	$197,448,012	$0	$0	$0			See WUG Contracts			
Reuse Strategies:																			
Fulshear Reuse	TBD	0	287	430	430	430	430	$0	$0	$0	$0	$0	$0	$0	$378,189	$188,436	$0	$0	$0
Houston Indirect Reuse	2040	0	0	0	66,420	114,679	128,801	$0	$0	$0	$0	$0	$0	$0	$0	$0	$276,409,030	$239,326,921	$206,086,899
Montgomery MUD 8/9 Indirect Reuse	2016	0	657	816	1,120	1,120	1,120	$0	$0	$0	$0	$0	$0	$0	$7,171,477	$1,743,456	$3,330,754	$0	$0
NHCRWA Indirect Reuse	2040	0	0	0	7,300	16,300	16,300	$0	$0	$0	$0	$0	$0	$0	$0	$0	$32,223,510	$34,555,184	$0
Wastewater Reuse for Industry	2060	0	0	0	0	0	67,200	$0	$0	$0	$0	$0	$332,051,761	$0	$0	$0	$0	$0	$0
Wastewater Reclamation for Mun. Irrigation	2030	0	0	7,272	15,425	25,561	36,388	$0	$0	$0	$0	$0	$0	$0	$0	$9,582,558	$10,837,039	$13,363,138	$14,260,514
Permit Strategies:																			
BRA System Operations Permit	2020	0	6,621	18,870	25,350	25,350	25,350			TBD						See WUG Contracts			
Houston Bayous Permit*	2020	0	0	0	0	0	0	$0	$20,956,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Strategies:																			
Brazoria Co. Interruptible Supplies for Irr.	2010	104,977	86,759	64,000	64,000	64,000	64,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Freeport Desalination Plant		0	0	0	0	33,600	33,600	$0	$0	$0	$255,699,000	$0	$0			See WUG Contracts			
Brazos Saltwater Barrier	2030			N/A				$0	$44,470,739	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Alternative Strategies:																			
Sabine to Region H Transfer	2030			N/A - Up to 486,500 ac-ft				$0	$0	$760,813,320	$0	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
Little-River Off-Channel Reservoir	2040			N/A - Up to 27,225 ac-ft				$0	$0	$0	$137,356,000	$0	$0	N/A	N/A	N/A	N/A	N/A	N/A
Montgomery Co. MUD 8/9 Brackish Desal	2010			N/A - Up to 2,240 ac-ft				N/A	N/A	N/A	N/A	N/A	N/A	$12,000,000	$0	$0	$0	$0	$0

Region H
Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	Supply Volume (ac-ft)						Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
												2010	2020	2030	2040	2050	2060			
ALVIN	H	SAN JACINTO-BRAZOS	BRAZORIA	080013000	08001300002011	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	99	208	383	595	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
CLEAR LAKE SHORES	H	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	87	89	89	89	89	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
COUNTY-OTHER	H	BRAZOS	BRAZORIA	080757020	08075702002012	BRAZOSPORT WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	116	124	129	137	146	Y	ALLENS CREEK LAKE/RESERVOIR	BWA to WUG Contract
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	BRAZOSPORT WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	1428	2293	2508	Y	ALLENS CREEK LAKE/RESERVOIR	BWA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	BRAZOSPORT WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	753	2781	Y	ALLENS CREEK LAKE/RESERVOIR	BWA to WUG Contract
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	3457	11289	6788	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	410	1471	876	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	123	6420	4547	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	131	274	305	340	379	Y	ALLENS CREEK LAKE/RESERVOIR	GC WCID 1 Contract
FAIRCHILDS	H	BRAZOS	FORT BEND	081019000	08101900007912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	129	303	164	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	MISSOURI CITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	133	68	Y	ALLENS CREEK LAKE/RESERVOIR	Missouri City to WUG Contract
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	SUGAR LAND	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	149	212	78	Y	ALLENS CREEK LAKE/RESERVOIR	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MISSOURI CITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	117	50	Y	ALLENS CREEK LAKE/RESERVOIR	Missouri City to WUG Contract
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	744	1750	949	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
FORT BEND COUNTY MUD #81	H	BRAZOS	FORT BEND	084129000	08412900007912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	308	717	388	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
IRRIGATION	H	BRAZOS	BRAZORIA	081004020	08100402002012	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	50	50	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	13628	13628	13771	15415	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
IRRIGATION	H	SAN JACINTO-BRAZOS	GALVESTON	081004084	08100408408411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	6788	6788	6788	6788	6788	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
KEMAH	H	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	208	230	237	241	247	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
LEAGUE CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	3485	3837	3909	3993	4093	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
LEAGUE CITY	H	SAN JACINTO-BRAZOS	HARRIS	080350000	08035000010111	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	15	15	15	16	16	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	44720	26791	46813	35606	36711	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	1615	0	0	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MANUFACTURING	H	BRAZOS	FORT BEND	081001079	08100107907912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	39	65	0	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO	FORT BEND	081001079	08100107907910	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	62	104	0	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MANVEL	H	SAN JACINTO-BRAZOS	BRAZORIA	080721000	08072100002011	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	49	44	45	48	51	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
MINING	H	BRAZOS	BRAZORIA	081003020	08100302002012	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	75	92	110	127	143	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	271	386	502	647	796	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	46	76	119	168	217	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	BRAZOS	FORT BEND	081003079	08100307907912	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	6	13	7	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	SAN JACINTO	FORT BEND	081003079	08100307907910	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	3	6	3	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	FORT BEND	081003079	08100307907911	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	12	6	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	GALVESTON	081003084	08100308408411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	21	24	28	31	34	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
MISSOURI CITY	H	SAN JACINTO	HARRIS	080409000	08040900010110	MISSOURI CITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	68	321	321	476	Y	ALLENS CREEK LAKE/RESERVOIR	Missouri City to WUG Contract
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	BRAZOS RIVER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	2	4	2	Y	ALLENS CREEK LAKE/RESERVOIR	BRA to WUG Contract
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	539	2068	4109	6783	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	47	130	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	SUGAR LAND	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	82	116	43	Y	ALLENS CREEK LAKE/RESERVOIR	Sugar Land to WUG Contract
RICHMOND	H	BRAZOS	FORT BEND	080500000	08050000007912	RICHMOND-ROSENBERG	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	0	81	Y	ALLENS CREEK LAKE/RESERVOIR	Richmond-Rosenberg to WUG Contract
ROSENBERG	H	BRAZOS	FORT BEND	080518000	08051800007912	RICHMOND-ROSENBERG	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	1091	2970	1767	Y	ALLENS CREEK LAKE/RESERVOIR	Richmond-Rosenberg to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	GALVESTON	081002084	08100208408411	GULF COAST WATER AUTHORITY	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	1381	1992	2819	3828	5057	Y	ALLENS CREEK LAKE/RESERVOIR	GCWA to WUG Contract
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	SUGAR LAND	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	0	0	162	328	Y	ALLENS CREEK LAKE/RESERVOIR	Sugar Land to WUG Contract
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	426	426	426	426	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	23	61	61	61	61	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	GULF COAST WATER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	0	1950	1950	1950	Y	BRA SYSTEM OPERATIONS PERMIT	GCWA to WUG Contract
FAIRCHILDS	H	BRAZOS	FORT BEND	081019000	08101900007912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	125	354	354	354	354	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	403	668	668	668	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	155	245	245	245	245	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #108	H	BRAZOS	FORT BEND	084118000	08411800007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	141	312	312	312	312	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #111	H	BRAZOS	FORT BEND	084119000	08411900007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	186	417	417	417	417	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	543	859	859	859	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	1025	1025	1025	1025	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
FORT BEND COUNTY MUD #67	H	BRAZOS	FORT BEND	084126000	08412600007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	197	441	441	441	441	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #68	H	BRAZOS	FORT BEND	084127000	08412700007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	144	324	324	324	324	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #69	H	BRAZOS	FORT BEND	084128000	08412800007912	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	117	260	260	260	260	Y	BRA SYSTEM OPERATIONS PERMIT	GCWA to WUG Contract
FORT BEND COUNTY MUD #81	H	BRAZOS	FORT BEND	084129000	08412900007912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	253	734	734	734	734	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	2779	2779	2779	2779	2779	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MANUFACTURING	H	BRAZOS	FORT BEND	081001079	08100107907912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	406	406	406	406	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO	FORT BEND	081001079	08100107907910	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	623	1292	1292	1292	1292	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MEADOWS	H	SAN JACINTO	FORT BEND	080792000	08079200007910	FORT BEND COUNTY WCID #2	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	447	993	993	993	993	Y	BRA SYSTEM OPERATIONS PERMIT	FB WCID 2 to WUG Contract
MEADOWS	H	SAN JACINTO-BRAZOS	FORT BEND	080792000	08079200007911	FORT BEND COUNTY WCID #2	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	44	99	99	99	99	Y	BRA SYSTEM OPERATIONS PERMIT	FB WCID 2 to WUG Contract
MINING	H	BRAZOS	BRAZORIA	081003020	08100302002012	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	44	44	44	44	44	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	160	160	160	160	160	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	27	27	27	27	27	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	BRAZOS	FORT BEND	081003079	08100307907912	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	189	383	383	383	383	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	SAN JACINTO	FORT BEND	081003079	08100307907910	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	77	165	165	165	165	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	FORT BEND	081003079	08100307907911	GULF COAST WATER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	86	703	717	717	717	Y	BRA SYSTEM OPERATIONS PERMIT	GCWA to WUG Contract
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	395	1287	1287	1287	1287	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	480	1079	1079	1079	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	2809	5675	5675	5675	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	BRAZOS RIVER AUTHORITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	4	10	10	10	10	Y	BRA SYSTEM OPERATIONS PERMIT	BRA to WUG Contract
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	87	135	135	135	135	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
SIENNA PLANTATION MUD #2	H	SAN JACINTO-BRAZOS	FORT BEND	084334000	08433400007911	MISSOURI CITY	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	318	740	772	772	772	Y	BRA SYSTEM OPERATIONS PERMIT	Missouri City to WUG Contract
SUGAR LAND	H	SAN JACINTO	FORT BEND	080585000	08058500007910	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	35	35	35	35	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	SUGAR LAND	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B012	0	0	778	1216	1216	1216	Y	BRA SYSTEM OPERATIONS PERMIT	Sugar Land to WUG Contract
IRRIGATION	H	BRAZOS	BRAZORIA	081004020	08100402002012	GULF COAST WATER AUTHORITY	BRAZORIA INTERRUPTIBLE IRRIGATIION SUPPLY	H	BRAZOS	BRAZORIA	BIIS12	1804	1434	1293	1207	1157	1157	Y	BRAZORIA INTERRUPTIBLE IRRIGATION	Irrigation
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	BRAZORIA INTERRUPTIBLE IRRIGATIION SUPPLY	H	BRAZOS	BRAZORIA	BIIS12	63173	45325	55707	55793	55843	55843	Y	BRAZORIA INTERRUPTIBLE IRRIGATION	Irrigation
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	BRAZORIA INTERRUPTIBLE IRRIGATIION SUPPLY - SJB	H	SAN JACINTO-BRAZOS	BRAZORIA	BIISJB11	33212	40000	7000	7000	7000	7000	Y	BRAZORIA INTERRUPTIBLE IRRIGATION	Irrigation
IRRIGATION	H	SAN JACINTO-BRAZOS	GALVESTON	081004084	08100408408411	GULF COAST WATER AUTHORITY	BRAZORIA INTERRUPTIBLE IRRIGATIION SUPPLY - SJB	H	SAN JACINTO-BRAZOS	BRAZORIA	BIISJB11	6788	0	0	0	0	0	Y	BRAZORIA INTERRUPTIBLE IRRIGATION	Irrigation
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOS RIVER AUTHORITY	BRAZORIA OCR	H	BRAZOS	RESERVOIR	BRAOCR12	0	0	0	0	0	20344	Y	BRAZORIA OCR	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	BRAZOS RIVER AUTHORITY	BRAZORIA OCR	H	BRAZOS	RESERVOIR	BRAOCR12	0	0	0	0	0	3656	Y	BRAZORIA OCR	BRA to WUG Contract
BEACH CITY	H	TRINITY	CHAMBERS	080822000	08082200003608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	42	52	61	69	74	Y	CLCND W Chambers System	CLCND to WUG Contract
BEACH CITY	H	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	238	298	353	414	478	Y	CLCND W Chambers System	CLCND to WUG Contract
COUNTY-OTHER	H	TRINITY	CHAMBERS	080757036	08075703603608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	187	180	173	168	166	Y	CLCND W Chambers System	CLCND to WUG Contract
COUNTY-OTHER	H	TRINITY-SAN JACINTO	CHAMBERS	080757036	08075703603609	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	101	100	99	97	99	Y	CLCND W Chambers System	CLCND to WUG Contract
MONT BELVIEU	H	TRINITY	CHAMBERS	080413000	08041300003608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	677	824	955	1090	1230	Y	CLCND W Chambers System	CLCND to WUG Contract
MONT BELVIEU	H	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	268	335	396	462	532	Y	CLCND W Chambers System	CLCND to WUG Contract
OLD RIVER-WINFREE	H	TRINITY	CHAMBERS	080727000	08072700003608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	0	178	189	198	211	225	Y	CLCND W Chambers System	CLCND to WUG Contract
BLUE BELL MANOR UTILITY COMPANY	H	SAN JACINTO	HARRIS	084026000	08402600010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	140	363	413	407	402	402	Y	COH GRP	COH GRP Participation
EL DORADO UD	H	SAN JACINTO	HARRIS	084101000	08410100010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	130	325	403	440	481	526	Y	COH GRP	COH GRP Participation
GREEN TRAILS MUD	H	SAN JACINTO	HARRIS	084143000	08414300010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	224	668	862	973	1087	1204	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #11	H	SAN JACINTO	HARRIS	084153000	08415300010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	102	303	389	437	487	543	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #119 INWOOD NORTH	H	SAN JACINTO	HARRIS	084154000	08415400010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	211	588	665	652	644	644	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #153	H	SAN JACINTO	HARRIS	084161000	08416100010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	295	1069	1559	1961	2373	2782	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #154	H	SAN JACINTO	HARRIS	084162000	08416200010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	163	532	721	860	995	1141	Y	COH GRP	COH GRP Participation
HARRIS COUNTY MUD #189	H	SAN JACINTO	HARRIS	084174000	08417400010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	193	621	838	995	1148	1311	Y	COH GRP	COH GRP Participation
HARRIS COUNTY UD #14	H	SAN JACINTO	HARRIS	084190000	08419000010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	143	409	511	559	609	661	Y	COH GRP	COH GRP Participation
HARRIS COUNTY UD #15	H	SAN JACINTO	HARRIS	084191000	08419100010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	104	312	403	455	509	568	Y	COH GRP	COH GRP Participation
HARRIS COUNTY WCID #133	H	SAN JACINTO	HARRIS	084195000	08419500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	181	480	553	546	550	550	Y	COH GRP	COH GRP Participation
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	-3762	-11417	-16809	-19870	-22399	-24990	Y	COH GRP	COH GRP Participation
LONGHORN TOWN UD	H	SAN JACINTO	HARRIS	084235000	08423500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	167	574	857	1105	1351	1597	Y	COH GRP	COH GRP Participation
MASON CREEK UD	H	SAN JACINTO	HARRIS	084247000	08424700010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	566	1487	1696	1682	1674	1674	Y	COH GRP	COH GRP Participation
NORTH BELT UD	H	SAN JACINTO	HARRIS	084275000	08427500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	112	384	541	666	796	926	Y	COH GRP	COH GRP Participation
NORTH GREEN MUD	H	SAN JACINTO	HARRIS	084279000	08427900010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	84	242	300	321	345	372	Y	COH GRP	COH GRP Participation
NORTHWEST PARK MUD	H	SAN JACINTO	HARRIS	084287000	08428700010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	662	2179	2525	2474	2450	2450	Y	COH GRP	COH GRP Participation
SUNBELT FWSD	H	SAN JACINTO	HARRIS	084350000	08435000010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	0	2418	4018	5005	5967	Y	COH GRP	COH GRP Participation
WEST HARRIS COUNTY MUD #6	H	SAN JACINTO	HARRIS	084387000	08438700010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	135	360	416	406	401	401	Y	COH GRP	COH GRP Participation
WOODCREEK MUD	H	SAN JACINTO	HARRIS	084404000	08440400010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	150	521	739	913	1092	1271	Y	COH GRP	COH GRP Participation
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	THE DOW CHEMICAL CO.	DOW OFFCHANNEL RESERVOIR	H	BRAZOS	RESERVOIR	DOWOCR12	0	19048	19048	19048	19048	19048	Y	DOW OFFCHANNEL RESERVOIR	DOW to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	THE DOW CHEMICAL CO.	DOW OFFCHANNEL RESERVOIR	H	BRAZOS	RESERVOIR	DOWOCR12	0	2752	2752	2752	2752	2752	Y	DOW OFFCHANNEL RESERVOIR	DOW to WUG Contract
ANGLETON	H	SAN JACINTO-BRAZOS	BRAZORIA	080018000	08001800002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	137	98	103	112	160	231	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
BACLIFF MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084012000	08401200008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	59	59	59	59	59	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
BACLIFF MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084012000	08401200008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	465	465	465	465	465	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
BACLIFF MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084012000	08401200008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	106	106	106	106	106	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	1142	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	CHCRWA	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	977	862	720	631	546	Y	EXPAND/INCREASE CURRENT CONTRACTS	CHCRWA to WUG Contract
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	CHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	794	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	CHCRWA to WUG Contract
CLUTE	H	SAN JACINTO-BRAZOS	BRAZORIA	080118000	08011800002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	0	0	24	42	84	144	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	1752	1852	2005	681	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	4730	3837	4313	5198	5355	4546	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	GALVESTON	080757084	08075708408411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	248	248	248	248	248	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	GALVESTON	080757084	08075708408411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	1962	1962	1962	1962	1962	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	GALVESTON	080757084	08075708408411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	449	449	449	449	449	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	59	59	59	59	59	Y	EXPAND/INCREASE CURRENT CONTRACTS	GC WCID 1 Contract
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	469	469	469	469	469	Y	EXPAND/INCREASE CURRENT CONTRACTS	GC WCID 1 Contract
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	107	107	107	107	107	Y	EXPAND/INCREASE CURRENT CONTRACTS	GC WCID 1 Contract
FREEPORT	H	SAN JACINTO-BRAZOS	BRAZORIA	080217000	08021700002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	0	95	263	439	670	950	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
GALVESTON	H	SAN JACINTO-BRAZOS	GALVESTON	080227000	08022700008411	CITY OF GALVESTON	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	677	677	677	677	677	Y	EXPAND/INCREASE CURRENT CONTRACTS	Galveston to WUG Contract
GALVESTON	H	SAN JACINTO-BRAZOS	GALVESTON	080227000	08022700008411	CITY OF GALVESTON	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	5360	5360	5360	5360	5360	Y	EXPAND/INCREASE CURRENT CONTRACTS	Galveston to WUG Contract
GALVESTON	H	SAN JACINTO-BRAZOS	GALVESTON	080227000	08022700008411	CITY OF GALVESTON	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	1225	1225	1225	1225	1225	Y	EXPAND/INCREASE CURRENT CONTRACTS	Galveston to WUG Contract
GALVESTON COUNTY WCID #12	H	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	213	213	213	213	213	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
GALVESTON COUNTY WCID #12	H	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	1688	1688	1688	1688	1688	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
GALVESTON COUNTY WCID #12	H	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	386	386	386	386	386	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
HITCHCOCK	H	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	17	17	17	17	17	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
HITCHCOCK	H	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	134	134	134	134	134	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
HITCHCOCK	H	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	31	31	31	31	31	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
HUMBLE	H	SAN JACINTO	HARRIS	080289000	08028900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	1718	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
LAKE JACKSON	H	SAN JACINTO-BRAZOS	BRAZORIA	080338000	08033800002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	744	708	830	1049	1349	1703	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	326	252	130	124	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612		844	4	6	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	FORT BEND	081001079	08100107907911	FORT BEND CO. WCID 1	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	FORT BEND	346110517011	0	148	824	940	1016	1016	Y	EXPAND/INCREASE CURRENT CONTRACTS	FB WCID 1 to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	8611	3177	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	444	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	NFBWA to WUG Contract
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	30880	30880	32734	29030	25398	Y	EXPAND/INCREASE CURRENT CONTRACTS	NHCRWA to WUG Contract
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	25573	14181	7419	3616	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	NHCRWA to WUG Contract
OYSTER CREEK	H	SAN JACINTO-BRAZOS	BRAZORIA	080730000	08073000002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	25	31	42	57	76	100	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
RICHWOOD	H	SAN JACINTO-BRAZOS	BRAZORIA	080501000	08050100002011	BRAZOSPORT WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	BRAZORIA	346120536612	36	33	36	42	56	76	Y	EXPAND/INCREASE CURRENT CONTRACTS	BWA to WUG Contract
SAN LEON MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	117	117	117	117	117	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
SAN LEON MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	930	930	930	930	930	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
SAN LEON MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	213	213	213	213	213	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	967	0	0	0	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	Pasadena to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	3286	3357	4189	5154	6027	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
SUNBELT FWSD	H	SAN JACINTO	HARRIS	084350000	08435000010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	2842	1459	553	246	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	COH to WUG Contract
TEXAS CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080602000	08060200008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	940	940	940	940	940	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TEXAS CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080602000	08060200008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	7444	7444	7444	7444	7444	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TEXAS CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080602000	08060200008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	1701	1701	1701	1701	1701	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TIKI ISLAND	H	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	GULF COAST WATER AUTHORITY	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A11	0	59	59	59	59	59	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TIKI ISLAND	H	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	0	465	465	465	465	465	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
TIKI ISLAND	H	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	0	106	106	106	106	106	Y	EXPAND/INCREASE CURRENT CONTRACTS	GCWA to WUG Contract
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	219	471	286	209	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	WHCRWA to WUG Contract
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	31618	12123	6225	3861	0	Y	EXPAND/INCREASE CURRENT CONTRACTS	WHCRWA to WUG Contract
AMES	H	TRINITY	LIBERTY	080676000	08067600014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	22	42	60	84	113	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ANGLETON	H	SAN JACINTO-BRAZOS	BRAZORIA	080018000	08001800002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	46	58	54	61	71	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAILEY'S PRAIRIE	H	BRAZOS	BRAZORIA	080817000	08081700002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	0	0	0	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAILEY'S PRAIRIE	H	SAN JACINTO-BRAZOS	BRAZORIA	080817000	08081700002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	3	5	7	10	15	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAYOU VISTA	H	SAN JACINTO-BRAZOS	GALVESTON	080759000	08075900008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	3	4	4	4	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAYTOWN	H	TRINITY-SAN JACINTO	CHAMBERS	080042000	08004200003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	HARRIS	1011509	0	9	14	18	23	28	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAYTOWN	H	SAN JACINTO	HARRIS	080042000	08004200010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	1	1	1	2	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BAYTOWN	H	TRINITY-SAN JACINTO	HARRIS	080042000	08004200010109	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	HARRIS	1011509	0	1	7	7	7	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BEACH CITY	H	TRINITY	CHAMBERS	080822000	08082200003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	0	2	3	4	6	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BEACH CITY	H	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	0	22	35	44	52	58	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BEASLEY	H	BRAZOS	FORT BEND	081012000	08101200007912	None	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	1	2	4	6	8	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BEASLEY	H	BRAZOS-COLORADO	FORT BEND	081012000	08101200007913	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	FORT BEND	0791513	0	11	24	38	58	82	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	52	104	104	104	104	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BELLVILLE	H	BRAZOS	AUSTIN	080048000	08004800000812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	285	472	568	618	697	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BRAZORIA COUNTY MUD #1	H	SAN JACINTO-BRAZOS	BRAZORIA	084030000	08403000002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	300	650	955	1294	1648	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BRAZORIA COUNTY MUD #2	H	BRAZOS	BRAZORIA	084031000	08403100002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	380	813	1200	1621	2060	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BRAZORIA COUNTY MUD #3	H	SAN JACINTO-BRAZOS	BRAZORIA	084032000	08403200002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	217	468	687	931	1186	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BROOKSHIRE	H	BRAZOS	WALLER	080077000	08007700023712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	124	304	506	754	1050	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BROOKSIDE VILLAGE	H	SAN JACINTO-BRAZOS	BRAZORIA	080078000	08007800002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	14	39	63	91	124	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
BUFFALO	H	TRINITY	LEON	080083000	08008300014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	36	53	49	44	47	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CENTERVILLE	H	TRINITY	LEON	080105000	08010500014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	14	21	18	16	17	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CLEAR BROOK CITY MUD WOODMEADOWS	H	SAN JACINTO	HARRIS	084063000	08406300010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	18	38	38	38	38	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CLEAR LAKE SHORES	H	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	1	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CLEVELAND	H	SAN JACINTO	LIBERTY	080116000	08011600014610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	24	51	75	123	188	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CLUTE	H	SAN JACINTO-BRAZOS	BRAZORIA	080118000	08011800002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	14	20	32	44	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COLDSPRING	H	SAN JACINTO	SAN JACINTO	080122000	08012200020410	None	GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	2041510	0	7	12	15	16	17	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COLDSPRING	H	TRINITY	SAN JACINTO	080122000	08012200020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	23	42	53	59	62	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	37	359	626	858	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CONSOLIDATED WSC	H	TRINITY	WALKER	084071000	08407100023608	None	YEGUA-JACKSON AQUIFER	H	TRINITY	WALKER	2363108	0	1	1	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS-COLORADO	AUSTIN	080757008	08075700800813	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	AUSTIN	0081513	0	26	45	53	57	66	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	COLORADO	AUSTIN	080757008	08075700800814	None	GULF COAST AQUIFER	H	COLORADO	AUSTIN	0081514	0	3	5	5	6	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	141	230	279	321	366	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	1804	2457	2514	2437	2356	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS	LEON	080757145	08075714514512	None	CARRIZO-WILCOX AQUIFER	H	BRAZOS	LEON	1451012	0	21	26	17	10	13	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	LEON	080757145	08075714514508	None	SPARTA AQUIFER	H	TRINITY	LEON	1452708	0	7	8	5	3	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	LEON	080757145	08075714514508	None	QUEEN CITY AQUIFER	H	TRINITY	LEON	1452408	0	6	8	5	2	3	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	LEON	080757145	08075714514508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	7	8	5	3	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	NECHES	LIBERTY	080757146	08075714614606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	25	49	74	101	134	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	NECHES-TRINITY	LIBERTY	080757146	08075714614607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	LIBERTY	1461507	0	1	3	5	7	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO	LIBERTY	080757146	08075714614610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	210	413	624	851	1133	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	LIBERTY	080757146	08075714614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	156	463	789	1139	1584	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY-SAN JACINTO	LIBERTY	080757146	08075714614609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	LIBERTY	1461509	0	30	60	90	123	163	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS	MADISON	080757157	08075715715712	None	SPARTA AQUIFER	H	BRAZOS	MADISON	1572712	0	4	7	9	12	16	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	MADISON	080757157	08075715715708	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	MADISON	1571008	0	50	100	57	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	MADISON	080757157	08075715715708	None	QUEEN CITY AQUIFER	H	TRINITY	MADISON	1572408	0	11	6	4	9	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	MADISON	080757157	08075715715708	None	SPARTA AQUIFER	H	TRINITY	MADISON	1572708	0	0	0	8	91	156	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	406	2740	5360	7371	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	POLK	080757187	08075718718708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	71	124	174	260	356	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO	SAN JACINTO	080757204	08075720420410	None	GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	2041510	0	106	184	223	246	261	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	SAN JACINTO	080757204	08075720420408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	174	268	124	33	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	TRINITY	080757228	08075722822808	None	GULF COAST AQUIFER	H	TRINITY	TRINITY	2281508	0	32	35	21	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	TRINITY	WALKER	080757236	08075723623608	None	GULF COAST AQUIFER	H	TRINITY	WALKER	2363108	0	1	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	BRAZOS	WALLER	080757237	08075723723712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	0	28	65	136	216	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
COUNTY-OTHER	H	SAN JACINTO	WALLER	080757237	08075723723710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	172	386	594	888	1219	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CROSBY MUD	H	SAN JACINTO	HARRIS	084078000	08407800010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	14	27	27	27	27	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	MONTGOMERY	084081000	08408100017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	8	45	72	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DAISETTA	H	NECHES	LIBERTY	080149000	08014900014606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	1	2	3	4	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DAISETTA	H	TRINITY	LIBERTY	080149000	08014900014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	2	3	4	7	11	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DANBURY	H	SAN JACINTO-BRAZOS	BRAZORIA	080693000	08069300002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	7	14	25	39	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DAYTON	H	TRINITY	LIBERTY	080152000	08015200014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	424	816	1187	1618	2118	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DEER PARK	H	SAN JACINTO	HARRIS	080154000	08015400010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	0	2	2	2	2	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DEER PARK	H	SAN JACINTO-BRAZOS	HARRIS	080154000	08015400010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	1	2	2	2	2	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	GALVESTON COUNTY WCID #1	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	33	50	50	50	50	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	11	38	59	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FLO COMMUNITY WSC	H	TRINITY	LEON	084114000	08411400014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	107	160	156	141	149	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FREEPORT	H	BRAZOS	BRAZORIA	080217000	08021700002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	9	23	32	41	49	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FREEPORT	H	SAN JACINTO-BRAZOS	BRAZORIA	080217000	08021700002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	45	150	213	256	291	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FRIENDSWOOD	H	SAN JACINTO-BRAZOS	GALVESTON	080219000	08021900008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	28	40	38	40	40	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
GALENA PARK	H	SAN JACINTO	HARRIS	080226000	08022600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	0	2	2	2	2	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
GALVESTON COUNTY MUD #1	H	SAN JACINTO-BRAZOS	GALVESTON	084135000	08413500008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	5	8	8	8	8	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
GALVESTON COUNTY WCID #12	H	SAN JACINTO-BRAZOS	GALVESTON	084136000	08413600008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	3	4	4	4	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARDIN	H	TRINITY	LIBERTY	080878000	08087800014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	19	36	55	75	99	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARDIN WSC	H	TRINITY	LIBERTY	084148000	08414800014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	102	200	298	406	532	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY FWSD #6	H	SAN JACINTO	HARRIS	084151000	08415100010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	5	9	9	9	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY MUD #53	H	SAN JACINTO	HARRIS	084186000	08418600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	90	174	174	174	174	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY MUD #8	H	SAN JACINTO	HARRIS	084189000	08418900010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	12	23	23	23	23	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY WCID #21	H	SAN JACINTO	HARRIS	084196000	08419600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	5	9	9	9	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY WCID #36	H	SAN JACINTO	HARRIS	084197000	08419700010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	27	40	40	40	40	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HARRIS COUNTY WCID #50	H	SAN JACINTO	HARRIS	084198000	08419800010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	5	11	11	11	11	Y	EXPANDED USE OF GW	EXPANDED USE OF GW

Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
HARRIS COUNTY WCID #84	H	SAN JACINTO	HARRIS	084200000	08420000010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	0	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HEMPSTEAD	H	BRAZOS	WALLER	080271000	08027100023712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	473	1076	1766	2581	3539	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HILLCREST	H	SAN JACINTO-BRAZOS	BRAZORIA	080881000	08088100002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	0	0	0	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HITCHCOCK	H	SAN JACINTO-BRAZOS	GALVESTON	080279000	08027900008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	1	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HOLIDAY LAKES	H	SAN JACINTO-BRAZOS	BRAZORIA	080779000	08077900002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	0	0	0	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	7398	14308	14308	14308	14308	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HOUSTON	H	SAN JACINTO-BRAZOS	HARRIS	080285000	08028500010111	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	207	339	339	339	339	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HOUSTON	H	SAN JACINTO	MONTGOMERY	080285000	08028500017010	CITY OF HOUSTON	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	62	173	305	481	689	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
HUNTERS CREEK VILLAGE	H	SAN JACINTO	HARRIS	080290000	08029000010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	24	47	47	47	47	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IOWA COLONY	H	SAN JACINTO-BRAZOS	BRAZORIA	080885000	08088500002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	3	11	20	29	39	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	4748	2105	1912	268	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IRRIGATION	H	NECHES	LIBERTY	081004146	08100414614606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	12	24	35	47	78	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IRRIGATION	H	SAN JACINTO	WALLER	081004237	08100423723710	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	0	0	13	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
IRRIGATION	H	SAN JACINTO	WALLER	081004237	08100423723710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	474	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
JACINTO CITY	H	SAN JACINTO	HARRIS	080301000	08030100010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	9	22	22	22	22	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
JAMAICA BEACH	H	SAN JACINTO-BRAZOS	GALVESTON	080886000	08088600008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	4	7	7	7	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
JEWETT	H	BRAZOS	LEON	080887000	08088700014512	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	9	13	13	12	13	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
JEWETT	H	TRINITY	LEON	080887000	08088700014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	26	41	40	37	39	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
KEMAH	H	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	4	7	7	7	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
KENDLETON	H	BRAZOS-COLORADO	FORT BEND	KENDLETON	KENDLETON07913	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	FORT BEND	0791513	0	43	100	173	267	388	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
KENEFICK	H	TRINITY	LIBERTY	081033000	08103300014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	18	34	50	68	89	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LA PORTE	H	SAN JACINTO	HARRIS	080346000	08034600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	2	4	4	4	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LA PORTE	H	SAN JACINTO-BRAZOS	HARRIS	080346000	08034600010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	33	71	71	71	71	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE JACKSON	H	SAN JACINTO-BRAZOS	BRAZORIA	080338000	08033800002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	333	473	508	515	521	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	LIBERTY	084226000	08422600014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	0	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	POLK	084226000	08422600018708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	0	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	TRINITY	084226000	08422600022808	None	GULF COAST AQUIFER	H	TRINITY	TRINITY	2281508	0	2	1	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	WALKER	084226000	08422600023608	None	GULF COAST AQUIFER	H	TRINITY	WALKER	2361508	0	0	1	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LEAGUE CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	77	119	119	119	119	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LIBERTY	H	TRINITY	LIBERTY	080356000	08035600014608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	18	23	34	69	119	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LIVESTOCK	H	SAN JACINTO-BRAZOS	BRAZORIA	081005020	08100502002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	13	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
LIVESTOCK	H	SAN JACINTO-BRAZOS	GALVESTON	81005084	08100508408411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	10	26	26	26	26	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MADISONVILLE	H	TRINITY	MADISON	080382000	08038200015708	None	SPARTA AQUIFER	H	TRINITY	MADISON	1572708	0	34	56	75	100	127	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MAGNOLIA	H	SAN JACINTO	MONTGOMERY	080907000	08090700017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	11	39	61	82	99	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	BRAZOS	AUSTIN	081001008	08100100800812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	19	36	51	64	85	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	BRAZOS-COLORADO	AUSTIN	081001008	08100100800813	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	AUSTIN	0081513	0	4	7	11	14	18	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	397	1821	2880	3364	3812	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY-SAN JACINTO	CHAMBERS	081001036	08100103603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	0	191	197	189	154	139	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO-BRAZOS	GALVESTON	081001084	08100108408411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	232	604	604	604	604	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	HARRIS	081001101	08100110110110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	3726	6894	6894	6894	6894	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	486	899	899	899	899	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY-SAN JACINTO	HARRIS	081001101	08100110110109	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	HARRIS	1011509	0	528	976	976	976	976	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	LEON	081001145	08100114514508	None	QUEEN CITY AQUIFER	H	TRINITY	LEON	1452408	0	0	0	0	0	8	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	LEON	081001145	08100114514508	None	CARRIZO-WILCOX AQUIFER	H	BRAZOS	LEON	1451012	0	0	105	234	291	390	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	LEON	081001145	08100114514508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	128	148	145	202	201	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	LIBERTY	081001146	08100114614610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	60	121	183	239	288	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	LIBERTY	081001146	08100114614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	12	23	35	46	55	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	MADISON	081001157	08100115715708	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	MADISON	1572408	0	0	0	4	5	5	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	MADISON	081001157	08100115715708	None	CARRIZO-WILCOX AQUIFER	H	BRAZOS	MADISON	1571012	0	0	41	68	61	61	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	MADISON	081001157	08100115715708	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	MADISON	1571008	0	29	15	11	41	72	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	SAN JACINTO	081001204	08100120420410	None	GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	2041510	0	4	8	12	15	20	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	WALKER	081001236	08100123623610	None	GULF COAST AQUIFER	H	SAN JACINTO	WALKER	2361510	0	92	176	262	337	416	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	TRINITY	WALKER	081001236	08100123623608	None	YEGUA-JACKSON AQUIFER	H	TRINITY	WALKER	2363108	0	627	1324	1515	1817	2155	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	BRAZOS	WALLER	081001237	08100123723712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	2	4	7	8	11	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANUFACTURING	H	SAN JACINTO	WALLER	081001237	08100123723710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	10	19	27	36	44	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MANVEL	H	SAN JACINTO-BRAZOS	BRAZORIA	080721000	08072100002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	23	25	22	18	15	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MERCY WSC	H	SAN JACINTO	LIBERTY	084253000	08425300014610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	13	25	38	51	67	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MERCY WSC	H	SAN JACINTO	SAN JACINTO	084253000	08425300020410	None	GULF COAST AQUIFER	H	SAN JACINTO	SAN JACINTO	2041510	0	66	117	149	166	175	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	BRAZOS	AUSTIN	081003008	08100300800812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	4	7	9	11	13	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	BRAZOS-COLORADO	AUSTIN	081003008	08100300800813	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	AUSTIN	0081513	0	0	0	0	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	COLORADO	AUSTIN	081003008	08100300800814	None	GULF COAST AQUIFER	H	COLORADO	AUSTIN	0081514	0	1	1	2	2	2	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	133	182	226	243	246	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	35	59	70	74	75	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	NECHES-TRINITY	CHAMBERS	081003036	08100303603607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	CHAMBERS	0361507	0	2	7	8	10	11	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY	CHAMBERS	081003036	08100303603608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	0	197	305	408	504	581	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY-SAN JACINTO	CHAMBERS	081003036	08100303603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	0	102	26	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	BRAZOS-COLORADO	FORT BEND	081003079	08100307907913	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	FORT BEND	0791513	0	4	4	6	7	9	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	NECHES-TRINITY	GALVESTON	081003084	08100308408407	None	GULF COAST AQUIFER	H	NECHES-TRINITY	GALVESTON	0841507	0	0	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO-BRAZOS	GALVESTON	081003084	08100308408411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	1	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO	HARRIS	081003101	08100310110110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	15	24	24	24	24	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO-BRAZOS	HARRIS	081003101	08100310110111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	1	1	1	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	NECHES	LIBERTY	081003146	08100314614606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	0	0	0	0	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	NECHES-TRINITY	LIBERTY	081003146	08100314614607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	LIBERTY	1461507	0	0	0	1	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	SAN JACINTO	LIBERTY	081003146	08100314614610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	0	0	0	1	1	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY	LIBERTY	081003146	08100314614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	57	109	157	211	268	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY-SAN JACINTO	LIBERTY	081003146	08100314614609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	LIBERTY	1461509	0	10	15	20	25	30	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MINING	H	TRINITY	POLK	081003187	08100318718708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	2	3	4	5	6	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONT BELVIEU	H	TRINITY	CHAMBERS	080413000	08041300003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	0	29	56	77	99	121	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONT BELVIEU	H	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	0	23	38	48	56	62	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	396	513	583	596	587	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	215	473	704	880	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	6	31	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NEEDVILLE	H	BRAZOS	FORT BEND	080428000	08042800007912	None	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	43	97	152	229	320	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NEEDVILLE	H	BRAZOS-COLORADO	FORT BEND	080428000	08042800007913	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	FORT BEND	0791513	0	53	118	185	277	387	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NEW CANEY MUD	H	SAN JACINTO	MONTGOMERY	084272000	08427200017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	5	55	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NEW WAVERLY	H	SAN JACINTO	WALKER	080926000	08092600023610	None	GULF COAST AQUIFER	H	SAN JACINTO	WALKER	2361510	0	17	25	18	17	17	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	150	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	6440	2725	2725	2725	2725	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NORMANGEE	H	BRAZOS	LEON	080927000	08092700014512	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	4	7	6	5	6	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NORMANGEE	H	TRINITY	LEON	080927000	08092700014508	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	LEON	1451008	0	11	16	14	13	14	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
NORMANGEE	H	TRINITY	MADISON	080927000	08092700015708	None	CARRIZO-WILCOX AQUIFER	H	TRINITY	MADISON	1571008	0	2	3	3	4	4	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
OLD RIVER-WINFREE	H	TRINITY	CHAMBERS	080727000	08072700003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	0	0	0	0	1	3	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ONALASKA	H	TRINITY	POLK	080933000	08093300018708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	40	71	92	113	136	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ONALASKA WSC	H	TRINITY	POLK	084293000	08429300018708	None	GULF COAST AQUIFER	H	TRINITY	POLK	1871508	0	4	7	2	6	15	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ORBIT SYSTEMS INC	H	BRAZOS-COLORADO	BRAZORIA	084294000	08429400002013	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	5	12	20	27	36	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	BRAZORIA	084294000	08429400002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	62	124	185	247	321	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
OYSTER CREEK	H	SAN JACINTO-BRAZOS	BRAZORIA	080730000	08073000002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	15	24	27	29	30	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PASADENA	H	SAN JACINTO	HARRIS	080456000	08045600010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	145	277	277	277	277	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PASADENA	H	SAN JACINTO-BRAZOS	HARRIS	080456000	08045600010111	CITY OF PASADENA	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	40	77	77	77	77	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	421	1142	1692	2074	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	14	27	27	27	27	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PINE ISLAND	H	BRAZOS	WALLER	080938000	08093800023712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	29	60	93	137	188	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PINE TRAILS UTILITY	H	SAN JACINTO	HARRIS	084302000	08430200010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	14	26	26	26	26	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PINEY POINT VILLAGE	H	SAN JACINTO	HARRIS	080468000	08046800010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	8	17	17	17	17	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PLEAK	H	BRAZOS	FORT BEND	081053000	08105300007912	none	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	63	180	298	457	639	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PLUM GROVE	H	SAN JACINTO	LIBERTY	081054000	08105400014610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	35	66	99	136	178	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
POINT AQUARIUS MUD	H	SAN JACINTO	MONTGOMERY	084305000	08430500017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	48	127	201	257	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
POINT BLANK	H	TRINITY	SAN JACINTO	081056000	08105600020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	11	19	23	26	27	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PRAIRIE VIEW	H	BRAZOS	WALLER	080485000	08048500023712	None	GULF COAST AQUIFER	H	BRAZOS	WALLER	2371512	0	82	178	289	429	597	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
PRAIRIE VIEW	H	SAN JACINTO	WALLER	080485000	08048500023710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	9	20	32	47	66	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
RICHWOOD	H	SAN JACINTO-BRAZOS	BRAZORIA	080501000	08050100002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	15	20	21	22	23	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	16	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
RIVERSIDE WSC	H	TRINITY	SAN JACINTO	084323000	08432300020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	29	63	120	152	187	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
RIVERSIDE WSC	H	TRINITY	WALKER	084323000	08432300023608	None	GULF COAST AQUIFER	H	TRINITY	WALKER	2361508	0	0	5	49	72	109	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
ROMAN FOREST	H	SAN JACINTO	MONTGOMERY	080801000	08080100017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	65	142	198	250	293	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SAN FELIPE	H	BRAZOS	AUSTIN	080954000	08095400000812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	21	35	43	46	52	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SAN JACINTO WSC	H	TRINITY	SAN JACINTO	084328000	08432800020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	68	122	155	171	181	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SAN LEON MUD	H	SAN JACINTO-BRAZOS	GALVESTON	084329000	08432900008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	4	5	5	5	5	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	45	87	87	87	87	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SEALY	H	BRAZOS	AUSTIN	080549000	08054900000812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	360	608	725	785	888	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SHEPHERD	H	TRINITY	SAN JACINTO	080746000	08074600020408	None	GULF COAST AQUIFER	H	TRINITY	SAN JACINTO	2041508	0	54	93	110	123	130	Y	EXPANDED USE OF GW	EXPANDED USE OF GW

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
SHOREACRES	H	SAN JACINTO-BRAZOS	HARRIS	080558000	08055800010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	2	3	3	3	3	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SIMONTON	H	BRAZOS	FORT BEND	081062000	08106200007912	None	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	78	173	232	352	494	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SOUTH HOUSTON	H	SAN JACINTO	HARRIS	080569000	08056900010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	21	47	47	47	47	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SOUTHSIDE PLACE	H	SAN JACINTO	HARRIS	080572000	08057200010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	6	10	10	10	10	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SOUTHWEST UTILITIES	H	SAN JACINTO-BRAZOS	BRAZORIA	084343000	08434300002011	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	0	1	3	7	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SOUTHWEST UTILITIES	H	SAN JACINTO	LIBERTY	084343000	08434300014610	None	GULF COAST AQUIFER	H	SAN JACINTO	LIBERTY	1461510	0	2	4	6	9	12	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SPLENDORA	H	SAN JACINTO	MONTGOMERY	080962000	08096200017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	6	17	25	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	17	37	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STAGECOACH	H	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	7	15	24	36	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	GALVESTON	081002084	08100208408411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	401	469	469	469	469	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	2259	2641	2641	2641	2641	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	94	117	117	117	117	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	TRINITY	LIBERTY	081002146	08100214614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	1278	1995	2869	3934	5077	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	TRINITY	LIBERTY	081002146	08100214614608	None	GULF COAST AQUIFER	H	TRINITY	LIBERTY	1461508	0	0	0	0	0	156	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
STEAM ELECTRIC POWER	H	SAN JACINTO	MONTGOMERY	081002170	08100217017010	None	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	1037	811	728	588	502	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SURFSIDE BEACH	H	BRAZOS	BRAZORIA	080967000	08096700002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	11	29	47	66	88	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
SWEENY	H	BRAZOS-COLORADO	BRAZORIA	080590000	08059000002013	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	0	17	37	68	106	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	4038	2033	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
TIKI ISLAND	H	SAN JACINTO-BRAZOS	GALVESTON	080973000	08097300008411	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	0	4	6	6	6	6	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
TRINITY	H	TRINITY	TRINITY	080610000	08061000022808	None	UNDIFFERENTIATED AQUIFER	H	TRINITY	TRINITY	2282208	0	2	0	0	0	0	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
VARNER CREEK UD	H	BRAZOS	BRAZORIA	084370000	08437000002012	None	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	45	108	166	228	296	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WALKER COUNTY RURAL WSC	H	TRINITY	WALKER	084372000	08437200023608	None	SPARTA AQUIFER	H	TRINITY	WALKER	2362708	0	78	119	119	131	146	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WALLER	H	SAN JACINTO	HARRIS	080629000	08062900010110	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	70	112	146	179	10	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WALLER	H	SAN JACINTO	WALLER	080629000	08062900023710	None	GULF COAST AQUIFER	H	SAN JACINTO	WALLER	2371510	0	72	156	252	366	501	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WALLIS	H	BRAZOS-COLORADO	AUSTIN	080630000	08063000000813	None	GULF COAST AQUIFER	H	BRAZOS-COLORADO	AUSTIN	0081513	0	16	24	29	31	36	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WEBSTER	H	SAN JACINTO-BRAZOS	HARRIS	080635000	08063500010111	None	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	HARRIS	1011511	0	68	135	135	135	135	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WEST HARDIN WSC	H	NECHES	LIBERTY	084383000	08438300014606	None	GULF COAST AQUIFER	H	NECHES	LIBERTY	1461506	0	6	13	18	25	34	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
WEST UNIVERSITY PL.	H	SAN JACINTO	HARRIS	080643000	08064300010110	None	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	0	35	48	48	48	48	Y	EXPANDED USE OF GW	EXPANDED USE OF GW
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	None	FORT BEND MUD 25 REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	FBM2511	0	589	589	589	589	589	Y	FORT BEND MUD 25 REUSE	FORT BEND MUD 25 REUSE
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	13942	Y	FORT BEND OCR	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	1800	Y	FORT BEND OCR	BRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	9339	Y	FORT BEND OCR	BRA to WUG Contract
FAIRCHILDS	H	BRAZOS	FORT BEND	081019000	08101900007912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	338	Y	FORT BEND OCR	BRA to WUG Contract
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	MISSOURI CITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	140	Y	FORT BEND OCR	Missouri City to WUG Contract
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	SUGAR LAND	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	161	Y	FORT BEND OCR	Sugar Land to WUG Contract
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MISSOURI CITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	103	Y	FORT BEND OCR	Missouri City to WUG Contract
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	1950	Y	FORT BEND OCR	BRA to WUG Contract
FORT BEND COUNTY MUD #81	H	BRAZOS	FORT BEND	084129000	08412900007912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	796	Y	FORT BEND OCR	BRA to WUG Contract
MANUFACTURING	H	BRAZOS	FORT BEND	081001079	08100107907912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	16	Y	FORT BEND OCR	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO	FORT BEND	081001079	08100107907910	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	5	Y	FORT BEND OCR	BRA to WUG Contract
MINING	H	BRAZOS	FORT BEND	081003079	08100307907912	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	11	Y	FORT BEND OCR	BRA to WUG Contract
MINING	H	SAN JACINTO	FORT BEND	081003079	08100307907910	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	5	Y	FORT BEND OCR	BRA to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	FORT BEND	081003079	08100307907911	GULF COAST WATER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	16	Y	FORT BEND OCR	GCWA to WUG Contract
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	MISSOURI CITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	723	Y	FORT BEND OCR	Missouri City to WUG Contract
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	3535	Y	FORT BEND OCR	Missouri City to WUG Contract
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	BRAZOS RIVER AUTHORITY	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	5	Y	FORT BEND OCR	BRA to WUG Contract
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	SUGAR LAND	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	88	Y	FORT BEND OCR	Sugar Land to WUG Contract
RICHMOND	H	BRAZOS	FORT BEND	080500000	08050000007912	RICHMOND-ROSENBERG	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	167	Y	FORT BEND OCR	Richmond-Rosenberg to WUG Contract
ROSENBERG	H	BRAZOS	FORT BEND	080518000	08051800007912	RICHMOND-ROSENBERG	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	90	3630	Y	FORT BEND OCR	Richmond-Rosenberg to WUG Contract
STEAM ELECTRIC POWER	H	BRAZOS	FORT BEND	081002079	08100207907912	NRG	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	8500	Y	FORT BEND OCR	NRG to WUG Contract
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	SUGAR LAND	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR12	0	0	0	0	0	673	Y	FORT BEND OCR	Sugar Land to WUG Contract
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	BRAZOS RIVER AUTHORITY	FREEPORT DESALINATION PLANT	H	GULF	RESERVOIR	FPDESAL24	0	0	0	0	29116	29116	Y	FREEPORT DESALINATION PLANT	BRA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	BRAZOS RIVER AUTHORITY	FREEPORT DESALINATION PLANT	H	GULF	RESERVOIR	FPDESAL24	0	0	0	0	4484	4484	Y	FREEPORT DESALINATION PLANT	BRA to WUG Contract
FULSHEAR	H	BRAZOS	FORT BEND	080869000	08086900007912	none	FULSHEAR REUSE	H	BRAZOS	FORT BEND	FURU12	0	172	258	258	258	258	Y	FULSHEAR REUSE	Fulshear Reuse
FULSHEAR	H	SAN JACINTO-BRAZOS	FORT BEND	080869000	08086900007911	none	FULSHEAR REUSE	H	BRAZOS	FORT BEND	FURU12	0	115	172	172	172	172	Y	FULSHEAR REUSE	Fulshear Reuse
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	GULF COAST WATER AUTHORITY	GCWA OFFCHANNEL RESERVOIR	H	SAN JACINTO-BRAZOS	RESERVOIR	GCWAOC11	0	0	37920	37920	37920	37920	Y	GCWA OFFCHANNEL RESERVOIR	GCWA to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS	BRAZORIA	081001020	08100102002011	GULF COAST WATER AUTHORITY	GCWA OFFCHANNEL RESERVOIR	H	SAN JACINTO-BRAZOS	RESERVOIR	GCWAOC11	0	0	1580	1580	1580	1580	Y	GCWA OFFCHANNEL RESERVOIR	GCWA to WUG Contract
HARRIS COUNTY MUD #50	H	SAN JACINTO	HARRIS	084185000	08418500010110	none	SAN JACINTO RIVER RUN-OF-RIVER	H	SAN JACINTO	HARRIS	346100496410	560	560	560	560	560	560	N	Harris County MUD 50 WTP	Harris County MUD 50 WTP
HARRIS COUNTY MUD #50	H	SAN JACINTO	HARRIS	084185000	08418500010110	none	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	0	0	0	28	72	N	Harris County MUD 50 WTP	Harris County MUD 50 WTP
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	11372	32445	32445	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	12518	20450	66201	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
MANUFACTURING	H	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	14250	16080	16080	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	18130	31629	0	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	8634	12318	12318	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	CITY OF HOUSTON	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	1516	1757	1757	Y	HOUSTON INDIRECT REUSE	HOUSTON INDIRECT REUSE
MANUFACTURING	H	SAN JACINTO-BRAZOS	FORT BEND	081001079	08100107907911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	558	558	558	558	558	Y	INDUSTRIAL CONSERVATION	INDUSTRIAL CONSERVATION
BEACH CITY	H	TRINITY	CHAMBERS	080822000	08082200003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	32	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
CLEAR LAKE SHORES	H	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	83	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	1870	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
CONSUMERS WATER INC	H	SAN JACINTO	MONTGOMERY	084072000	08407200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	38	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
COUNTY-OTHER	H	BRAZOS	BRAZORIA	080757020	08075702002012	none	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
COUNTY-OTHER	H	TRINITY	CHAMBERS	080757036	08075703603608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	193	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	3989	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	MONTGOMERY	084081000	08408100017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	103	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	36	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	489	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	82	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	282	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
KEMAH	H	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	171	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
LEAGUE CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	2835	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
LEAGUE CITY	H	SAN JACINTO-BRAZOS	HARRIS	080350000	08035000010111	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	15	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
LIVESTOCK	H	NECHES-TRINITY	GALVESTON	081005084	08100508408407	none	GULF COAST AQUIFER	H	NECHES-TRINITY	GALVESTON	0841507	14	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
MAGNOLIA	H	SAN JACINTO	MONTGOMERY	080907000	08090700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	77	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	none	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	24916	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
MANUFACTURING	H	SAN JACINTO	MONTGOMERY	081001170	08100117017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	469	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MINING	H	BRAZOS	BRAZORIA	081003020	08100302002012	none	GULF COAST AQUIFER	H	BRAZOS	BRAZORIA	0201512	0	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
MINING	H	BRAZOS-COLORADO	BRAZORIA	081003020	08100302002013	none	GULF COAST AQUIFER	H	BRAZOS-COLORADO	BRAZORIA	0201513	0	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
MINING	H	SAN JACINTO-BRAZOS	BRAZORIA	081003020	08100302002011	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	0	0	0	0	0	Y	INTERIM GROUNDWATER	INTERIM GROUNDWATER
MINING	H	SAN JACINTO-BRAZOS	GALVESTON	081003084	08100308408411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	15	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
MINING	H	SAN JACINTO	MONTGOMERY	081003170	08100317017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	110	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONT BELVIEU	H	TRINITY	CHAMBERS	080413000	08041300003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	516	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	43	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	318	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	80	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	143	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	138	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY UD #2	H	SAN JACINTO	MONTGOMERY	084265000	08426500017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	97	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	82	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	167	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
MONTGOMERY COUNTY WCID #1	H	SAN JACINTO	MONTGOMERY	084268000	08426800017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	84	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
NEW CANEY MUD	H	SAN JACINTO	MONTGOMERY	084272000	08427200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	266	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	115	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
OLD RIVER-WINFREE	H	TRINITY	CHAMBERS	080727000	08072700003608	None	GULF COAST AQUIFER	H	TRINITY	CHAMBERS	0361508	162	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	114	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
PATTON VILLAGE	H	SAN JACINTO	MONTGOMERY	080734000	08073400017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	15	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
POINT AQUARIUS MUD	H	SAN JACINTO	MONTGOMERY	084305000	08430500017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	124	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
PORTER WSC	H	SAN JACINTO	MONTGOMERY	084307000	08430700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	323	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	384	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	141	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
ROMAN FOREST	H	SAN JACINTO	MONTGOMERY	080801000	08080100017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	93	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	297	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	315	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SOUTHWEST UTILITIES	H	SAN JACINTO	MONTGOMERY	084343000	08434300017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	43	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SPLENDORA	H	SAN JACINTO	MONTGOMERY	080962000	08096200017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	33	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	91	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
STAGECOACH	H	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	14	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	126	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	GALVESTON	081002084	08100208408411	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	GALVESTON	0841511	2803	0	0	0	0	0	Y	INTERIM Groundwater	INTERIM GROUNDWATER
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	2438	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	96	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater
WOODBRANCH	H	SAN JACINTO	MONTGOMERY	080807000	08080700017010	none	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	32	0	0	0	0	0	Y	INTERIM GROUNDWATER	Interim Groundwater

Region H
Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
IRRIGATION	H	BRAZOS	BRAZORIA	081004020	08100402002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381302012	582	582	582	582	582	582	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	BRAZOS-COLORADO	BRAZORIA	081004020	08100402002013	None	CONSERVATION	H	BRAZOS-COLORADO	BRAZORIA	381302013	771	771	771	771	771	771	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381302011	17439	17439	17439	17439	17439	17439	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	NECHES-TRINITY	CHAMBERS	081004036	08100403603607	None	CONSERVATION	H	NECHES-TRINITY	CHAMBERS	380803607	16981	16981	16981	16981	16981	16981	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	TRINITY	CHAMBERS	081004036	08100403603608	None	CONSERVATION	H	TRINITY	CHAMBERS	380803608	6677	6677	6677	6677	6677	6677	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	TRINITY-SAN JACINTO	CHAMBERS	081004036	08100403603609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	380803609	360	360	360	360	360	360	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	BRAZOS	FORT BEND	081004079	08100407907912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	1757	1757	1757	1757	1651	1388	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	BRAZOS-COLORADO	FORT BEND	081004079	08100407907913	None	CONSERVATION	H	BRAZOS-COLORADO	FORT BEND	381207913	0	0	0	0	106	369	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO-BRAZOS	FORT BEND	081004079	08100407907911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381207911	3440	3440	3440	3440	3440	3440	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO-BRAZOS	GALVESTON	081004084	08100408408411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	2392	2392	2392	2392	2392	2392	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	NECHES	LIBERTY	081004146	08100414614606	None	CONSERVATION	H	NECHES	LIBERTY	380814606	835	835	835	835	835	835	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	NECHES-TRINITY	LIBERTY	081004146	08100414614607	None	CONSERVATION	H	NECHES-TRINITY	LIBERTY	380814607	2088	2088	2088	2088	2088	2088	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO	LIBERTY	081004146	08100414614610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	380814610	209	209	209	209	209	209	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	TRINITY	LIBERTY	081004146	08100414614608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	13360	13360	13360	13360	13360	13360	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	TRINITY-SAN JACINTO	LIBERTY	081004146	08100414614609	None	CONSERVATION	H	TRINITY-SAN JACINTO	LIBERTY	380814609	4384	4384	4384	4384	4384	4384	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	BRAZOS	WALLER	081004237	08100423723712	None	CONSERVATION	H	BRAZOS	WALLER	381023712	0	0	0	0	1387	1387	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
IRRIGATION	H	SAN JACINTO	WALLER	081004237	08100423723710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	0	0	0	0	5219	5219	Y	IRRIGATION CONSERVATION	IRRIGATION CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	LIBERTY	084226000	08422600014608	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	72	71	72	73	77	80	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	POLK	084226000	08422600018708	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	591	577	569	568	571	577	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	SAN JACINTO	SAN JACINTO	084226000	08422600020410	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	63	70	73	75	75	74	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	SAN JACINTO	084226000	08422600020408	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	137	150	159	163	162	158	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	TRINITY	084226000	08422600022808	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	72	68	64	59	54	50	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	WALKER	084226000	08422600023608	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	19	18	17	16	15	15	N	LLWSSSC SURFACE WATER PROJECT	PROJECT
STEAM ELECTRIC POWER	H	BRAZOS	FORT BEND	081002079	08100207907912	NRG	MILLICAN LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	MLR12	0	0	0	0	0	0	Y	MILLICAN LAKE/RESERVOIR	NRG to WUG Contract
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	MISSOURI CITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	0	157	157	157	157	157	Y	MISSOURI CITY ASR	Missouri City GRP - ASR
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	MISSOURI CITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	0	662	662	662	662	662	Y	MISSOURI CITY ASR	Missouri City GRP - ASR
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	0	2955	2955	2955	2955	2955	Y	MISSOURI CITY ASR	Missouri City GRP - ASR
MISSOURI CITY	H	SAN JACINTO	HARRIS	080409000	08040900010110	MISSOURI CITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	0	373	373	373	373	373	Y	MISSOURI CITY ASR	Missouri City GRP - ASR
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	MISSOURI CITY	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	172	859	929	946	959	Y	MISSOURI CITY GRP	Missouri City GRP Participation
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	MISSOURI CITY	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	26	85	594	778	829	Y	MISSOURI CITY GRP	Missouri City GRP Participation
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	MISSOURI CITY	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	342	390	163	78	50	Y	MISSOURI CITY GRP	Missouri City GRP Participation
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	MISSOURI CITY	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	464	526	210	94	58	Y	MISSOURI CITY GRP	Missouri City GRP Participation
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	MISSOURI CITY	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	-514	-1249	-1092	-1024	-1009	Y	MISSOURI CITY GRP	Missouri City GRP Participation
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	-464	-526	-683	-751	-766	Y	MISSOURI CITY GRP	Missouri City GRP Participation
SIENNA PLANTATION MUD #2	H	SAN JACINTO-BRAZOS	FORT BEND	084334000	08433400007911	MISSOURI CITY	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	-26	-85	-121	-121	-121	Y	MISSOURI CITY GRP	Missouri City GRP Participation
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	MISSOURI CITY	MISSOURI CITY GRP REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MORU11	0	470	470	470	470	470	Y	MISSOURI CITY GRP REUSE	MISSOURI CITY GRP REUSE
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	MISSOURI CITY	MISSOURI CITY GRP REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MORU11	0	53	53	53	53	53	Y	MISSOURI CITY GRP REUSE	MISSOURI CITY GRP REUSE
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	MISSOURI CITY	MISSOURI CITY GRP REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MORU11	0	104	104	104	104	104	Y	MISSOURI CITY GRP REUSE	MISSOURI CITY GRP REUSE
MISSOURI CITY	H	SAN JACINTO	HARRIS	080409000	08040900010110	MISSOURI CITY	MISSOURI CITY GRP REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MORU11	0	13	13	13	13	13	Y	MISSOURI CITY GRP REUSE	MISSOURI CITY GRP REUSE
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	MONTGOMERY COUNTY GRP REUSE	H	SAN JACINTO	MONTGOMERY	MCGR10	0	332	401	534	534	534	Y	MUD 8 AND 9 REUSE	MUD 8 AND 9 REUSE
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	MONTGOMERY COUNTY GRP REUSE	H	SAN JACINTO	MONTGOMERY	MCGR10	0	325	415	586	586	586	Y	MUD 8 AND 9 REUSE	MUD 8 AND 9 REUSE
ALVIN	H	SAN JACINTO-BRAZOS	BRAZORIA	080013000	08001300002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	170	218	226	237	252	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
AMES	H	TRINITY	LIBERTY	080676000	08067600014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	9	10	11	12	14	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ANGLETON	H	SAN JACINTO-BRAZOS	BRAZORIA	080018000	08001800002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	141	141	142	143	146	152	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ARCOLA	H	SAN JACINTO-BRAZOS	FORT BEND	080998000	08099800007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	22	24	26	29	31	35	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BAILEY'S PRAIRIE	H	BRAZOS	BRAZORIA	080817000	08081700002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	0	0	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BAYTOWN	H	TRINITY-SAN JACINTO	CHAMBERS	080042000	08004200003609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	3890369	30	66	71	75	80	86	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BAYTOWN	H	SAN JACINTO	HARRIS	080042000	08004200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	31	63	63	63	64	66	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BAYTOWN	H	TRINITY-SAN JACINTO	HARRIS	080042000	08004200010109	None	CONSERVATION	H	TRINITY-SAN JACINTO	HARRIS	3891019	527	1054	1060	1065	1084	1111	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BEACH CITY	H	TRINITY	CHAMBERS	080822000	08082200003608	None	CONSERVATION	H	TRINITY	CHAMBERS	3880368	0	0	0	0	0	5	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BEACH CITY	H	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	3890369	15	20	24	28	32	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BEASLEY	H	BRAZOS	FORT BEND	081012000	08101200007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	1	1	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BEASLEY	H	BRAZOS-COLORADO	FORT BEND	081012000	08101200007913	None	CONSERVATION	H	BRAZOS-COLORADO	FORT BEND	381307913	0	5	6	7	8	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	237	253	270	287	305	325	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BELLVILLE	H	BRAZOS	AUSTIN	080048000	08004800000812	None	CONSERVATION	H	BRAZOS	AUSTIN	381200812	0	88	99	105	108	113	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BLUE BELL MANOR UTILITY COMPANY	H	SAN JACINTO	HARRIS	084026000	08402600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	32	31	31	30	30	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BOLIVAR PENINSULAR SUD	H	NECHES-TRINITY	GALVESTON	084027000	08402700008407	None	CONSERVATION	H	NECHES-TRINITY	GALVESTON	380708407	67	72	74	75	75	76	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BRAZORIA COUNTY MUD #1	H	SAN JACINTO-BRAZOS	BRAZORIA	084030000	08403000002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	72	95	114	135	158	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BRAZORIA COUNTY MUD #2	H	BRAZOS	BRAZORIA	084031000	08403100002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	95	122	147	173	201	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BRAZORIA COUNTY MUD #3	H	SAN JACINTO-BRAZOS	BRAZORIA	084032000	08403200002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	52	68	82	97	113	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BRITMOORE UTILITIES	H	SAN JACINTO	HARRIS	084036000	08403600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	26	31	35	39	43	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BROOKSHIRE	H	BRAZOS	WALLER	080077000	08007700023712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	50	62	75	90	109	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BROOKSIDE VILLAGE	H	SAN JACINTO-BRAZOS	BRAZORIA	080078000	08007800002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	16	18	19	21	23	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BUFFALO	H	TRINITY	LEON	080083000	08008300014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	21	22	22	22	22	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
BUNKER HILL VILLAGE	H	SAN JACINTO	HARRIS	080085000	08008500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	90	89	88	87	87	87	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CANDLELIGHT HILLS SUBDIVISION	H	SAN JACINTO	HARRIS	084043000	08404300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	25	29	34	38	43	47	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CENTERVILLE	H	TRINITY	LEON	080105000	08010500014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	11	12	11	11	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	357	357	357	357	357	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CHIMNEY HILL MUD	H	SAN JACINTO	HARRIS	084053000	08405300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	26	37	37	36	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CLEAR LAKE SHORES	H	SAN JACINTO-BRAZOS	GALVESTON	080764000	08076400008411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	16	16	16	16	16	16	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CLEVELAND	H	SAN JACINTO	LIBERTY	080116000	08011600014610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	24	51	75	87	91	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CLUTE	H	SAN JACINTO-BRAZOS	BRAZORIA	080118000	08011800002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	34	67	80	82	86	90	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COLDSPRING	H	SAN JACINTO	SAN JACINTO	080122000	08012200020410	None	CONSERVATION	H	SAN JACINTO	SAN JACINTO	381020410	0	3	3	3	3	3	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COLDSPRING	H	TRINITY	SAN JACINTO	080122000	08012200020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	0	10	11	12	12	12	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	714	925	1174	1457	1830	2273	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CONSOLIDATED WSC	H	TRINITY	WALKER	084071000	08407100023608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	0	0	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CONSUMERS WATER INC	H	SAN JACINTO	HARRIS	084072000	08407200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	24	31	39	46	53	61	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CONSUMERS WATER INC	H	SAN JACINTO	MONTGOMERY	084072000	08407200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	13	14	18	22	28	35	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS-COLORADO	AUSTIN	080757008	08075700800813	None	CONSERVATION	H	BRAZOS-COLORADO	AUSTIN	381300813	0	17	18	19	19	19	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	COLORADO	AUSTIN	080757008	08075700800814	None	CONSERVATION	H	COLORADO	AUSTIN	381400814	0	2	2	2	2	2	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	BRAZORIA	080757020	08075702002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	7	7	8	8	8	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	None	CONSERVATION	H	BRAZOS-COLORADO	BRAZORIA	381302013	235	249	264	275	290	306	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	559	613	679	734	800	872	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	NECHES-TRINITY	CHAMBERS	080757036	08075703603607	None	CONSERVATION	H	NECHES-TRINITY	CHAMBERS	3870367	3	3	3	2	2	2	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	CHAMBERS	080757036	08075703603608	None	CONSERVATION	H	TRINITY	CHAMBERS	3880368	14	13	13	12	12	12	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY-SAN JACINTO	CHAMBERS	080757036	08075703603609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	3890369	9	9	8	8	8	7	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	61	269	536	1068	1701	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	6	5	6	34	106	188	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	28	26	21	228	687	1196	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	0	823	1890	3350	4892	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	LEON	080757145	08075714514512	None	CONSERVATION	H	BRAZOS	LEON	381214512	0	21	23	17	10	13	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	LEON	080757145	08075714514508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	20	24	15	8	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	NECHES	LIBERTY	080757146	08075714614606	None	CONSERVATION	H	NECHES	LIBERTY	380614606	0	10	11	13	14	16	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	NECHES-TRINITY	LIBERTY	080757146	08075714614607	None	CONSERVATION	H	NECHES-TRINITY	LIBERTY	380714607	0	1	1	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	LIBERTY	080757146	08075714614610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	83	95	106	119	135	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	LIBERTY	080757146	08075714614608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	173	191	210	231	257	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY-SAN JACINTO	LIBERTY	080757146	08075714614609	None	CONSERVATION	H	TRINITY-SAN JACINTO	LIBERTY	380914609	0	12	14	15	17	19	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	MADISON	080757157	08075715715712	None	CONSERVATION	H	BRAZOS	MADISON	381215712	0	4	6	6	7	7	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	MADISON	080757157	08075715715708	None	CONSERVATION	H	TRINITY	MADISON	380815708	0	52	53	54	55	57	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	1272	1508	2131	2879	3962	5221	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	POLK	080757187	08075718718708	None	CONSERVATION	H	TRINITY	POLK	380818708	0	91	97	100	104	110	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	SAN JACINTO	080757204	08075720420410	None	CONSERVATION	H	SAN JACINTO	SAN JACINTO	381020410	0	54	58	61	62	63	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	TRINITY	WALKER	080757236	08075723623608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	1	0	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	WALLER	080757237	08075723723712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	23	42	44	48	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	SAN JACINTO	WALLER	080757237	08075723723710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	0	56	68	80	96	115	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CROSBY MUD	H	SAN JACINTO	HARRIS	084078001	08407800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010210	0	0	0	0	0	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	HARRIS	084081000	08408100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	1	2	2	2	3	3	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	MONTGOMERY	084081000	08408100017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	36	42	56	72	95	121	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	12	13	16	19	24	29	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DAISETTA	H	NECHES	LIBERTY	080149000	08014900014606	None	CONSERVATION	H	NECHES	LIBERTY	380614606	0	1	2	3	3	4	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DAISETTA	H	TRINITY	LIBERTY	080149000	08014900014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	2	3	4	5	6	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DANBURY	H	SAN JACINTO-BRAZOS	BRAZORIA	080693000	08069300002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	11	13	13	14	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DAYTON	H	TRINITY	LIBERTY	080152000	08015200014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	129	152	174	200	230	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DEER PARK	H	SAN JACINTO	HARRIS	080154000	08015400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	116	206	207	208	213	219	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DEER PARK	H	SAN JACINTO-BRAZOS	HARRIS	080154000	08015400010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	177	316	318	320	326	335	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
DICKINSON	H	SAN JACINTO-BRAZOS	GALVESTON	080165000	08016500008411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	196	217	227	230	232	235	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	26	31	41	53	69	88	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
EL DORADO UD	H	SAN JACINTO	HARRIS	084101000	08410100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	9	30	32	35	37	40	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
EL LAGO	H	SAN JACINTO-BRAZOS	HARRIS	080695000	08069500010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	30	29	28	28	28	28	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FAIRCHILDS	H	BRAZOS	FORT BEND	081019000	08101900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	29	36	44	54	66	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FIRST COLONY MUD #9	H	BRAZOS	FORT BEND	084113000	08411300007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	85	87	90	93	96	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
FLO COMMUNITY WSC	H	TRINITY	LEON	084114000	08411400014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	31	34	34	33	34	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	53	53	53	53	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #108	H	BRAZOS	FORT BEND	084118000	08411800007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	32	32	32	32	32	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #111	H	BRAZOS	FORT BEND	084119000	08411900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	46	46	46	46	46	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #23	H	SAN JACINTO-BRAZOS	FORT BEND	084121000	08412100007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	71	141	141	141	141	141	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #25	H	SAN JACINTO-BRAZOS	FORT BEND	084122000	08412200007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	101	141	191	241	309	387	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #67	H	BRAZOS	FORT BEND	084126000	08412600007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	49	49	48	48	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #68	H	BRAZOS	FORT BEND	084127000	08412700007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	36	36	36	36	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #69	H	BRAZOS	FORT BEND	084128000	08412800007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	27	26	26	26	26	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FORT BEND COUNTY MUD #81	H	BRAZOS	FORT BEND	084129000	08412900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	43	57	75	93	117	144	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FOUNTAINVIEW SUBDIVISION	H	SAN JACINTO	HARRIS	084132000	08413200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	19	22	24	27	30	32	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FREEPORT	H	BRAZOS	BRAZORIA	080217000	08021700002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	9	8	8	8	8	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FREEPORT	H	SAN JACINTO-BRAZOS	BRAZORIA	080217000	08021700002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	130	150	167	186	208	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FULSHEAR	H	BRAZOS	FORT BEND	080869000	08086900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	12	15	19	22	28	33	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
FULSHEAR	H	SAN JACINTO-BRAZOS	FORT BEND	080869000	08086900007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	10	12	15	18	22	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
GALENA PARK	H	SAN JACINTO	HARRIS	080226000	08022600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	78	78	79	79	81	84	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
GREEN TRAILS MUD	H	SAN JACINTO	HARRIS	084143000	08414300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	51	57	64	71	77	84	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	108	118	145	175	218	267	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARDIN	H	TRINITY	LIBERTY	080878000	08087800014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	9	10	11	12	13	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARDIN WSC	H	TRINITY	LIBERTY	084148000	08414800014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	37	43	48	54	61	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY FWSD #47	H	SAN JACINTO	HARRIS	084149000	08414900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	25	24	23	23	17	17	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY FWSD #51	H	SAN JACINTO	HARRIS	084150000	08415000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	127	173	172	169	169	169	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY FWSD #6	H	SAN JACINTO	HARRIS	084151000	08415100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	21	24	26	29	32	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #11	H	SAN JACINTO	HARRIS	084153000	08415300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	23	26	29	32	35	38	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #119 INWOOD NORTH	H	SAN JACINTO	HARRIS	084154000	08415400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	52	55	54	52	52	52	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #132	H	SAN JACINTO	HARRIS	084157000	08415700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	105	130	154	178	202	227	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #151	H	SAN JACINTO	HARRIS	084159000	08415900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	76	76	75	75	75	75	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #152	H	SAN JACINTO	HARRIS	084160000	08416000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	47	60	73	86	100	113	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #153	H	SAN JACINTO	HARRIS	084161000	08416100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	73	99	126	151	177	203	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #154	H	SAN JACINTO	HARRIS	084162000	08416200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	40	49	58	67	75	85	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #158	H	SAN JACINTO	HARRIS	084165000	08416500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	7	35	34	34	34	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #180	H	SAN JACINTO	HARRIS	084170000	08417000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	37	44	51	59	66	74	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #189	H	SAN JACINTO	HARRIS	084174000	08417400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	48	58	68	77	87	98	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #261	H	SAN JACINTO	HARRIS	084179000	08417900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	48	48	48	48	48	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #345	H	SAN JACINTO	HARRIS	084182000	08418200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	84	84	84	83	83	83	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #46	H	SAN JACINTO	HARRIS	084183000	08418300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	50	49	48	48	48	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #5	H	SAN JACINTO	HARRIS	084184000	08418400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	39	38	37	37	36	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #50	H	SAN JACINTO	HARRIS	084185000	08418500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	0	27	44	46	49	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #53	H	SAN JACINTO	HARRIS	084186000	08418600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	123	151	178	205	232	261	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY MUD #8	H	SAN JACINTO	HARRIS	084189000	08418900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	42	45	48	52	55	60	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY UD #14	H	SAN JACINTO	HARRIS	084190000	08419000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	32	35	38	41	44	47	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY UD #15	H	SAN JACINTO	HARRIS	084191000	08419100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	24	27	30	33	36	40	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #1	H	SAN JACINTO	HARRIS	084193000	08419300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	75	84	93	102	111	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #133	H	SAN JACINTO	HARRIS	084195000	08419500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	45	45	45	44	44	44	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #21	H	SAN JACINTO	HARRIS	084196000	08419600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	90	93	96	98	102	107	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #36	H	SAN JACINTO	HARRIS	084197001	08419700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	85	92	98	105	112	120	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #50	H	SAN JACINTO	HARRIS	084198000	08419800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	36	40	43	46	49	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #76	H	SAN JACINTO	HARRIS	084199000	08419900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	16	16	16	15	15	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HARRIS COUNTY WCID #84	H	SAN JACINTO	HARRIS	084200000	08420000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	33	34	34	34	34	34	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HEDWIG VILLAGE	H	SAN JACINTO	HARRIS	080269000	08026900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	46	46	45	45	45	45	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HEMPSTEAD	H	BRAZOS	WALLER	080271000	08027100023712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	122	161	204	256	317	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HILLCREST	H	SAN JACINTO-BRAZOS	BRAZORIA	080881000	08088100002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	1	1	2	5	7	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HILLSHIRE VILLAGE	H	SAN JACINTO	HARRIS	081025000	08102500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	10	10	10	10	10	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOLIDAY LAKES	H	SAN JACINTO-BRAZOS	BRAZORIA	080779000	08077900002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	0	0	0	0	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO	FORT BEND	080285000	08028500007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	3880798	258	296	341	389	454	532	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO-BRAZOS	FORT BEND	080285000	08028500007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	181	208	240	273	319	374	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	22938	25284	27474	29731	32122	34704	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO-BRAZOS	HARRIS	080285000	08028500010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	1278	1409	1531	1657	1790	1934	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HOUSTON	H	SAN JACINTO	MONTGOMERY	080285000	08028500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	12	13	24	33	45	59	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HUMBLE	H	SAN JACINTO	HARRIS	080289000	08028900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	232	258	283	308	334	362	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
HUNTERS CREEK VILLAGE	H	SAN JACINTO	HARRIS	080290000	08029000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	104	111	118	125	132	139	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
IOWA COLONY	H	SAN JACINTO-BRAZOS	BRAZORIA	080885000	08088500002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	7	7	7	8	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
JACINTO CITY	H	SAN JACINTO	HARRIS	080301000	08030100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	0	57	92	97	102	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
JERSEY VILLAGE	H	SAN JACINTO	HARRIS	080709000	08070900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	112	129	147	164	182	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
JEWETT	H	BRAZOS	LEON	080887000	08088700014512	None	CONSERVATION	H	BRAZOS	LEON	381214512	0	3	4	4	3	4	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
JEWETT	H	TRINITY	LEON	080887000	08088700014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	10	11	11	10	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KATY	H	SAN JACINTO	FORT BEND	080312000	08031200007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	18	24	31	38	47	58	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KATY	H	SAN JACINTO	HARRIS	080312000	08031200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	203	245	288	332	374	419	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KATY	H	SAN JACINTO	WALLER	080312000	08031200023710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	17	26	35	46	58	73	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KEMAH	H	SAN JACINTO-BRAZOS	GALVESTON	080316000	08031600008411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	15	18	19	20	20	20	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KENDLETON	H	BRAZOS-COLORADO	FORT BEND	KENDLETON	KENDLETON07913	None	CONSERVATION	H	BRAZOS-COLORADO	FORT BEND	381307913	0	11	14	18	23	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
KENEFICK	H	TRINITY	LIBERTY	081033000	08103300014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	6	7	8	9	10	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE JACKSON	H	SAN JACINTO-BRAZOS	BRAZORIA	080338000	08033800002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	255	275	292	310	330	355	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	LIBERTY	084226000	08422600014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	7	8	8	9	10	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	POLK	084226000	08422600018708	None	CONSERVATION	H	TRINITY	POLK	380818708	0	54	62	64	66	70	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	SAN JACINTO	SAN JACINTO	084226000	08422600020410	None	CONSERVATION	H	SAN JACINTO	SAN JACINTO	381020410	6	7	8	8	9	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	SAN JACINTO	084226000	08422600020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	13	16	17	18	19	19	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	TRINITY	084226000	08422600022808	None	CONSERVATION	H	TRINITY	TRINITY	380822808	0	2	1	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	H	TRINITY	WALKER	084226000	08422600023608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	0	1	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LEAGUE CITY	H	SAN JACINTO-BRAZOS	GALVESTON	080350000	08035000008411	None	CONSERVATION	H	SAN JACINTO-BRAZOS	GALVESTON	381108411	474	523	550	555	560	567	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LEAGUE CITY	H	SAN JACINTO-BRAZOS	HARRIS	080350000	08035000010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	2	2	2	2	2	2	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LIBERTY	H	TRINITY	LIBERTY	080356000	08035600014608	None	CONSERVATION	H	TRINITY	LIBERTY	380814608	0	18	23	34	69	97	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
LONGHORN TOWN UD	H	SAN JACINTO	HARRIS	084235000	08423500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	12	26	33	41	49	56	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MADISONVILLE	H	TRINITY	MADISON	080382000	08038200015708	None	CONSERVATION	H	TRINITY	MADISON	380815708	0	34	50	51	53	54	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MAGNOLIA	H	SAN JACINTO	MONTGOMERY	080907000	08090700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	24	34	44	56	72	91	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MANVEL	H	SAN JACINTO-BRAZOS	BRAZORIA	080721000	08072100002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	30	30	29	28	28	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MASON CREEK UD	H	SAN JACINTO	HARRIS	084247000	08424700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	140	138	137	135	135	135	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MEADOWS	H	SAN JACINTO	FORT BEND	080792000	08079200007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	112	111	110	108	108	108	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MEADOWS	H	SAN JACINTO-BRAZOS	FORT BEND	080792000	08079200007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	11	11	11	11	11	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MERCY WSC	H	SAN JACINTO	LIBERTY	084253000	08425300014610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	5	6	6	7	8	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MERCY WSC	H	SAN JACINTO	SAN JACINTO	084253000	08425300020410	None	CONSERVATION	H	SAN JACINTO	SAN JACINTO	381020410	0	22	25	27	28	28	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MISSOURI CITY	H	BRAZOS	FORT BEND	080409000	08040900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	25	30	35	38	46	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MISSOURI CITY	H	SAN JACINTO	FORT BEND	080409000	08040900007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	0	203	242	283	313	381	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MISSOURI CITY	H	SAN JACINTO-BRAZOS	FORT BEND	080409000	08040900007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	917	1096	1280	1417	1723	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MISSOURI CITY	H	SAN JACINTO	HARRIS	080409000	08040900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	83	98	113	129	146	162	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONT BELVIEU	H	TRINITY	CHAMBERS	080413000	08041300003608	None	CONSERVATION	H	TRINITY	CHAMBERS	3880368	37	48	59	67	77	86	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONT BELVIEU	H	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	None	CONSERVATION	H	TRINITY-SAN JACINTO	CHAMBERS	3890369	17	23	27	32	36	40	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	14	57	83	109	136	162	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	112	142	210	290	397	520	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	25	25	25	25	25	25	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	50	65	79	83	82	82	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	44	60	76	83	85	86	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY UD #2	H	SAN JACINTO	MONTGOMERY	084265000	08426500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	31	31	30	30	30	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	29	30	33	37	43	51	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	58	58	57	56	56	56	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
MONTGOMERY COUNTY WCID #1	H	SAN JACINTO	MONTGOMERY	084268000	08426800017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	30	31	34	39	45	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NEEDVILLE	H	BRAZOS	FORT BEND	080428000	08042800007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	0	0	0	0	0	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NEEDVILLE	H	BRAZOS-COLORADO	FORT BEND	080428000	08042800007913	None	CONSERVATION	H	BRAZOS-COLORADO	FORT BEND	381307913	0	18	22	26	31	38	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NEW CANEY MUD	H	SAN JACINTO	MONTGOMERY	084272000	08427200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	69	153	200	252	326	412	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NEW WAVERLY	H	SAN JACINTO	WALKER	080926000	08092600023610	None	CONSERVATION	H	SAN JACINTO	WALKER	381023610	0	13	13	13	13	13	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	115	169	233	331	454	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NFBWA	H	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	0	0	1686	1882	1934	1922	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	1521	2146	2713	3223	3705	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	57	61	65	69	74	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	6441	7598	8480	8961	9156	9389	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORMANGEE	H	BRAZOS	LEON	080927000	08092700014512	None	CONSERVATION	H	BRAZOS	LEON	381214512	0	3	3	3	3	3	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORMANGEE	H	TRINITY	LEON	080927000	08092700014508	None	CONSERVATION	H	TRINITY	LEON	380814508	0	6	7	7	7	7	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORMANGEE	H	TRINITY	MADISON	080927000	08092700015708	None	CONSERVATION	H	TRINITY	MADISON	380815708	1	1	1	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORTH BELT UD	H	SAN JACINTO	HARRIS	084275000	08427500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	27	36	44	51	60	68	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORTH GREEN MUD	H	SAN JACINTO	HARRIS	084279000	08427900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	21	23	24	26	28	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
NORTHWEST HARRIS COUNTY MUD #23	H	SAN JACINTO	HARRIS	084286000	08428600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	35	43	52	60	69	77	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
NORTHWEST PARK MUD	H	SAN JACINTO	HARRIS	084287000	08428700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	184	217	217	213	211	211	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	41	45	53	64	77	94	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
OLD RIVER-WINFREE	H	TRINITY	CHAMBERS	080727000	08072700003608	None	CONSERVATION	H	TRINITY	CHAMBERS	3880368	12	13	14	15	16	17	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ONALASKA	H	TRINITY	POLK	080933000	08093300018708	None	CONSERVATION	H	TRINITY	POLK	380818708	0	13	14	16	17	18	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ORBIT SYSTEMS INC	H	BRAZOS-COLORADO	BRAZORIA	084294000	08429400002013	None	CONSERVATION	H	BRAZOS-COLORADO	BRAZORIA	381302013	0	3	4	4	5	5	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	BRAZORIA	084294000	08429400002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	27	31	34	38	42	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ORBIT SYSTEMS INC	H	SAN JACINTO-BRAZOS	FORT BEND	084294000	08429400007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	1	1	1	1	1	1	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
OYSTER CREEK	H	SAN JACINTO-BRAZOS	BRAZORIA	080730000	08073000002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	9	10	12	13	14	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	36	38	39	41	43	45	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PARKWAY UD	H	SAN JACINTO	HARRIS	084298000	08429800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	17	16	16	16	15	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PASADENA	H	SAN JACINTO	HARRIS	080456000	08045600010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	1014	1106	1189	1278	1374	1482	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PASADENA	H	SAN JACINTO-BRAZOS	HARRIS	080456000	08045600010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	284	309	333	358	385	415	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PATTON VILLAGE	H	SAN JACINTO	MONTGOMERY	080734000	08073400017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	5	5	6	6	8	9	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	216	538	631	719	817	920	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	8	18	21	23	26	28	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PECAN GROVE MUD #1	H	BRAZOS	FORT BEND	084299000	08429900007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	115	162	164	166	171	178	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PECAN GROVE MUD #1	H	SAN JACINTO-BRAZOS	FORT BEND	084299000	08429900007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	31	43	44	44	45	47	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PINE ISLAND	H	BRAZOS	WALLER	080938000	08093800023712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	8	10	12	14	17	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PINE TRAILS UTILITY	H	SAN JACINTO	HARRIS	084302000	08430200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	56	60	64	68	72	77	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PINEY POINT VILLAGE	H	SAN JACINTO	HARRIS	080468000	08046800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	76	78	81	84	86	90	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	34	33	32	32	32	32	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PLEAK	H	BRAZOS	FORT BEND	081053000	08105300007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	36	43	50	59	70	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PLUM GROVE	H	SAN JACINTO	LIBERTY	081054000	08105400014610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	10	11	13	15	18	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
POINT AQUARIUS MUD	H	SAN JACINTO	MONTGOMERY	084305000	08430500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	44	54	78	105	142	184	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
POINT BLANK	H	TRINITY	SAN JACINTO	081056000	08105600020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	0	5	6	6	6	6	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PORTER WSC	H	SAN JACINTO	MONTGOMERY	084307000	08430700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	123	137	171	212	210	210	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PRAIRIE VIEW	H	BRAZOS	WALLER	080485000	08048500023712	None	CONSERVATION	H	BRAZOS	WALLER	381223712	0	8	9	9	10	11	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
PRAIRIE VIEW	H	SAN JACINTO	WALLER	080485000	08048500023710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	0	72	78	85	93	103	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	146	145	144	144	144	144	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RICHMOND	H	BRAZOS	FORT BEND	080500000	08050000007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	179	213	245	301	363	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RICHWOOD	H	SAN JACINTO-BRAZOS	BRAZORIA	080501000	08050100002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	20	21	22	22	23	24	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	50	49	48	48	48	48	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RIVERSIDE WSC	H	TRINITY	SAN JACINTO	084323000	08432300020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	0	11	13	16	18	20	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
RIVERSIDE WSC	H	TRINITY	WALKER	084323000	08432300023608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	0	5	23	24	26	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ROLLING FORK PUD	H	SAN JACINTO	HARRIS	084411000	08441100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	39	40	42	43	45	47	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ROMAN FOREST	H	SAN JACINTO	MONTGOMERY	080801000	08080100017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	32	50	71	93	124	160	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
ROSENBERG	H	BRAZOS	FORT BEND	080518000	08051800007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	150	497	616	738	904	1101	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SAN FELIPE	H	BRAZOS	AUSTIN	080954000	08095400000812	None	CONSERVATION	H	BRAZOS	AUSTIN	381200812	0	8	9	9	9	10	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	None	CONSERVATION	H	SAN JACINTO-BRAZOS	HARRIS	381110111	153	182	208	237	264	293	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SEALY	H	BRAZOS	AUSTIN	080549000	08054900000812	None	CONSERVATION	H	BRAZOS	AUSTIN	381200812	0	97	112	119	123	129	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	104	121	141	162	191	226	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SHEPHERD	H	TRINITY	SAN JACINTO	080746000	08074600020408	None	CONSERVATION	H	TRINITY	SAN JACINTO	380820408	0	20	22	23	24	24	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SIENNA PLANTATION MUD #2	H	SAN JACINTO-BRAZOS	FORT BEND	084334000	08433400007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	63	72	72	72	72	72	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SIMONTON	H	BRAZOS	FORT BEND	081062000	08106200007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	0	0	38	45	54	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	121	152	153	158	160	164	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHSIDE PLACE	H	SAN JACINTO	HARRIS	080572000	08057200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	6	24	25	27	28	30	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHWEST UTILITIES	H	SAN JACINTO-BRAZOS	BRAZORIA	084343000	08434300002011	None	CONSERVATION	H	SAN JACINTO-BRAZOS	BRAZORIA	381102011	0	2	4	5	5	5	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHWEST UTILITIES	H	SAN JACINTO	HARRIS	084343000	08434300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	42	47	53	57	63	68	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHWEST UTILITIES	H	SAN JACINTO	LIBERTY	084343000	08434300014610	None	CONSERVATION	H	SAN JACINTO	LIBERTY	381014610	0	1	1	1	1	2	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SOUTHWEST UTILITIES	H	SAN JACINTO	MONTGOMERY	084343000	08434300017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	15	17	21	26	32	40	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SPLENDORA	H	SAN JACINTO	MONTGOMERY	080962000	08096200017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	10	12	16	21	28	36	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	32	36	48	61	80	101	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SPRING VALLEY	H	SAN JACINTO	HARRIS	080575000	08057500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	53	55	56	58	60	63	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
STAGECOACH	H	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	4	6	8	11	15	20	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	44	54	54	53	53	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SUGAR LAND	H	BRAZOS	FORT BEND	080585000	08058500007912	None	CONSERVATION	H	BRAZOS	FORT BEND	381207912	0	625	641	638	638	638	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SUGAR LAND	H	SAN JACINTO	FORT BEND	080585000	08058500007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	0	63	64	64	64	64	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	None	CONSERVATION	H	SAN JACINTO-BRAZOS	FORT BEND	381107911	0	854	876	872	872	872	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SUNBELT FWSD	H	SAN JACINTO	HARRIS	084350000	08435000010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	285	331	375	422	468	517	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SURFSIDE BEACH	H	BRAZOS	BRAZORIA	080967000	08096700002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	10	12	13	14	15	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
SWEENY	H	BRAZOS-COLORADO	BRAZORIA	080590000	08059000002013	None	CONSERVATION	H	BRAZOS-COLORADO	BRAZORIA	381302013	0	30	40	41	43	45	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	930	1686	1796	1788	1779	1779	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
TOMBALL	H	SAN JACINTO	HARRIS	080608000	08060800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	166	209	244	306	353	420	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
TRAIL OF THE LAKES MUD	H	SAN JACINTO	HARRIS	084355000	08435500010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	90	87	86	85	85	85	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
VARNER CREEK UD	H	BRAZOS	BRAZORIA	084370000	08437000002012	None	CONSERVATION	H	BRAZOS	BRAZORIA	381202012	0	24	27	31	35	39	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WALKER COUNTY RURAL WSC	H	TRINITY	WALKER	084372000	08437200023608	None	CONSERVATION	H	TRINITY	WALKER	380823608	0	54	55	53	53	53	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WALLER	H	SAN JACINTO	HARRIS	080629000	08062900010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	7	9	11	12	14	16	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WALLER	H	SAN JACINTO	WALLER	080629000	08062900023710	None	CONSERVATION	H	SAN JACINTO	WALLER	381023710	0	27	32	37	43	51	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WALLIS	H	BRAZOS-COLORADO	AUSTIN	080630000	08063000000813	None	CONSERVATION	H	BRAZOS-COLORADO	AUSTIN	381300813	0	11	11	11	12	12	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WEST HARDIN WSC	H	NECHES	LIBERTY	084383000	08438300014606	None	CONSERVATION	H	NECHES	LIBERTY	380614606	0	2	2	3	3	3	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WEST HARRIS COUNTY MUD #6	H	SAN JACINTO	HARRIS	084387000	08438700010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	34	33	33	33	32	32	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WEST UNIVERSITY PL.	H	SAN JACINTO	HARRIS	080643000	08064300010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	197	208	218	228	240	253	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	None	CONSERVATION	H	SAN JACINTO	FORT BEND	381007910	178	209	241	282	323	363	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	0	3760	4102	4348	4420	4452	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	34	39	49	61	77	97	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WILLOW RUN SUBDIVISION	H	SAN JACINTO	HARRIS	084398000	08439800010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	40	39	38	37	37	37	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WINDFERN FOREST UD	H	SAN JACINTO	HARRIS	084401000	08440100010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	48	62	60	60	60	60	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WOODBRANCH	H	SAN JACINTO	MONTGOMERY	080807000	08080700017010	None	CONSERVATION	H	SAN JACINTO	MONTGOMERY	381017010	10	11	12	14	16	18	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
WOODCREEK MUD	H	SAN JACINTO	HARRIS	084404000	08440400010110	None	CONSERVATION	H	SAN JACINTO	HARRIS	381010110	37	49	60	71	82	93	Y	MUNICIPAL CONSERVATION	MUNICIPAL CONSERVATION
COUNTY-OTHER	H	BRAZOS	BRAZORIA	080757020	08075702002012	none	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS	BRAZORIA	MNPR12	0	0	0	1	2	2	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	BRAZOS-COLORADO	BRAZORIA	080757020	08075702002013	none	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS-COLORADO	BRAZORIA	MNPR13	0	0	21	42	64	87	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	BRAZORIA	080757020	08075702002011	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO-BRAZOS	BRAZORIA	MNPR11	0	0	95	184	278	376	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	none	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS	FORT BEND	MNPR12	0	0	460	1072	2286	3714	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	BRAZOS-COLORADO	FORT BEND	080757079	08075707907913	none	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS-COLORADO	FORT BEND	MNPR13	0	0	14	21	31	34	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO	FORT BEND	080757079	08075707907910	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	FORT BEND	MNPR10	0	0	3	66	229	414	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MNPR11	0	0	0	457	1499	2648	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	HARRIS	MNPR10	0	0	930	2994	5816	8773	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	HARRIS	080757101	08075710110111	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO-BRAZOS	HARRIS	MNPR11	0	0	52	7	2	7	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	TRINITY-SAN JACINTO	HARRIS	080757101	08075710110109	none	MUNICIPAL NON-POTABLE REUSE	H	TRINITY-SAN JACINTO	HARRIS	MNPR09	0	0	26	0	0	0	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	none	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	MONTGOMERY	MNPR10	0	0	1752	3838	6787	10215	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	MUNICIPAL NON-POTABLE REUSE	H	BRAZOS	FORT BEND	MNPR12	0	0	90	194	356	561	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NFBWA	H	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	NFBWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	FORT BEND	MNPR10	0	0	474	812	926	929	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO-BRAZOS	FORT BEND	MNPR11	0	0	1026	1967	2836	3657	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	NFBWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	HARRIS	MNPR10	0	0	0	7	11	11	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	HARRIS	MNPR10	0	0	1595	2473	2886	3274	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	FORT BEND	MNPR10	0	0	69	155	240	320	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	MUNICIPAL NON-POTABLE REUSE	H	SAN JACINTO	HARRIS	MNPR10	0	0	665	1135	1312	1366	Y	MUNICIPAL NON-POTABLE REUSE	MUNICIPAL NON-POTABLE REUSE
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	SAN JACINTO RIVER AUTHORITY	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	346080427908	0	0	5299	19014	16041	17533	Y	NEW CONTRACT FROM EXISTING SUPPLY	SJRA to WUG Contract
HARRIS COUNTY MUD #50	H	SAN JACINTO	HARRIS	084185000	08418500010110	SAN JACINTO RIVER AUTHORITY	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	0	0	0	28	72	Y	NEW CONTRACT FROM EXISTING SUPPLY	SJRA to WUG Contract
MANUFACTURING	H	TRINITY-SAN JACINTO	CHAMBERS	081001036	08100103603609	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	8264	9230	10252	11284	12240	13445	Y	NEW CONTRACT FROM EXISTING SUPPLY	TRA to WUG Contract
MANUFACTURING	H	TRINITY-SAN JACINTO	HARRIS	081001101	08100110110109	SAN JACINTO RIVER AUTHORITY	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	LIBERTY	3410805271B08	23008	24777	24777	24777	24777	24777	Y	NEW CONTRACT FROM EXISTING SUPPLY	SJRA to WUG Contract
MANUFACTURING	H	TRINITY-SAN JACINTO	HARRIS	081001101	08100110110109	SAN JACINTO RIVER AUTHORITY	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	346080427908	0	2977	7014	10986	13959	12467	Y	NEW CONTRACT FROM EXISTING SUPPLY	SJRA to WUG Contract
MINING	H	TRINITY	CHAMBERS	081003036	08100303603608	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	4344	6494	7816	9116	10411	11550	Y	NEW CONTRACT FROM EXISTING SUPPLY	TRA to WUG Contract
MINING	H	TRINITY-SAN JACINTO	CHAMBERS	081003036	08100303603609	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	1215	1359	1904	2488	3081	3677	Y	NEW CONTRACT FROM EXISTING SUPPLY	TRA to WUG Contract
MINING	H	NECHES-TRINITY	GALVESTON	081003084	08100308408407	LOWER NECHES VALLEY AUTHORITY	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	I	NECHES	RESERVOIR	060A006	16	23	26	29	33	37	Y	NEW CONTRACT FROM EXISTING SUPPLY	LNVA to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	2671	1642	0	0	0	Y	NEW CONTRACT FROM EXISTING SUPPLY	COH to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	839	0	0	0	0	Y	NEW CONTRACT FROM EXISTING SUPPLY	COH to WUG Contract
LIVESTOCK	H	SAN JACINTO-BRAZOS	BRAZORIA	081005020	08100502002011	none	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	BRAZORIA	0201511	0	27	27	27	27	27	Y	NEW GROUNDWATER WELLS FOR LIVESTOCK	New Groundwater Wells for Livestock
LIVESTOCK	H	NECHES-TRINITY	GALVESTON	081005084	08100508408407	none	GULF COAST AQUIFER	H	NECHES-TRINITY	GALVESTON	0841507	0	14	14	14	14	14	Y	NEW GROUNDWATER WELLS FOR LIVESTOCK	New Groundwater Wells for Livestock
ARCOLA	H	SAN JACINTO-BRAZOS	FORT BEND	080998000	08099800007911	NFBWA	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	106	258	295	345	397	Y	NFBWA GRP	NFBWA GRP Participation
FULSHEAR	H	BRAZOS	FORT BEND	080869000	08086900007912	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	76	178	Y	NFBWA GRP	NFBWA GRP Participation
FULSHEAR	H	SAN JACINTO-BRAZOS	FORT BEND	080869000	08086900007911	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	45	112	Y	NFBWA GRP	NFBWA GRP Participation
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	-45	-112	Y	NFBWA GRP	NFBWA GRP Participation
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	-106	-258	-295	-345	-397	Y	NFBWA GRP	NFBWA GRP Participation
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	-76	-178	Y	NFBWA GRP	NFBWA GRP Participation
JERSEY VILLAGE	H	SAN JACINTO	HARRIS	080709000	08070900010110	NHCRWA	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	364	767	1043	1315	1600	Y	NHCRWA GRP	NHCRWA GRP Participation
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	-761	-2569	-3476	-4530	-5349	-6488	Y	NHCRWA GRP	NHCRWA GRP Participation
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	1003010	0	-364	-767	-1043	-1315	-1600	Y	NHCRWA GRP	NHCRWA GRP Participation
NORTHWEST HARRIS COUNTY MUD #23	H	SAN JACINTO	HARRIS	084286000	08428600010110	NHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	141	467	646	770	908	1046	Y	NHCRWA GRP	NHCRWA GRP Participation
TOMBALL	H	SAN JACINTO	HARRIS	080608000	08060800010110	NHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	620	2102	2830	3760	4441	5442	Y	NHCRWA GRP	NHCRWA GRP Participation

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	INDIRECT REUSE HARRIS COUNTY	H	SAN JACINTO	HARRIS	351010110	0	0	0	7300	16300	16300	Y	NHCRWA INDIRECT REUSE	NHCRWA INDIRECT REUSE
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	3889	3900	3775	6893	6187	5454	N	Pearland SWTP	Pearland SWTP
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	2590	2597	2514	4591	4120	3632	N	Pearland SWTP	Pearland SWTP
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	none	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	1290012	0	0	223	1565	2788	4053	N	Pearland SWTP	Pearland SWTP
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	145	134	125	223	195	169	N	Pearland SWTP	Pearland SWTP
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	96	89	83	148	130	112	N	Pearland SWTP	Pearland SWTP
PECAN GROVE MUD #1	H	BRAZOS	FORT BEND	084299000	08429900007912	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	120E012	182	182	363	363	363	363	N	PECAN GROVE GRP	PECAN GROVE GRP
PECAN GROVE MUD #1	H	SAN JACINTO-BRAZOS	FORT BEND	084299000	08429900007911	none	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	120E012	684	684	1368	1368	1368	1368	N	PECAN GROVE GRP	PECAN GROVE GRP
BEACH CITY	H	TRINITY-SAN JACINTO	CHAMBERS	080822000	08082200003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	178	0	0	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	1440	489	496	259	172	467	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
BRITMOORE UTILITIES	H	SAN JACINTO	HARRIS	084036000	08403600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	115	354	127	67	45	121	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
BUNKER HILL VILLAGE	H	SAN JACINTO	HARRIS	080085000	08008500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	478	469	125	56	33	33	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CANDLELIGHT HILLS SUBDIVISION	H	SAN JACINTO	HARRIS	084043000	08404300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	110	342	123	66	44	123	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	CHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	423	211	132	217	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CHIMNEY HILL MUD	H	SAN JACINTO	HARRIS	084053000	08405300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	10	4	2	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CONSUMERS WATER INC	H	SAN JACINTO	HARRIS	084072000	08407200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	96	336	131	74	52	173	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
COUNTY-OTHER	H	TRINITY-SAN JACINTO	CHAMBERS	080757036	08075703603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	104	0	0	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	181	1937	13715	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	HARRIS	080757101	08075710110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	203	0	17	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	HARRIS	084081000	08408100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	5	17	7	4	3	9	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
EL LAGO	H	SAN JACINTO-BRAZOS	HARRIS	080695000	08069500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	248	270	77	36	22	33	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
FOUNTAINVIEW SUBDIVISION	H	SAN JACINTO	HARRIS	084132000	08413200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	83	250	89	46	30	81	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
GALENA PARK	H	SAN JACINTO	HARRIS	080226000	08022600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	22	25	9	5	5	49	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY FWSD #47	H	SAN JACINTO	HARRIS	084149000	08414900010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	25	14	1	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY FWSD #51	H	SAN JACINTO	HARRIS	084150000	08415000010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	363	266	68	26	15	15	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY FWSD #6	H	SAN JACINTO	HARRIS	084151000	08415100010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	103	145	50	29	21	74	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #158	H	SAN JACINTO	HARRIS	084165000	08416500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	7	2	1	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #261	H	SAN JACINTO	HARRIS	084179000	08417900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	140	495	158	72	42	42	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #345	H	SAN JACINTO	HARRIS	084182000	08418200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	341	898	282	129	76	76	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #5	H	SAN JACINTO	HARRIS	084184000	08418400010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	157	411	126	57	33	33	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #53	H	SAN JACINTO	HARRIS	084186000	08418600010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	587	920	335	204	149	574	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY MUD #8	H	SAN JACINTO	HARRIS	084189000	08418900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	96	140	49	29	21	88	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #1	H	SAN JACINTO	HARRIS	084193000	08419300010110	BAYTOWN AREA WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	26	71	49	39	196	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #21	H	SAN JACINTO	HARRIS	084196000	08419600010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	272	313	95	48	32	102	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #36	H	SAN JACINTO	HARRIS	084197000	08419700010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	190	268	92	54	40	160	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #50	H	SAN JACINTO	HARRIS	084198000	08419800010110	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	508	557	163	81	52	115	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #76	H	SAN JACINTO	HARRIS	084199000	08419900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	73	187	57	26	15	15	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HARRIS COUNTY WCID #84	H	SAN JACINTO	HARRIS	084200000	08420000010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	199	200	55	25	15	25	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HEDWIG VILLAGE	H	SAN JACINTO	HARRIS	080269000	08026900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	458	459	125	58	34	40	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HILSHIRE VILLAGE	H	SAN JACINTO	HARRIS	081025000	08102500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	5	6	2	1	1	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HOUSTON	H	SAN JACINTO	FORT BEND	080285000	08028500007910	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	-454	-5	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HOUSTON	H	SAN JACINTO	HARRIS	080285000	08028500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	-17056	-13867	-10665	-22379	-32021	-43418	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HOUSTON	H	SAN JACINTO-BRAZOS	HARRIS	080285000	08028500010111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	-1197	-1409	-1531	-1657	-1790	-20	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HUMBLE	H	SAN JACINTO	HARRIS	080289000	08028900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	820	820	879	450	293	707	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
HUNTERS CREEK VILLAGE	H	SAN JACINTO	HARRIS	080290000	08029000010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	955	1034	302	150	96	210	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	BRAZOS	BRAZORIA	081004020	08100402002012	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	-50	-50	-50	-50	-50	-50	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	-13197	-13197	-13197	-13197	-13197	-13197	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	SAN JACINTO-BRAZOS	BRAZORIA	081004020	08100402002011	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	-447	-447	-447	-447	-447	-447	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	NECHES-TRINITY	CHAMBERS	081004036	08100403603607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	CHAMBERS	0361507	-104	-155	-183	-213	-243	-270	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	NECHES-TRINITY	CHAMBERS	081004036	08100403603607	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	-20376	-20600	-20734	-20857	-20975	-21076	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY	CHAMBERS	081004036	08100403603608	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B08	20376	20600	20734	20857	20975	21076	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY-SAN JACINTO	CHAMBERS	081004036	08100403603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	-530	-509	-472	-439	-409	-379	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	NECHES-TRINITY	LIBERTY	081004146	08100414614607	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	0	-1091	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY	LIBERTY	081004146	08100414614608	CITY OF HOUSTON	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	LIBERTY	346080427708	-6657	-6697	-6732	-6767	-6805	-5742	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY-SAN JACINTO	LIBERTY	081004146	08100414614609	CITY OF HOUSTON	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	LIBERTY	346080427708	6657	6697	6732	6767	6805	5742	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
IRRIGATION	H	TRINITY-SAN JACINTO	LIBERTY	081004146	08100414614609	TRINITY RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	0	1091	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
JACINTO CITY	H	SAN JACINTO	HARRIS	080301000	08030100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	2	83	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	GULF COAST WATER AUTHORITY	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E012	50	50	50	50	50	50	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B12	13197	13197	13197	13197	13197	13197	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	BRAZOS	BRAZORIA	081001020	08100102002012	GULF COAST WATER AUTHORITY	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	346120516812	447	447	447	447	447	447	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	SAN JACINTO	HARRIS	081001101	08100110110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	0	-67200	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MANUFACTURING	H	SAN JACINTO-BRAZOS	HARRIS	081001101	08100110110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	4487	251	251	2029	1394	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MINING	H	NECHES-TRINITY	CHAMBERS	081003036	08100303603607	None	GULF COAST AQUIFER	H	NECHES-TRINITY	CHAMBERS	0361507	104	155	183	213	243	270	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MINING	H	TRINITY-SAN JACINTO	CHAMBERS	081003036	08100303603609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	45	509	472	439	409	379	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MINING	H	SAN JACINTO	HARRIS	081003101	08100310110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	140	274	97	56	40	123	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MINING	H	SAN JACINTO-BRAZOS	HARRIS	081003101	08100310110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	3	5	2	1	1	3	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
MONT BELVIEU	H	TRINITY-SAN JACINTO	CHAMBERS	080413000	08041300003609	None	GULF COAST AQUIFER	H	TRINITY-SAN JACINTO	CHAMBERS	0361509	203	0	0	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	218	211	220	1872	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NFBWA	H	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1965	1353	909	1466	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	2504	2176	1821	8869	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	199	106	67	80	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	420	11686	55563	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PARKWAY UD	H	SAN JACINTO	HARRIS	084298000	08429800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	225	221	58	26	15	17	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PEARLAND	H	SAN JACINTO-BRAZOS	BRAZORIA	080457000	08045700002011	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	201	294	325	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PEARLAND	H	SAN JACINTO-BRAZOS	HARRIS	080457000	08045700010111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	4	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PINE TRAILS UTILITY	H	SAN JACINTO	HARRIS	084302000	08430200010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	215	266	85	47	33	110	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
PINEY POINT VILLAGE	H	SAN JACINTO	HARRIS	080468000	08046800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	697	731	207	100	62	114	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
ROLLING FORK PUD	H	SAN JACINTO	HARRIS	084411000	08441100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	173	470	152	74	45	76	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	1109	484	484	271	188	603	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SOUTHSIDE PLACE	H	SAN JACINTO	HARRIS	080572000	08057200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	3	6	6	5	33	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SOUTHWEST UTILITIES	H	SAN JACINTO	HARRIS	084343000	08434300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	171	509	178	91	59	151	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SPRING VALLEY	H	SAN JACINTO	HARRIS	080575000	08057500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	213	585	190	90	56	94	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	1229	1068	3909	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	400	400	394	216	152	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
SUNBELT FWSD	H	SAN JACINTO	HARRIS	084350000	08435000010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	576	0	0	0	0	0	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WALLER	H	SAN JACINTO	HARRIS	080629000	08062900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	0	203	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WEST UNIVERSITY PL.	H	SAN JACINTO	HARRIS	080643000	08064300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	231	359	136	80	60	256	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	770	770	1555	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	1241	0	0	11748	11748	17886	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WILLOW RUN SUBDIVISION	H	SAN JACINTO	HARRIS	084398000	08439800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	159	417	129	58	34	34	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
WINDFERN FOREST UD	H	SAN JACINTO	HARRIS	084401000	08440100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	126	591	185	84	49	49	Y	REALLOCATE EXISTING SUPPLY	REALLOCATE EXISTING SUPPLY
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	None	RIVER PLANTATION REUSE	H	SAN JACINTO	MONTGOMERY	RPRU10	168	368	368	368	368	368	Y	RIVER PLANTATION GRP REUSE	RIVER PLANTATION GRP REUSE
SEALY	H	BRAZOS	AUSTIN	080549000	08054900000812	None	GULF COAST AQUIFER	H	BRAZOS	AUSTIN	0081512	0	360	360	360	360	888	N	SEALY GW TREATMENT EXPANSION	SEALY GW TREATMENT EXPANSION
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	-7593	-8219	-9004	-9249	-9456	Y	SJRA WRAP	Supplies
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	12849	16769	15216	13490	12274	Y	SJRA WRAP	SJRA WRAP Participation
CONSUMERS WATER INC	H	SAN JACINTO	MONTGOMERY	084072000	08407200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	89	143	204	291	395	Y	SJRA WRAP	SJRA WRAP Participation
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	10308	16122	19183	13789	5335	Y	SJRA WRAP	SJRA WRAP Participation
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	375	4087	12079	17836	Y	SJRA WRAP	SJRA WRAP Participation
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	MONTGOMERY	084081000	08408100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	257	439	663	982	1371	Y	SJRA WRAP	SJRA WRAP Participation
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-127	-136	-138	-139	Y	SJRA WRAP	Supplies
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	86	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	261	233	203	183	Y	SJRA WRAP	SJRA WRAP Participation
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-326	-372	-399	-418	Y	SJRA WRAP	Supplies
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	203	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	670	635	586	547	Y	SJRA WRAP	SJRA WRAP Participation
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-1012	-1083	-1099	-1107	Y	SJRA WRAP	Supplies
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	672	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	2067	1833	1605	1441	Y	SJRA WRAP	SJRA WRAP Participation
MAGNOLIA	H	SAN JACINTO	MONTGOMERY	080907000	08090700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	221	380	561	812	1118	Y	SJRA WRAP	SJRA WRAP Participation
MANUFACTURING	H	SAN JACINTO	MONTGOMERY	081001170	08100117017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	988	1384	1756	2129	2504	Y	SJRA WRAP	SJRA WRAP Participation
MINING	H	SAN JACINTO	MONTGOMERY	081003170	08100317017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	216	279	331	382	425	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	-787	-777	Y	SJRA WRAP	Supplies
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	374	710	1087	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	0	1151	1011	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-1909	-2136	-2308	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	865	1655	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	3236	3122	3000	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-199	-173	-141	-115	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	167	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	410	296	209	153	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-546	-441	-358	Y	SJRA WRAP	Supplies

Region H
Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	16	160	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	51	63	583	407	295	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-589	-488	-404	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	19	171	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	51	64	633	453	335	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #2	H	SAN JACINTO	MONTGOMERY	084265000	08426500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	203	259	298	337	369	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-245	-232	-222	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	184	264	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	418	342	292	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-369	-300	-245	Y	SJRA WRAP	Supplies
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	353	452	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	630	445	326	Y	SJRA WRAP	SJRA WRAP Participation
MONTGOMERY COUNTY WCID #1	H	SAN JACINTO	MONTGOMERY	084268000	08426800017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	189	272	358	470	600	Y	SJRA WRAP	SJRA WRAP Participation
NEW CANEY MUD	H	SAN JACINTO	MONTGOMERY	084272000	08427200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	546	944	1396	2058	2854	Y	SJRA WRAP	SJRA WRAP Participation
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-398	-418	-414	-414	Y	SJRA WRAP	Supplies
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	272	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	816	709	609	541	Y	SJRA WRAP	SJRA WRAP Participation
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-315	-290	-247	-211	Y	SJRA WRAP	Supplies
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	251	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	649	496	366	280	Y	SJRA WRAP	SJRA WRAP Participation
PATTON VILLAGE	H	SAN JACINTO	MONTGOMERY	080734000	08073400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	32	47	64	84	113	Y	SJRA WRAP	SJRA WRAP Participation
POINT AQUARIUS MUD	H	SAN JACINTO	MONTGOMERY	084305000	08430500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	331	613	966	1472	2091	Y	SJRA WRAP	SJRA WRAP Participation
PORTER WSC	H	SAN JACINTO	MONTGOMERY	084307000	08430700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	777	1260	1826	2047	2239	Y	SJRA WRAP	SJRA WRAP Participation
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-1005	-884	-719	-587	Y	SJRA WRAP	Supplies
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	826	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	2055	1501	1060	776	Y	SJRA WRAP	SJRA WRAP Participation
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	0	0	Y	SJRA WRAP	Supplies
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
ROMAN FOREST	H	SAN JACINTO	MONTGOMERY	080801000	08080100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	306	561	860	1283	1809	Y	SJRA WRAP	SJRA WRAP Participation
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-1046	-1064	-1025	-996	Y	SJRA WRAP	Supplies
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	737	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	2144	1808	1504	1304	Y	SJRA WRAP	SJRA WRAP Participation
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-1072	-974	-804	-673	Y	SJRA WRAP	Supplies
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	866	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	2190	1650	1179	884	Y	SJRA WRAP	SJRA WRAP Participation
SOUTHWEST UTILITIES	H	SAN JACINTO	MONTGOMERY	084343000	08434300017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	102	166	237	336	457	Y	SJRA WRAP	SJRA WRAP Participation
SPLENDORA	H	SAN JACINTO	MONTGOMERY	080962000	08096200017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	83	141	212	313	435	Y	SJRA WRAP	SJRA WRAP Participation
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-355	-401	-428	-447	Y	SJRA WRAP	Supplies
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	224	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	727	681	626	583	Y	SJRA WRAP	SJRA WRAP Participation
STAGECOACH	H	SAN JACINTO	MONTGOMERY	STAGECOACH	STAGECOACH17010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	39	68	107	165	249	Y	SJRA WRAP	SJRA WRAP Participation
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	-348	-284	-231	Y	SJRA WRAP	Supplies
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	329	423	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	0	593	419	307	Y	SJRA WRAP	SJRA WRAP Participation
STEAM ELECTRIC POWER	H	SAN JACINTO	MONTGOMERY	081002170	08100217017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	0	0	1593	4307	Y	SJRA WRAP	SJRA WRAP Participation
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	-13848	-12584	-11041	-8974	-7359	Y	SJRA WRAP	Supplies
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	23426	25536	18663	13118	9607	Y	SJRA WRAP	SJRA WRAP Participation
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	0	-362	-401	-415	-429	Y	SJRA WRAP	Supplies
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	236	0	0	0	0	Y	SJRA WRAP	SJRA WRAP Participation
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	SAN JACINTO RIVER AUTHORITY	CONROE LAKE/RESERVOIR	H	SAN JACINTO	MONTGOMERY	1006010	0	0	742	681	608	559	Y	SJRA WRAP	SJRA WRAP Participation
WOODBRANCH	H	SAN JACINTO	MONTGOMERY	080807000	08080700017010	SAN JACINTO RIVER AUTHORITY	GULF COAST AQUIFER	H	SAN JACINTO	MONTGOMERY	1701510	0	74	107	138	177	225	Y	SJRA WRAP	SJRA WRAP Participation
COUNTY-OTHER	H	BRAZOS	FORT BEND	080757079	08075707907912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	102	919	1293	1291	1183	Y	SUGAR LAND GRP	Sugar Land GRP Participation
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	FORT BEND	080757079	08075707907911	SUGAR LAND	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	29	60	536	814	814	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #106	H	BRAZOS	FORT BEND	084117000	08411700007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	80	278	127	64	37	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #111	H	BRAZOS	FORT BEND	084119000	08411900007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	64	107	102	51	29	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #67	H	BRAZOS	FORT BEND	084126000	08412600007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	69	115	108	54	31	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #68	H	BRAZOS	FORT BEND	084127000	08412700007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	50	74	80	40	23	Y	SUGAR LAND GRP	Sugar Land GRP Participation
FORT BEND COUNTY MUD #69	H	BRAZOS	FORT BEND	084128000	08412800007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	40	51	63	32	18	Y	SUGAR LAND GRP	Sugar Land GRP Participation
PLANTATION MUD	H	SAN JACINTO-BRAZOS	FORT BEND	084303000	08430300007911	SUGAR LAND	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	46	159	71	35	20	Y	SUGAR LAND GRP	Sugar Land GRP Participation
SUGAR LAND	H	BRAZOS	FORT BEND	080585000	08058500007912	SUGAR LAND	GULF COAST AQUIFER	H	BRAZOS	FORT BEND	0791512	0	-405	-1544	-1773	-1532	-1321	Y	SUGAR LAND GRP	Sugar Land GRP Participation
SUGAR LAND	H	SAN JACINTO-BRAZOS	FORT BEND	080585000	08058500007911	SUGAR LAND	GULF COAST AQUIFER	H	SAN JACINTO-BRAZOS	FORT BEND	0791511	0	-147	-338	-812	-974	-913	Y	SUGAR LAND GRP	Sugar Land GRP Participation
SUGAR LAND	H	BRAZOS	FORT BEND	080585000	08058500007912	SUGAR LAND	SUGAR LAND GRP REUSE	H	BRAZOS	FORT BEND	SLGR12	0	560	5040	5040	5040	5040	Y	SUGAR LAND GRP Reuse	SUGAR LAND GRP Reuse
BELLAIRE	H	SAN JACINTO	HARRIS	080046000	08004600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1327	1841	2179	2179	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
BRITMOORE UTILITIES	H	SAN JACINTO	HARRIS	084036000	08403600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	339	479	570	570	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
BUNKER HILL VILLAGE	H	SAN JACINTO	HARRIS	080085000	08008500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	335	399	415	415	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CANDLELIGHT HILLS SUBDIVISION	H	SAN JACINTO	HARRIS	084043000	08404300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	331	470	561	561	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CHCRWA	H	SAN JACINTO	HARRIS	CHCRWA	CHCRWA10110	CHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1129	1500	1668	1668	Y	TRA TO HOUSTON CONTRACT	CHCRWA to WUG Contract
CHIMNEY HILL MUD	H	SAN JACINTO	HARRIS	084053000	08405300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	27	27	118	118	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CONSUMERS WATER INC	H	SAN JACINTO	HARRIS	084072000	08407200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	352	522	661	661	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	HARRIS	080757101	08075710110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	2155	2155	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
COUNTY-OTHER	H	SAN JACINTO-BRAZOS	HARRIS	080757101	08075710110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	47	47	47	47	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CRYSTAL SPRNGS WATER COMPANY	H	SAN JACINTO	HARRIS	084081000	08408100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	17	26	32	32	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
EL LAGO	H	SAN JACINTO-BRAZOS	HARRIS	080695000	08069500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	206	258	276	276	Y	TRA TO HOUSTON CONTRACT	Pasadena to WUG Contract
FOUNTAINVIEW SUBDIVISION	H	SAN JACINTO	HARRIS	084132000	08413200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	237	326	384	384	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
GALENA PARK	H	SAN JACINTO	HARRIS	080226000	08022600010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	24	35	66	66	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY FWSD #47	H	SAN JACINTO	HARRIS	084149000	08414900010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	3	3	3	3	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY FWSD #51	H	SAN JACINTO	HARRIS	084150000	08415000010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	182	187	196	196	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY FWSD #6	H	SAN JACINTO	HARRIS	084151000	08415100010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	134	207	260	260	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY MUD #158	H	SAN JACINTO	HARRIS	084165000	08416500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	18	18	18	18	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY MUD #261	H	SAN JACINTO	HARRIS	084179000	08417900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	423	513	537	537	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY MUD #345	H	SAN JACINTO	HARRIS	084182000	08418200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	756	916	959	959	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY MUD #5	H	SAN JACINTO	HARRIS	084184000	08418400010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	339	402	415	415	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY MUD #53	H	SAN JACINTO	HARRIS	084186000	08418600010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	896	1448	1880	1880	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY MUD #8	H	SAN JACINTO	HARRIS	084189000	08418900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	130	205	271	271	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY WCID #1	H	SAN JACINTO	HARRIS	084193000	08419300010110	BAYTOWN AREA WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	191	349	496	496	Y	TRA TO HOUSTON CONTRACT	BAWA to WUG Contract
HARRIS COUNTY WCID #21	H	SAN JACINTO	HARRIS	084196000	08419600010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	254	341	411	411	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY WCID #36	H	SAN JACINTO	HARRIS	084197000	08419700010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	246	384	500	500	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HARRIS COUNTY WCID #50	H	SAN JACINTO	HARRIS	084198000	08419800010110	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	437	578	657	657	Y	TRA TO HOUSTON CONTRACT	Pasadena to WUG Contract
HARRIS COUNTY WCID #76	H	SAN JACINTO	HARRIS	084199000	08419900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	154	183	189	189	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HARRIS COUNTY WCID #84	H	SAN JACINTO	HARRIS	084200000	08420000010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	146	176	191	191	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
HEDWIG VILLAGE	H	SAN JACINTO	HARRIS	080269000	08026900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	336	409	431	431	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HILSHIRE VILLAGE	H	SAN JACINTO	HARRIS	081025000	08102500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	15	17	18	18	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HUMBLE	H	SAN JACINTO	HARRIS	080289000	08028900010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	2355	3196	3708	3708	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
HUNTERS CREEK VILLAGE	H	SAN JACINTO	HARRIS	080290000	08029000010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	809	1068	1216	1216	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
JACINTO CITY	H	SAN JACINTO	HARRIS	080301000	08030100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	25	25	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
MANUFACTURING	H	SAN JACINTO-BRAZOS		081001101	08100110110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	9181	9181	9181	9181	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
MINING	H	SAN JACINTO	HARRIS	081003101	08100310110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	261	399	506	506	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
MINING	H	SAN JACINTO-BRAZOS	HARRIS	081003101	08100310110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	5	8	9	9	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
NFBWA	H	BRAZOS	FORT BEND	NFBWA	NFBWA07912	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	584	1500	2782	2782	Y	TRA TO HOUSTON CONTRACT	NFBWA to WUG Contract
NFBWA	H	SAN JACINTO	FORT BEND	NFBWA	NFBWA07910	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	5261	9610	11492	11492	Y	TRA TO HOUSTON CONTRACT	NFBWA to WUG Contract
NFBWA	H	SAN JACINTO-BRAZOS	FORT BEND	NFBWA	NFBWA07911	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	6707	15453	23033	23033	Y	TRA TO HOUSTON CONTRACT	NFBWA to WUG Contract
NFBWA	H	SAN JACINTO	HARRIS	NFBWA	NFBWA10110	NFBWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	533	752	848	848	Y	TRA TO HOUSTON CONTRACT	NFBWA to WUG Contract
NHCRWA	H	SAN JACINTO	HARRIS	088000000	08800000010110	NHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	37980	24338	2080	2080	Y	TRA TO HOUSTON CONTRACT	NHCRWA to WUG Contract
PARKWAY UD	H	SAN JACINTO	HARRIS	084298000	08429800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	156	184	190	190	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
PINE TRAILS UTILITY	H	SAN JACINTO	HARRIS	084302000	08430200010110	NORTH CHANNEL WATER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	227	332	411	411	Y	TRA TO HOUSTON CONTRACT	NCWA to WUG Contract
PINEY POINT VILLAGE	H	SAN JACINTO	HARRIS	080468000	08046800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	556	710	788	788	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
ROLLING FORK PUD	H	SAN JACINTO	HARRIS	084411000	08441100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	408	515	565	565	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
SEABROOK	H	SAN JACINTO-BRAZOS	HARRIS	080545000	08054500010111	CITY OF PASADENA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1298	1929	2384	2384	Y	TRA TO HOUSTON CONTRACT	Pasadena to WUG Contract
SOUTHSIDE PLACE	H	SAN JACINTO	HARRIS	080572000	08057200010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	17	39	67	67	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
SOUTHWEST UTILITIES	H	SAN JACINTO	HARRIS	084343000	08434300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	475	645	752	752	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
SPRING VALLEY	H	SAN JACINTO	HARRIS	080575000	08057500010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	509	642	703	703	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO	HARRIS	081002101	08100210110110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	4396	4396	4396	4396	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
STEAM ELECTRIC POWER	H	SAN JACINTO-BRAZOS	HARRIS	081002101	08100210110111	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1055	1055	1055	1055	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
WEST UNIVERSITY PL.	H	SAN JACINTO	HARRIS	080643000	08064300010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	363	568	759	759	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	1261	1261	1872	1872	Y	TRA TO HOUSTON CONTRACT	WHCRWA to WUG Contract
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	32469	32469	37089	37089	Y	TRA TO HOUSTON CONTRACT	WHCRWA to WUG Contract
WILLOW RUN SUBDIVISION	H	SAN JACINTO	HARRIS	084398000	08439800010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	345	412	425	425	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
WINDFERN FOREST UD	H	SAN JACINTO	HARRIS	084401000	08440100010110	CITY OF HOUSTON	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	496	596	624	624	Y	TRA TO HOUSTON CONTRACT	COH to WUG Contract
CONROE	H	SAN JACINTO	MONTGOMERY	080130000	08013000017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	2165	9786	17812	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
COUNTY-OTHER	H	SAN JACINTO	MONTGOMERY	080757170	08075717017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	537	8580	25585	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract

Table 4A-7: WMS Supply Allocations by WUG

WUG Name	WUG RWPG	WUG Basin	WUG County	WUG ID	WUG-County-Basin ID	Wholesale Water Provider	Water Source	Source RWPG	Source Basin	Source County	Source-Basin ID	2010	2020	2030	2040	2050	2060	Non-Recursive Volume?	Major WMS Project Name	WUG-Level WMS Name
CUT AND SHOOT	H	SAN JACINTO	MONTGOMERY	080854000	08085400017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	33	147	265	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
EAST PLANTATION UD	H	SAN JACINTO	MONTGOMERY	084098000	08409800017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	91	426	794	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
H M W SUD	H	SAN JACINTO	MONTGOMERY	084147000	08414700017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	261	1164	2091	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY	H	SAN JACINTO	MONTGOMERY	MONTGOMERY	MONTGOMERY17010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	0	835	1467	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY MUD #18	H	SAN JACINTO	MONTGOMERY	084261000	08426100017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	461	2265	4354	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY MUD #19	H	SAN JACINTO	MONTGOMERY	084262000	08426200017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	42	152	222	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY MUD #8	H	SAN JACINTO	MONTGOMERY	084263000	08426300017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	149	361	493	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY MUD #9	H	SAN JACINTO	MONTGOMERY	084264000	08426400017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	160	400	558	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY UD #3	H	SAN JACINTO	MONTGOMERY	084266000	08426600017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	60	248	423	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MONTGOMERY COUNTY UD #4	H	SAN JACINTO	MONTGOMERY	084267000	08426700017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	90	322	473	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
OAK RIDGE NORTH	H	SAN JACINTO	MONTGOMERY	080726000	08072600017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	101	442	784	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
PANORAMA VILLAGE	H	SAN JACINTO	MONTGOMERY	080732000	08073200017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	71	265	406	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
RAYFORD ROAD MUD	H	SAN JACINTO	MONTGOMERY	084312000	08431200017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	214	769	1127	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
RIVER PLANTATION MUD	H	SAN JACINTO	MONTGOMERY	084322000	08432200017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	76	272	398	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
SHENANDOAH	H	SAN JACINTO	MONTGOMERY	080745000	08074500017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	258	1091	1892	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
SOUTHERN MONTGOMERY COUNTY MUD	H	SAN JACINTO	MONTGOMERY	084339000	08433900017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	235	856	1282	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
SPRING CREEK UD	H	SAN JACINTO	MONTGOMERY	084344000	08434400017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	97	455	846	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
STANLEY LAKE MUD	H	SAN JACINTO	MONTGOMERY	084347000	08434700017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	84	304	445	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
THE WOODLANDS	H	SAN JACINTO	MONTGOMERY	088001000	08800100017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	2653	9514	13948	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
WILLIS	H	SAN JACINTO	MONTGOMERY	080655000	08065500017010	SAN JACINTO RIVER AUTHORITY	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H008	0	0	0	97	442	811	Y	TRA TO SJRA CONTRACT	SJRA to WUG Contract
MANUFACTURING	H	SAN JACINTO	HARRIS	081001101	08100110110110	CITY OF HOUSTON	WASTEWATER REUSE FOR INDUSTRY	H	SAN JACINTO	HARRIS	361010110	0	0	0	0	0	67200	Y	WASTEWATER REUSE FOR INDUSTRY	INDUSTRY
HARRIS COUNTY MUD #132	H	SAN JACINTO	HARRIS	084157000	08415700010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	421	1393	1909	2292	2667	3058	Y	WHCRWA GRP	WHCRWA GRP Participation
HARRIS COUNTY MUD #151	H	SAN JACINTO	HARRIS	084159000	08415900010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	306	811	932	925	925	925	Y	WHCRWA GRP	WHCRWA GRP Participation
HARRIS COUNTY MUD #152	H	SAN JACINTO	HARRIS	084160000	08416000010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	189	650	909	1112	1324	1536	Y	WHCRWA GRP	WHCRWA GRP Participation
HARRIS COUNTY MUD #180	H	SAN JACINTO	HARRIS	084170000	08417000010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	148	475	640	758	874	998	Y	WHCRWA GRP	WHCRWA GRP Participation
HARRIS COUNTY MUD #46	H	SAN JACINTO	HARRIS	084183000	08418300010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	201	526	598	593	593	593	Y	WHCRWA GRP	WHCRWA GRP Participation
KATY	H	SAN JACINTO	FORT BEND	080312000	08031200007910	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	FORT BEND	0791510	68	238	356	462	601	764	Y	WHCRWA GRP	WHCRWA GRP Participation
KATY	H	SAN JACINTO	HARRIS	080312000	08031200010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	756	2462	3347	3989	4619	5276	Y	WHCRWA GRP	WHCRWA GRP Participation
KATY	H	SAN JACINTO	WALLER	080312000	08031200023710	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	65	258	409	566	751	968	Y	WHCRWA GRP	WHCRWA GRP Participation
TRAIL OF THE LAKES MUD	H	SAN JACINTO	HARRIS	084355000	08435500010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	334	876	1005	986	986	986	Y	WHCRWA GRP	WHCRWA GRP Participation
WHCRWA	H	SAN JACINTO	FORT BEND	088002000	08800200007910	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	FORT BEND	0791510	-68	-238	-356	-462	-601	-764	Y	WHCRWA GRP	WHCRWA GRP Participation
WHCRWA	H	SAN JACINTO	HARRIS	088002000	08800200010110	WHCRWA	GULF COAST AQUIFER	H	SAN JACINTO	HARRIS	1011510	-2420	-7451	-9749	-11221	-12739	-14340	Y	WHCRWA GRP	WHCRWA GRP Participation

Region H
Table 4A-8: WUG-Level Contracts

Note- includes GRP/WRAP participation, reuse supplies with a listed WWP, expanded GW with a listed WWP, and interruptible irrigation supplies.

WWP	WWP ID	WUG	WUG Basin	WUG County	WUG ID	2010	2020	2030	2040	2050	2060
BAYTOWN AREA WATER AUTHORITY	15	HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	08419300010110	0	26	262	398	535	692
WWP Total						**0**	**26**	**262**	**398**	**535**	**692**
BRAZOS RIVER AUTHORITY	331	COUNTY-OTHER	SAN JACINTO	FORT BEND	08075707907910	0	23	61	471	1,532	2,737
BRAZOS RIVER AUTHORITY	331	COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	0	0	0	123	6,420	13,886
BRAZOS RIVER AUTHORITY	331	COUNTY-OTHER	BRAZOS	FORT BEND	08075707907912	0	0	426	3,883	11,715	21,156
BRAZOS RIVER AUTHORITY	331	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	0	0	0	1,615	4,484	8,140
BRAZOS RIVER AUTHORITY	331	MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	0	47,499	29,570	49,592	67,501	88,950
BRAZOS RIVER AUTHORITY	331	MANUFACTURING	SAN JACINTO	FORT BEND	08100107907910	0	623	1,292	1,354	1,396	1,297
BRAZOS RIVER AUTHORITY	331	MANUFACTURING	BRAZOS	FORT BEND	08100107907912	0	0	406	445	471	422
BRAZOS RIVER AUTHORITY	331	MINING	SAN JACINTO-BRAZOS	BRAZORIA	08100302002011	0	73	103	146	195	244
BRAZOS RIVER AUTHORITY	331	MINING	BRAZOS	BRAZORIA	08100302002012	0	119	136	154	171	187
BRAZOS RIVER AUTHORITY	331	MINING	BRAZOS-COLORADO	BRAZORIA	08100302002013	0	431	546	662	807	956
BRAZOS RIVER AUTHORITY	331	MINING	SAN JACINTO	FORT BEND	08100307907910	0	77	165	168	171	173
BRAZOS RIVER AUTHORITY	331	MINING	BRAZOS	FORT BEND	08100307907912	0	189	383	389	396	401
BRAZOS RIVER AUTHORITY	331	FAIRCHILDS	BRAZOS	FORT BEND	08101900007912	0	125	354	483	657	856
BRAZOS RIVER AUTHORITY	331	FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	08412200007911	0	0	1,025	1,769	2,775	3,924
BRAZOS RIVER AUTHORITY	331	FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	08412900007912	0	253	734	1,042	1,451	1,918
BRAZOS RIVER AUTHORITY	331	ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	08429400007911	0	4	10	12	14	17
WWP Total						**0**	**49,416**	**35,211**	**62,308**	**100,156**	**145,264**
BRAZOSPORT WATER AUTHORITY	2000	ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	08001800002011	137	98	103	112	160	231
BRAZOSPORT WATER AUTHORITY	2000	CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	08011800002011	0	0	24	42	84	144
BRAZOSPORT WATER AUTHORITY	2000	FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	08021700002011	0	95	263	439	670	950
BRAZOSPORT WATER AUTHORITY	2000	LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	08033800002011	744	708	830	1,049	1,349	1,703
BRAZOSPORT WATER AUTHORITY	2000	RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	08050100002011	36	33	36	42	56	76
BRAZOSPORT WATER AUTHORITY	2000	OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	08073000002011	25	31	42	57	76	100
BRAZOSPORT WATER AUTHORITY	2000	COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	08075702002011	4,730	3,837	4,313	5,198	6,108	7,327
BRAZOSPORT WATER AUTHORITY	2000	COUNTY-OTHER	BRAZOS	BRAZORIA	08075702002012	0	116	124	129	137	146
BRAZOSPORT WATER AUTHORITY	2000	COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	08075702002013	1,752	1,852	2,005	2,109	2,293	2,508
BRAZOSPORT WATER AUTHORITY	2000	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	0	844	4	6	0	0
BRAZOSPORT WATER AUTHORITY	2000	MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	326	252	130	124	0	0
WWP Total						**7,750**	**7,866**	**7,874**	**9,307**	**10,933**	**13,185**
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	MONT BELVIEU	TRINITY	CHAMBERS	08041300003608	0	677	824	955	1,090	1,230
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	08041300003609	0	268	335	396	462	532
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	OLD RIVER-WINFREE	TRINITY	CHAMBERS	08072700003608	0	178	189	198	211	225
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	COUNTY-OTHER	TRINITY	CHAMBERS	08075703603608	0	187	180	173	168	166
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	08075703603609	0	101	100	99	97	99
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	BEACH CITY	TRINITY	CHAMBERS	08082200003608	0	42	52	61	69	74
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	08082200003609	0	238	298	353	414	478
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	IRRIGATION	NECHES-TRINITY	CHAMBERS	08100403603607	0	0	0	0	0	0
CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	IRRIGATION	TRINITY	CHAMBERS	08100403603608	20,376	20,600	20,734	20,857	20,975	21,076
WWP Total						**20,376**	**22,291**	**22,712**	**23,092**	**23,486**	**23,880**
CHCRWA	999902	CHCRWA	SAN JACINTO	HARRIS	CHCRWA10110	0	1,771	2,414	2,431	2,431	2,431
WWP Total						**0**	**1,771**	**2,414**	**2,431**	**2,431**	**2,431**
CITY OF GALVESTON	316200	GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	08022700008411	0	7,262	7,262	7,262	7,262	7,262
WWP Total						**0**	**7,262**	**7,262**	**7,262**	**7,262**	**7,262**
CITY OF HOUSTON	396200	BELLAIRE	SAN JACINTO	HARRIS	08004600010110	1,440	1,631	1,823	2,100	2,351	2,646
CITY OF HOUSTON	396200	BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	08008500010110	478	469	460	455	448	448
CITY OF HOUSTON	396200	GALENA PARK	SAN JACINTO	HARRIS	08022600010110	22	25	33	40	71	115
CITY OF HOUSTON	396200	HEDWIG VILLAGE	SAN JACINTO	HARRIS	08026900010110	458	459	461	467	465	471
CITY OF HOUSTON	396200	HOUSTON	SAN JACINTO	FORT BEND	08028500007910	0	0	0	0	0	0
CITY OF HOUSTON	396200	HOUSTON	SAN JACINTO	HARRIS	08028500010110	0	0	0	0	0	12,101
CITY OF HOUSTON	396200	HOUSTON	SAN JACINTO-BRAZOS	HARRIS	08028500010111	0	0	0	0	0	319
CITY OF HOUSTON	396200	HOUSTON	SAN JACINTO	MONTGOMERY	08028500017010	0	62	173	305	481	689
CITY OF HOUSTON	396200	HUMBLE	SAN JACINTO	HARRIS	08028900010110	820	2,538	3,234	3,646	4,001	4,415
CITY OF HOUSTON	396200	HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	08029000010110	955	1,034	1,111	1,218	1,312	1,426
CITY OF HOUSTON	396200	JACINTO CITY	SAN JACINTO	HARRIS	08030100010110	0	0	0	0	27	108
CITY OF HOUSTON	396200	PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	08045700002011	0	0	201	294	325	0
CITY OF HOUSTON	396200	PEARLAND	SAN JACINTO-BRAZOS	HARRIS	08045700010111	0	0	0	0	4	0
CITY OF HOUSTON	396200	PINEY POINT VILLAGE	SAN JACINTO	HARRIS	08046800010110	697	731	763	810	850	902
CITY OF HOUSTON	396200	SOUTHSIDE PLACE	SAN JACINTO	HARRIS	08057200010110	0	3	23	45	72	100
CITY OF HOUSTON	396200	SPRING VALLEY	SAN JACINTO	HARRIS	08057500010110	213	585	699	732	759	797
CITY OF HOUSTON	396200	WALLER	SAN JACINTO	HARRIS	08062900010110	0	0	0	0	0	203
CITY OF HOUSTON	396200	WEST UNIVERSITY PL.	SAN JACINTO	HARRIS	08064300010110	231	359	499	648	819	1,015
CITY OF HOUSTON	396200	COUNTY-OTHER	SAN JACINTO	HARRIS	08075710110110	0	0	0	11,553	36,537	48,315
CITY OF HOUSTON	396200	COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	08075710110111	203	0	64	47	47	47
CITY OF HOUSTON	396200	MANUFACTURING	SAN JACINTO	HARRIS	08100110110110	0	0	0	0	0	0

Table 4A-8: WUG-Level Contracts

WWP	WWP ID	WUG	WUG Basin	WUG County	WUG ID	2010	2020	2030	2040	2050	2060
CITY OF HOUSTON	396200	MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	08100110110111	4,487	8,862	12,609	25,460	26,655	25,261
CITY OF HOUSTON	396200	STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	08100210110110	0	5,957	9,395	18,448	22,936	26,650
CITY OF HOUSTON	396200	STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	08100210110111	400	1,239	1,449	2,787	2,964	2,812
CITY OF HOUSTON	396200	MINING	SAN JACINTO	HARRIS	08100310110110	140	274	358	455	546	629
CITY OF HOUSTON	396200	MINING	SAN JACINTO-BRAZOS	HARRIS	08100310110111	3	5	7	9	10	12
CITY OF HOUSTON	396200	IRRIGATION	TRINITY	LIBERTY	08100414614608	0	0	0	0	0	0
CITY OF HOUSTON	396200	IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	08100414614609	6,657	6,697	6,732	6,767	6,805	5,742
CITY OF HOUSTON	396200	HILSHIRE VILLAGE	SAN JACINTO	HARRIS	08102500010110	0	5	21	19	19	19
CITY OF HOUSTON	396200	BLUE BELL MANOR UTILITY COMPAN	SAN JACINTO	HARRIS	08402600010110	140	363	413	407	402	402
CITY OF HOUSTON	396200	BRITMOORE UTILITIES	SAN JACINTO	HARRIS	08403600010110	115	354	466	546	615	691
CITY OF HOUSTON	396200	CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	08404300010110	110	342	454	536	605	684
CITY OF HOUSTON	396200	CHIMNEY HILL MUD	SAN JACINTO	HARRIS	08405300010110	0	0	37	31	120	118
CITY OF HOUSTON	396200	CONSUMERS WATER INC	SAN JACINTO	HARRIS	08407200010110	96	336	483	596	713	834
CITY OF HOUSTON	396200	CRYSTAL SPRNGS WATER COMPAN	SAN JACINTO	HARRIS	08408100010110	5	17	24	30	35	41
CITY OF HOUSTON	396200	EL DORADO UD	SAN JACINTO	HARRIS	08410100010110	130	325	403	440	481	526
CITY OF HOUSTON	396200	FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	08413200010110	83	250	326	372	414	465
CITY OF HOUSTON	396200	GREEN TRAILS MUD	SAN JACINTO	HARRIS	08414300010110	224	668	862	973	1,087	1,204
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	08415300010110	102	303	389	437	487	543
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #119 INWOOD	SAN JACINTO	HARRIS	08415400010110	211	588	665	652	644	644
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	08416100010110	295	1,069	1,559	1,961	2,373	2,782
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	08416200010110	163	532	721	860	995	1,141
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #158	SAN JACINTO	HARRIS	08416500010110	0	0	25	20	19	18
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	08417400010110	193	621	838	995	1,148	1,311
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	08417900010110	140	495	581	585	579	579
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	08418200010110	341	898	1,038	1,045	1,035	1,035
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	08418400010110	157	411	465	459	448	448
CITY OF HOUSTON	396200	HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	08418900010110	96	140	179	234	292	359
CITY OF HOUSTON	396200	HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	08419000010110	143	409	511	559	609	661
CITY OF HOUSTON	396200	HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	08419100010110	104	312	403	455	509	568
CITY OF HOUSTON	396200	HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	08419500010110	181	480	553	546	550	550
CITY OF HOUSTON	396200	HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	08419900010110	73	187	211	209	204	204
CITY OF HOUSTON	396200	LONGHORN TOWN UD	SAN JACINTO	HARRIS	08423500010110	167	574	857	1,105	1,351	1,597
CITY OF HOUSTON	396200	MASON CREEK UD	SAN JACINTO	HARRIS	08424700010110	566	1,487	1,696	1,682	1,674	1,674
CITY OF HOUSTON	396200	NORTH BELT UD	SAN JACINTO	HARRIS	08427500010110	112	384	541	666	796	926
CITY OF HOUSTON	396200	NORTH GREEN MUD	SAN JACINTO	HARRIS	08427900010110	84	242	300	321	345	372
CITY OF HOUSTON	396200	NORTHWEST PARK MUD	SAN JACINTO	HARRIS	08428700010110	662	2,179	2,525	2,474	2,450	2,450
CITY OF HOUSTON	396200	PARKWAY UD	SAN JACINTO	HARRIS	08429800010110	225	221	214	210	205	207
CITY OF HOUSTON	396200	SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	08434300010110	171	509	653	736	811	903
CITY OF HOUSTON	396200	SUNBELT FWSD	SAN JACINTO	HARRIS	08435000010110	576	2,842	3,877	4,571	5,251	5,967
CITY OF HOUSTON	396200	WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	08438700010110	135	360	416	406	401	401
CITY OF HOUSTON	396200	WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	08439800010110	159	417	474	470	459	459
CITY OF HOUSTON	396200	WINDFERN FOREST UD	SAN JACINTO	HARRIS	08440100010110	126	591	681	680	673	673
CITY OF HOUSTON	396200	WOODCREEK MUD	SAN JACINTO	HARRIS	08440400010110	150	521	739	913	1,092	1,271
CITY OF HOUSTON	396200	ROLLING FORK PUD	SAN JACINTO	HARRIS	08441100010110	173	470	560	589	610	641
WWP Total						**23,612**	**50,832**	**65,254**	**104,076**	**138,986**	**168,591**
CITY OF PASADENA	651900	PASADENA	SAN JACINTO-BRAZOS	HARRIS	08045600010111	0	40	77	77	77	77
CITY OF PASADENA	651900	EL LAGO	SAN JACINTO-BRAZOS	HARRIS	08069500010111	248	270	283	294	298	309
CITY OF PASADENA	651900	HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	08419800010110	508	557	600	659	709	772
CITY OF PASADENA	651900	SEABROOK	SAN JACINTO-BRAZOS	HARRIS	08054500010111	1,109	1,451	1,782	2,200	2,572	2,987
WWP Total						**1,865**	**2,318**	**2,742**	**3,230**	**3,656**	**4,145**
FORT BEND CO. WCID 1	380	MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	08100107907911	0	148	824	940	1,016	1,016
WWP Total						**0**	**148**	**824**	**940**	**1,016**	**1,016**
FORT BEND COUNTY WCID #2	821000	MEADOWS	SAN JACINTO	FORT BEND	08079200007910	0	447	993	993	993	993
FORT BEND COUNTY WCID #2	821000	MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	08079200007911	0	44	99	99	99	99
WWP Total						**0**	**491**	**1,092**	**1,092**	**1,092**	**1,092**
GALVESTON COUNTY WCID #1	316325	DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	08016500008411	0	799	959	990	1,025	1,064
WWP Total						**0**	**799**	**959**	**990**	**1,025**	**1,064**
GULF COAST WATER AUTHORITY	325	ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	08001300002011	0	0	99	208	383	595
GULF COAST WATER AUTHORITY	325	HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	08027900008411	0	182	182	182	182	182
GULF COAST WATER AUTHORITY	325	KEMAH	SAN JACINTO-BRAZOS	GALVESTON	08031600008411	0	208	230	237	241	247
GULF COAST WATER AUTHORITY	325	LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	08035000008411	0	3,485	3,837	3,909	3,993	4,093
GULF COAST WATER AUTHORITY	325	LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	08035000010111	0	15	15	15	16	16
GULF COAST WATER AUTHORITY	325	PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	08045700002011	0	0	539	2,068	4,109	6,783
GULF COAST WATER AUTHORITY	325	PEARLAND	SAN JACINTO-BRAZOS	HARRIS	08045700010111	0	0	0	0	47	130
GULF COAST WATER AUTHORITY	325	TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	08060200008411	0	10,085	10,085	10,085	10,085	10,085
GULF COAST WATER AUTHORITY	325	MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	08072100002011	0	49	44	45	48	51
GULF COAST WATER AUTHORITY	325	COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	0	0	0	1,950	1,950	1,950
GULF COAST WATER AUTHORITY	325	COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	08075708408411	0	2,659	2,659	2,659	2,659	2,659
GULF COAST WATER AUTHORITY	325	CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	08076400008411	0	87	89	89	89	89
GULF COAST WATER AUTHORITY	325	TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	08097300008411	0	630	630	630	630	630

Region H
Table 4A-8: WUG-Level Contracts

WWP	WWP ID	WUG	WUG Basin	WUG County	WUG ID	2010	2020	2030	2040	2050	2060
GULF COAST WATER AUTHORITY	325	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	0	0	1,580	1,580	1,580	1,580
GULF COAST WATER AUTHORITY	325	MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	13,694	13,694	51,614	51,614	51,614	51,614
GULF COAST WATER AUTHORITY	325	STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	08100208408411	0	1,381	1,992	2,819	3,828	5,057
GULF COAST WATER AUTHORITY	325	MINING	SAN JACINTO-BRAZOS	FORT BEND	08100307907911	0	86	703	717	729	739
GULF COAST WATER AUTHORITY	325	MINING	SAN JACINTO-BRAZOS	GALVESTON	08100308408411	0	21	24	28	31	34
GULF COAST WATER AUTHORITY	325	IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	08100402002011	82,741	71,681	62,691	62,777	62,970	64,614
GULF COAST WATER AUTHORITY	325	IRRIGATION	BRAZOS	BRAZORIA	08100402002012	1,754	1,384	1,243	1,157	1,157	1,157
GULF COAST WATER AUTHORITY	325	IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	08100408408411	6,788	6,788	6,788	6,788	6,788	6,788
GULF COAST WATER AUTHORITY	325	BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	08401200008411	0	630	630	630	630	630
GULF COAST WATER AUTHORITY	325	GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	08413600008411	0	2,287	2,287	2,287	2,287	2,287
GULF COAST WATER AUTHORITY	325	SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	08432900008411	0	1,260	1,260	1,260	1,260	1,260
WWP Total						**104,977**	**116,612**	**149,221**	**153,734**	**157,306**	**163,270**
LOWER NECHES VALLEY AUTHORITY	140	MINING	NECHES-TRINITY	GALVESTON	08100308408407	16	23	26	29	33	37
WWP Total						**16**	**23**	**26**	**29**	**33**	**37**
MISSOURI CITY	999903	MISSOURI CITY	SAN JACINTO	FORT BEND	08040900007910	0	715	1,195	1,794	1,794	2,517
MISSOURI CITY	999903	MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	08040900007911	0	2,595	5,342	8,051	7,983	11,503
MISSOURI CITY	999903	MISSOURI CITY	BRAZOS	FORT BEND	08040900007912	0	508	665	822	890	905
MISSOURI CITY	999903	MISSOURI CITY	SAN JACINTO	HARRIS	08040900010110	0	386	454	707	707	862
MISSOURI CITY	999903	COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	0	26	85	594	778	829
MISSOURI CITY	999903	COUNTY-OTHER	BRAZOS	FORT BEND	08075707907912	0	172	859	929	946	959
MISSOURI CITY	999903	FIRST COLONY MUD #9	BRAZOS	FORT BEND	08411300007912	0	342	793	831	879	926
MISSOURI CITY	999903	FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	08412100007911	0	464	1,069	1,069	1,070	1,070
MISSOURI CITY	999903	SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	08433400007911	0	292	655	651	651	651
WWP Total						**0**	**5,500**	**11,117**	**15,448**	**15,698**	**20,222**
NFBWA	999901	FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	08086900007911	0	0	0	0	45	112
NFBWA	999901	FULSHEAR	BRAZOS	FORT BEND	08086900007912	0	0	0	0	76	178
NFBWA	999901	ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	08099800007911	0	106	258	295	345	397
NFBWA	999901	NFBWA	SAN JACINTO	FORT BEND	NFBWA07910	0	0	7,700	11,775	13,327	13,887
NFBWA	999901	NFBWA	SAN JACINTO-BRAZOS	FORT BEND	NFBWA07911	0	6,334	12,704	22,026	29,994	37,709
NFBWA	999901	NFBWA	BRAZOS	FORT BEND	NFBWA07912	0	150	892	1,905	3,313	5,103
NFBWA	999901	NFBWA	SAN JACINTO	HARRIS	NFBWA10110	0	444	732	865	926	939
WWP Total						**0**	**7,034**	**22,286**	**36,866**	**48,026**	**58,325**
NHCRWA	999904	TOMBALL	SAN JACINTO	HARRIS	08060800010110	620	2,102	2,830	3,760	4,441	5,442
NHCRWA	999904	JERSEY VILLAGE	SAN JACINTO	HARRIS	08070900010110	0	364	767	1,043	1,315	1,600
NHCRWA	999904	NORTHWEST HARRIS COUNTY MUD	SAN JACINTO	HARRIS	08428600010110	141	467	646	770	908	1,046
NHCRWA	999904	NHCRWA	SAN JACINTO	HARRIS	08800000010110	0	53,520	80,393	87,241	90,563	94,527
WWP Total						**761**	**56,453**	**84,636**	**92,814**	**97,227**	**102,615**
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	08414900010110	25	14	4	3	3	3
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	08415000010110	363	266	250	213	211	211
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	08415100010110	103	145	184	236	281	334
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	08418600010110	587	920	1,231	1,652	2,029	2,454
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	08419600010110	272	313	349	389	443	513
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	08419700010110	190	268	338	438	540	660
NORTH CHANNEL WATER AUTHORITY	607473	HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	08420000010110	199	200	201	201	206	216
NORTH CHANNEL WATER AUTHORITY	607473	PINE TRAILS UTILITY	SAN JACINTO	HARRIS	08430200010110	215	266	312	379	444	521
WWP Total						**1,954**	**2,392**	**2,869**	**3,511**	**4,157**	**4,912**
NRG	398300	STEAM ELECTRIC POWER	BRAZOS	FORT BEND	08100207907912	0	0	0	0	0	8,500
WWP Total						**0**	**0**	**0**	**0**	**0**	**8,500**
RICHMOND-ROSENBERG	999905	RICHMOND	BRAZOS	FORT BEND	08050000007912	0	0	0	0	0	248
RICHMOND-ROSENBERG	999905	ROSENBERG	BRAZOS	FORT BEND	08051800007912	0	0	0	1,091	3,060	5,397
WWP Total						**0**	**0**	**0**	**1,091**	**3,060**	**5,645**
SAN JACINTO RIVER AUTHORITY	240	CONROE	SAN JACINTO	MONTGOMERY	08013000017010	0	5,256	8,550	8,377	14,027	20,630
SAN JACINTO RIVER AUTHORITY	240	WILLIS	SAN JACINTO	MONTGOMERY	08065500017010	0	236	380	377	635	941
SAN JACINTO RIVER AUTHORITY	240	OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	08072600017010	0	272	418	392	637	911
SAN JACINTO RIVER AUTHORITY	240	PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	08073200017010	0	251	334	277	384	475
SAN JACINTO RIVER AUTHORITY	240	PATTON VILLAGE	SAN JACINTO	MONTGOMERY	08073400017010	0	32	47	64	84	113
SAN JACINTO RIVER AUTHORITY	240	SHENANDOAH	SAN JACINTO	MONTGOMERY	08074500017010	0	737	1,098	1,002	1,570	2,200
SAN JACINTO RIVER AUTHORITY	240	COUNTY-OTHER	SAN JACINTO	HARRIS	08075710110110	0	0	5,299	19,014	16,041	17,533
SAN JACINTO RIVER AUTHORITY	240	COUNTY-OTHER	SAN JACINTO	MONTGOMERY	08075717017010	0	10,308	16,497	23,807	34,448	48,756
SAN JACINTO RIVER AUTHORITY	240	ROMAN FOREST	SAN JACINTO	MONTGOMERY	08080100017010	0	306	561	860	1,283	1,809
SAN JACINTO RIVER AUTHORITY	240	WOODBRANCH	SAN JACINTO	MONTGOMERY	08080700017010	0	74	107	138	177	225
SAN JACINTO RIVER AUTHORITY	240	CUT AND SHOOT	SAN JACINTO	MONTGOMERY	08085400017010	0	86	134	130	212	309
SAN JACINTO RIVER AUTHORITY	240	MAGNOLIA	SAN JACINTO	MONTGOMERY	08090700017010	0	221	380	561	812	1,118
SAN JACINTO RIVER AUTHORITY	240	SPLENDORA	SAN JACINTO	MONTGOMERY	08096200017010	0	83	141	212	313	435
SAN JACINTO RIVER AUTHORITY	240	MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	08100110110109	23,008	27,754	31,791	35,763	38,736	37,244
SAN JACINTO RIVER AUTHORITY	240	MANUFACTURING	SAN JACINTO	MONTGOMERY	08100117017010	0	988	1,384	1,756	2,129	2,504
SAN JACINTO RIVER AUTHORITY	240	STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	08100217017010	0	0	0	0	1,593	4,307

Region H
Table 4A-8: WUG-Level Contracts

WWP	WWP ID	WUG	WUG Basin	WUG County	WUG ID	2010	2020	2030	2040	2050	2060
SAN JACINTO RIVER AUTHORITY	240	MINING	SAN JACINTO	MONTGOMERY	08100317017010	0	216	279	331	382	425
SAN JACINTO RIVER AUTHORITY	240	CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	08407200017010	0	89	143	204	291	395
SAN JACINTO RIVER AUTHORITY	240	CRYSTAL SPRNGS WATER COMPAN	SAN JACINTO	MONTGOMERY	08408100017010	0	257	439	663	982	1,371
SAN JACINTO RIVER AUTHORITY	240	EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	08409800017010	0	203	344	354	613	923
SAN JACINTO RIVER AUTHORITY	240	H M W SUD	SAN JACINTO	MONTGOMERY	08414700017010	0	672	1,055	1,011	1,670	2,425
SAN JACINTO RIVER AUTHORITY	240	HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	08418500010110	0	0	0	0	28	72
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY MUD #18	SAN JACINTO	MONTGOMERY	08426100017010	0	865	1,655	1,788	3,251	5,046
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	08426200017010	0	167	211	165	220	260
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	08426300017010	0	399	624	720	861	964
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	08426400017010	0	395	650	790	951	1,075
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	08426500017010	0	203	259	298	337	369
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	08426600017010	0	184	264	233	358	493
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	08426700017010	0	353	452	351	467	554
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	08426800017010	0	189	272	358	470	600
SAN JACINTO RIVER AUTHORITY	240	NEW CANEY MUD	SAN JACINTO	MONTGOMERY	08427200017010	0	546	944	1,396	2,058	2,854
SAN JACINTO RIVER AUTHORITY	240	POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	08430500017010	0	331	613	966	1,472	2,091
SAN JACINTO RIVER AUTHORITY	240	PORTER WSC	SAN JACINTO	MONTGOMERY	08430700017010	0	777	1,260	1,826	2,047	2,239
SAN JACINTO RIVER AUTHORITY	240	RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	08431200017010	0	826	1,050	831	1,110	1,316
SAN JACINTO RIVER AUTHORITY	240	RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	08432200017010	0	0	0	76	272	398
SAN JACINTO RIVER AUTHORITY	240	SOUTHERN MONTGOMERY COUNTY	SAN JACINTO	MONTGOMERY	08433900017010	0	866	1,118	911	1,231	1,493
SAN JACINTO RIVER AUTHORITY	240	SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	08434300017010	0	102	166	237	336	457
SAN JACINTO RIVER AUTHORITY	240	SPRING CREEK UD	SAN JACINTO	MONTGOMERY	08434400017010	0	224	372	377	653	982
SAN JACINTO RIVER AUTHORITY	240	STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	08434700017010	0	329	423	329	439	521
SAN JACINTO RIVER AUTHORITY	240	THE WOODLANDS	SAN JACINTO	MONTGOMERY	08800100017010	0	13,616	14,985	10,275	13,658	16,196
SAN JACINTO RIVER AUTHORITY	240	MONTGOMERY	SAN JACINTO	MONTGOMERY	MONTGOMERY17C	0	374	710	1,087	1,199	1,701
SAN JACINTO RIVER AUTHORITY	240	STAGECOACH	SAN JACINTO	MONTGOMERY	STAGECOACH170:	0	39	68	107	165	249
WWP Total						**23,008**	**68,826**	**95,477**	**118,414**	**148,602**	**184,979**
SUGAR LAND	999906	SUGAR LAND	SAN JACINTO	FORT BEND	08058500007910	0	0	35	35	35	35
SUGAR LAND	999906	SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	08058500007911	0	0	440	404	404	1,304
SUGAR LAND	999906	SUGAR LAND	BRAZOS	FORT BEND	08058500007912	0	155	3,496	3,267	3,508	3,719
SUGAR LAND	999906	COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	0	29	60	536	814	814
SUGAR LAND	999906	COUNTY-OTHER	BRAZOS	FORT BEND	08075707907912	0	102	919	1,293	1,291	1,183
SUGAR LAND	999906	FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	08411700007912	0	235	523	521	521	521
SUGAR LAND	999906	FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	08411800007912	0	141	312	312	312	312
SUGAR LAND	999906	FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	08411900007912	0	250	524	519	468	446
SUGAR LAND	999906	FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	08412600007912	0	266	556	549	495	472
SUGAR LAND	999906	FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	08412700007912	0	194	398	404	364	347
SUGAR LAND	999906	FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	08412800007912	0	157	311	323	292	278
SUGAR LAND	999906	PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	08430300007911	0	133	294	288	286	286
WWP Total						**0**	**1,662**	**7,868**	**8,451**	**8,790**	**9,717**
THE DOW CHEMICAL CO.	237200	MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	0	2,752	2,752	2,752	2,752	2,752
THE DOW CHEMICAL CO.	237200	MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	0	19,048	19,048	19,048	19,048	19,048
WWP Total						**0**	**21,800**	**21,800**	**21,800**	**21,800**	**21,800**
TRINITY RIVER AUTHORITY	187	IRRIGATION	NECHES-TRINITY	LIBERTY	08100414614607	0	0	0	0	0	0
TRINITY RIVER AUTHORITY	187	IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	08100414614609	0	0	0	0	0	1,091
TRINITY RIVER AUTHORITY	187	MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	08100103603609	8,264	9,230	10,252	11,284	12,240	13,445
TRINITY RIVER AUTHORITY	187	MINING	TRINITY	CHAMBERS	08100303603608	4,344	6,494	7,816	9,116	10,411	11,550
TRINITY RIVER AUTHORITY	187	MINING	TRINITY-SAN JACINTO	CHAMBERS	08100303603609	1,215	1,359	1,904	2,488	3,081	3,677
WWP Total						**13,823**	**17,083**	**19,972**	**22,888**	**25,732**	**29,763**
WHCRWA	999907	KATY	SAN JACINTO	FORT BEND	08031200007910	68	238	356	462	601	764
WHCRWA	999907	KATY	SAN JACINTO	HARRIS	08031200010110	756	2,462	3,347	3,989	4,619	5,276
WHCRWA	999907	KATY	SAN JACINTO	WALLER	08031200023710	65	258	409	566	751	968
WHCRWA	999907	HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	08415700010110	421	1,393	1,909	2,292	2,667	3,058
WHCRWA	999907	HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	08415900010110	306	811	932	925	925	925
WHCRWA	999907	HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	08416000010110	189	650	909	1,112	1,324	1,536
WHCRWA	999907	HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	08417000010110	148	475	640	758	874	998
WHCRWA	999907	HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	08418300010110	201	526	598	593	593	593
WHCRWA	999907	TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	08435500010110	334	876	1,005	986	986	986
WHCRWA	999907	WHCRWA	SAN JACINTO	FORT BEND	08800200007910	0	0	1,445	2,010	2,490	2,983
WHCRWA	999907	WHCRWA	SAN JACINTO	HARRIS	08800200010110	0	24,167	35,508	40,356	41,271	42,001
WWP Total						**2,488**	**31,856**	**47,058**	**54,049**	**57,101**	**60,088**

Notes:
Table includes summation of all WMS supplies provided by a WWP to a WUG. In cases where a WUG is also a WWP, supply volumes for the WWP and WUG are still listed in the contracts table for consistency

Appendix 4B

Water Management Strategy
Technical Memoranda

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REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Industrial Conservation

DATE: October 21, 2009

SUMMARY

STRATEGY DESCRIPTION: Address Industrial shortages (manufacturing, mining, and steam-electric power) in Brazoria, Chambers, Fort Bend, Harris, Montgomery, and Walker Counties through industrial conservation measures. Conservation measures will reduce water shortages through reduction of projected demands.

SUPPLY QUANTITY: Unknown

SUPPLY SOURCE: Savings from groundwater, Brazos River, San Bernard River, San Jacinto-Brazos Run-of-River, San Jacinto River, Trinity River, Lake Conroe, Lake Houston, and Lake Livingston water demand reductions

IMPLEMENTATION DECADE: Brazoria County - 2010
Chambers County - 2010
Fort Bend County - 2020
Harris County - 2010
Montgomery County - 2010

TOTAL STRATEGY COST: Unknown

UNIT WATER COST: Unknown

Water Management Strategy Analysis Description

INTRODUCTION

There are 6 counties in Region H with projected manufacturing shortfalls within the next sixty years: Brazoria, Chambers, Fort Bend, Harris, Montgomery, and Walker Counties. As part of the regional water planning process, all identified water user group (WUG) shortages must have strategies developed to meet the water supply shortages. Furthermore, conservation is required by the Texas Water Development Board (TWDB) to be considered for all WUGs identified with shortages and should conservation not be chosen as a management strategy, there should be discussion of the reasoning in the text of Report Chapter 4.

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 group of volunteers 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 strategy. Industrial water conservation BMPs, 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

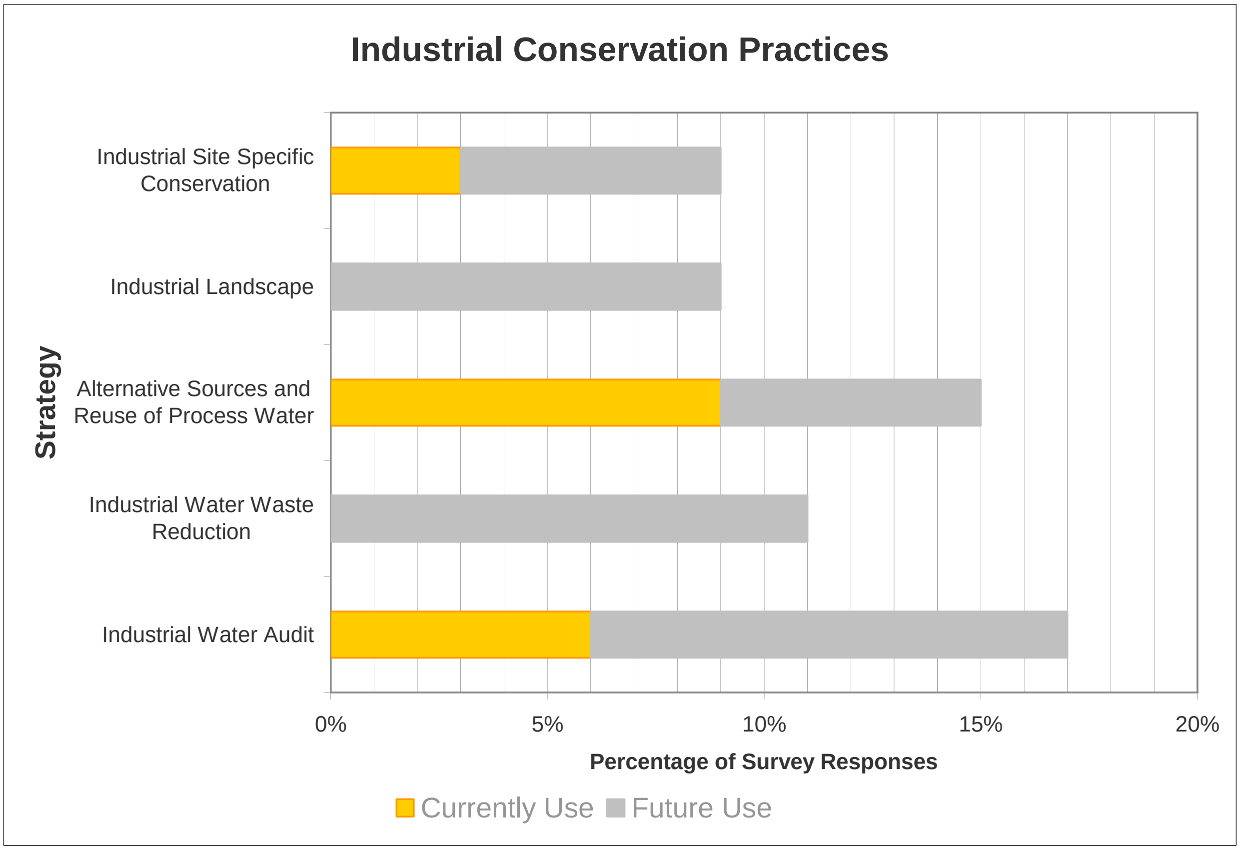
ANALYSIS

The application of the above BMPs to industrial water demands requires site-specific knowledge (i.e., processes used, equipment types, etc.) for the various industrial users in Region H. Currently, all industrial water users are grouped together to form a total "manufacturing" water user group for each county. Therefore, the use of the above BMPs to accurately estimate projected savings and costs for industrial conservation is not currently feasible. Region H is however considering an industrial reuse strategy to meet industrial water shortages in Harris and Galveston Counties. This strategy has been in development for several years for Harris County and is being sponsored by the City of Houston and the individual industrial users represented for this strategy. An industrial resue strategy is also being considered to meet industrial demands in Galveston County and is being sponsored by the Gulf Coast Water Authority (GCWA). Much technical information (i.e., specific water needs for specific processes, water quality requirements, demand patterns, etc.) has been assessed and developed for this strategy. However, this reuse strategy is location and industry specific and therefore not feasible to consider for all industrial demand shortages for the region.

A survey requesting information regarding water conservation was mailed to water utilities and Wholesale Water Providers (WWPs) in Region H to assess current levels of conservation for the 2011 Region H Water Plan. The survey responses indicated that currently, few industrial conservation practices have been implemented but have been considered for future implementation.

Not enough information is currently available on specific industrial processes within the Region to provide meaningful estimates of industrial conservation savings and to develop a conservation strategy that can be applied to manufacturing, mining, and steam-electric power demands across Region H. As industrial conservation strategies are developed in the region and the technical information becomes available, Region H can amend the Regional Water Plan to incorporate these future strategies. The exception to this lack of information is a single manufacturing facility in the Fort Bend County, which intends to meet groundwater reduction plan requirements largely through conservation strategies.

Figure 1 – Potential Industrial Conservation Strategies



WATER USER GROUP APPLICATION

In Brazoria, Chambers, Harris, and Montgomery Counties starting in the year 2010 and Fort Bend County starting in the year 2020.

ISSUES AND CONSIDERATIONS

In summary, the regional water planning group consultants recommend that the planning group not consider industrial conservation as a management strategy unless specific conservation projects (i.e., City of Houston Industrial Reuse Project) are known to exist at the time of plan preparation. The following additional reasons are provided for not considering conservation on a planning level for industrial water users:

- Various types of manufacturing currently exist within Region H and the location and types of specific operations are currently not known.
- The actual water usage required for specific manufacturing processes is not known.
- Very little guidance on implementation costs for specific conservation measures is available.
- Conservation is currently being practiced by manufacturers, in the form of reuse water in plant processes, due to the high cost of treatment for discharge.
- Industrial conservation may take place as the market dictates. Private entities will initiate conservation measures to save on water usage and/or disposal costs as new technologies/processes are developed and if these measures increase overall profits.

- Private manufacturing does not normally seek state funds/grants and therefore will not have the same impetus to develop conservation as municipal sector.

As industrial conservation strategies are developed in the region and the technical information becomes available, Region H can amend the Regional Water Plan to incorporate these future strategies. Although there are no quantifiable negative environmental impacts, it is difficult to estimate the potential beneficial environmental impacts.

REFERENCES

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

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: IRRIGATION CONSERVATION

DATE: October 21, 2009

SUMMARY

STRATEGY DESCRIPTION: Address Irrigation shortages in Brazoria, Chambers, Galveston, Liberty, and Waller Counties through irrigation conservation measures. Although Fort Bend County does not have predicted irrigation shortages, it was assumed that irrigation conservation could potentially occur in order to meet other predicted water use shortages. Conservation measures will reduce water shortages through reduction of projected demands.

SUPPLY QUANTITY: Demand reductions of	18,792 AFY in Brazoria County
	24,018 AFY in Chambers County
	5,197 AFY in Fort Bend County
	2,392 AFY in Galveston County
	20,876 AFY in Liberty County
	6,606 AFY in Waller County

SUPPLY SOURCE: Savings from groundwater, Brazos River, San Jacinto-Brazos Run-of-River, Neches-Trinity Run-of-River, Trinity River, Sam Rayburn Reservoir, and Lake Livingston water demand reductions

IMPLEMENTATION DECADE:	Brazoria County – 2010
	Chambers County – 2010
	Fort Bend County – 2010
	Galveston County – 2010
	Liberty County – 2010
	Waller County – 2050

TOTAL STRATEGY COST:	$1,850,200 annual cost, on-farm methods in Brazoria County
(Costs rounded to nearest $100)	$198,200 capital cost, canal lining in Brazoria County
	$2,336,300 annual cost, on-farm methods in Chambers County
	$279,200 capital cost, canal lining in Chambers County
	$509,900 annual cost, on-farm methods in Fort Bend County
	$56,500 capital cost, canal lining in Fort Bend County
	$231,100 annual cost, on-farm methods in Galveston County
	$29,400 capital cost, canal lining in Galveston County

$2,089,800 annual cost, on-farm methods in Liberty County
$188,700 capital cost, canal lining in Liberty County
$726,700 annual cost, on-farm methods in Waller County

UNIT WATER COST: $99 per acre-foot of savings in Brazoria County
$98 per acre-foot of savings in Chambers County
$99 per acre-foot of savings in Fort Bend County
$98 per acre-foot of savings in Galveston County
$100 per acre-foot of savings in Liberty County
$110 per acre-foot of savings in Waller County

Water Management Strategy Analysis Description

INTRODUCTION

There are 6 counties in Region H with projected non-municipal irrigation WUG shortfalls within the next sixty years: Brazoria, Chambers, Galveston, Liberty, San Jacinto, and Waller Counties. All of these counties except San Jacinto County predominantly grow rice, which requires considerably more water than many other crops and is addressed in more detail within this strategy. San Jacinto County agricultural activities are mainly in the production of timber products, poultry, and livestock. The Trinity River Authority currently has the capability to expand existing contracts to meet the limited irrigation demands within that county. Fort Bend County does not have predicted irrigation shortages through the planning period, but other water user groups within the county will experience shortfalls in water supply. This technical memorandum assumes that irrigation conservation will occur in Fort Bend County for the surface water supply portion of irrigation usage and the estimated savings could potentially be available for use by other water user groups. Therefore, this strategy focuses exclusively on the reduction of rice irrigation demand through conservation.

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 strategy.

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.

The conservation methods proposed in the Texas A&M report were evaluated for use in Brazoria, Chambers, Fort Bend, Galveston, Liberty, and Waller Counties.

ANALYSIS

Both on-farm and off-farm conservation measures for agricultural irrigation are outlined in the TWDB Report 362 and listed below. On-farm conservation measures include, but are not limited to:

- Irrigation Scheduling
- Volumetric Measurement of Irrigation Water use
- Crop Residue Management and Conservation Tillage
- On-Farm Irrigation Audit
- Furrow Dikes
- Land Leveling
- Contour Farming
- Conversion of Supplement Irrigated Farmland to Dry-land Farmland
- Brush Control/Management
- Lining of On-farm Irrigation Ditches
- Replacement of On-farm Irrigation Ditches with Pipelines
- Low Pressure Center Pivot Sprinkler Irrigation Systems
- Drip/Micro-Irrigation System
- Gated and Flexible Pipe for Field Water Distribution Systems
- Surge Flow Irrigation for Field Water Distribution Systems
- Linear Move Sprinkler Irrigation Systems

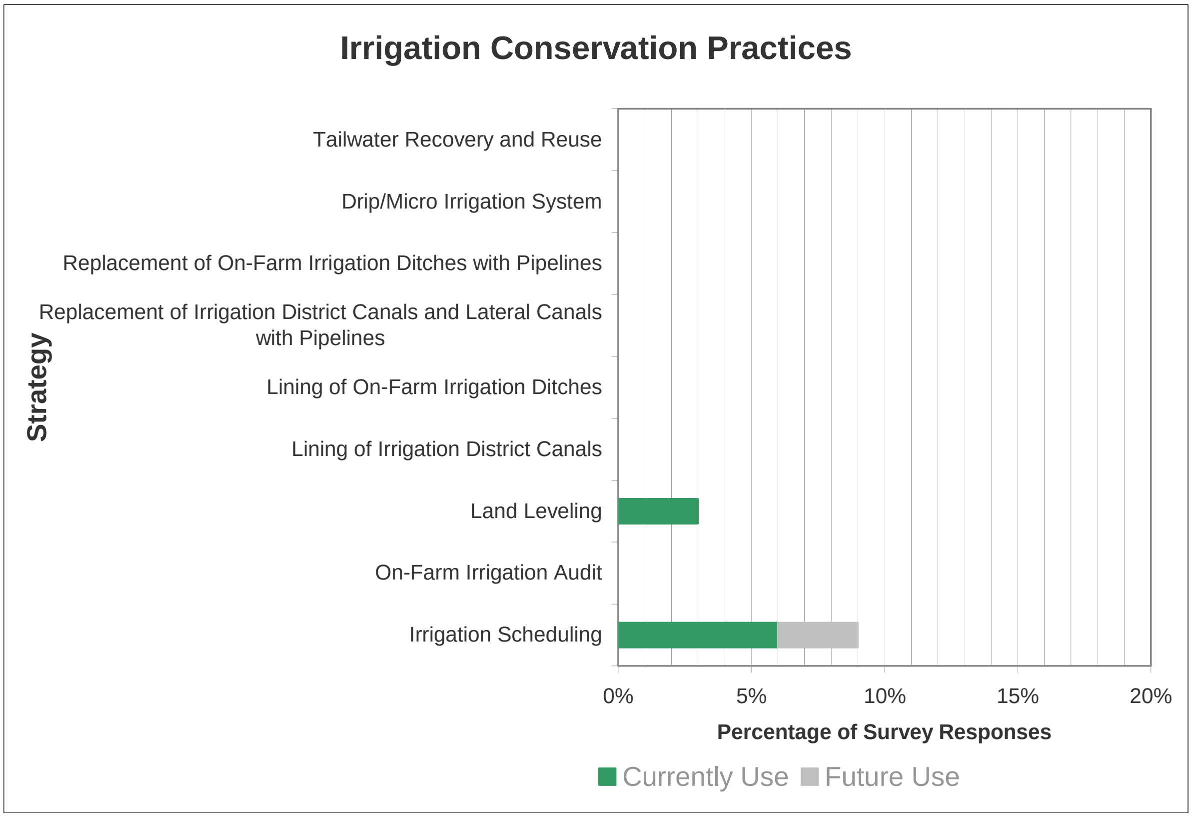
On-farm conservation was evaluated for all acreage planted in rice. The acreage is based on amounts documented in "Texas Rice Acreage" published by the U. S. Department of Agriculture Statistics Service. On-farm conservation was focused on rice production and therefore conservation measures used to develop savings estimates are specific to the rice industry. Due to local experience and realized savings estimates, the TAMU report was utilized to develop costs and savings for on-farm conservation. The conservation practice modeled was multiple irrigation inlets combined with land leveling. The potential annual irrigation savings associated with multiple irrigation inlets and land leveling are 0.750 acre-feet per acre and 0.583 acre-feet per acre, respectively. This method produces an on-farm conservation savings rate of 1.4 acre-feet per irrigated acre. The TAMU report assumes that on-farm conservation can be applied to 70% of the irrigated acreage. Use of these conservation measures is estimated to cost approximately $110 per acre-foot. The potential water savings are shown in Table 1.

The TWDB Report 362 also outlines various off-farm conservation BMPs as listed below:

- Lining of District Canals
- Replacement of Irrigation District Canals and Lateral Canals with Pipelines

A survey requesting information regarding water conservation was mailed to water utilities and Wholesale Water Providers (WWPs) in Region H to assess current levels of conservation for the 2011 Region H Water Plan. Of the 35 survey responses returned only one detailed the use of conservation practices for agriculture. The results of the survey are shown in Figure 1. The figure shows that approximately 6% of the WUGs that returned the surveys currently utilize irrigation scheduling as a method of conservation. This result is inflated due to the use of irrigation scheduling for non agricultural uses such as golf course and landscape irrigation.

Figure 1 – Potential Irrigation Conservation Strategies



Off-farm conservation is applied to all acreage irrigated with surface water. This acreage was determined using TWDB Water Use Survey information. This method was not applied to Waller County, where only groundwater is used. The TWDB report was supplemented with costs and savings identified in the TAMU report specific for Region H. The TAMU report estimates canal lining conservation savings as 38 acre-feet per canal mile. A ratio of 16.5 feet of irrigation canal per acre of irrigated land is used to calculate canal lengths. Partial canal lining using a 45 mil EPDM (synthetic rubber membrane) is selected from the TAMU report based upon the projected cost of $2916 per canal-mile, or $7 per acre-foot of savings. The potential water savings for Brazoria, Chambers, Fort Bend, Galveston, and Liberty Counties are shown in Table 2.

The average cost of water saved through on-farm conservation is $110 per acre-foot. The average cost of water saved through canal lining is $8.25 per acre-foot. Because the ratio of on-farm to off-farm conservation varies by county, the average cost of water is also unique to each county. Brazoria County averages $99 per acre-foot, Chambers County averages $98 per acre-foot, Fort Bend County averages $99 per acre-foot, Galveston County averages $98 per acre-foot, Liberty County averages $100 per acre-foot and Waller County averages $110 per acre-foot.

WATER USER GROUP APPLICATION

In Brazoria, Chambers, Fort Bend, Galveston, and Liberty Counties, both methods of conservation are recommended for implementation, starting in the year 2000. Additional irrigation WUG shortages will continue even in those counties with existing irrigation shortages after application of both on-farm and off-farm conservation practices, although conservation will delay further irrigation shortages in Liberty County until year 2030.

Irrigation conservation will be applied to the portion of Fort Bend County which receives surface water for irrigation. Due to Fort Bend Subsidence District Regulations, groundwater that potentially could be conserved due to the BMPs identified within this memorandum is not available for other water user groups within the county to utilize; therefore no incentive exists for funding the conservation efforts.

Groundwater conservation savings were not included in this technical memorandum for Fort Bend County.

In Waller County, rice irrigation conservation is recommended for implementation beginning in the 2050-decade. Eastern Waller County, which draws water from the Gulf Coast Aquifer, has the potential to reduce irrigation demand with on-farm conservation and offset the projected shortages through year 2060.

The projected irrigation demand, supply and conservation savings for these counties are shown in Table 3.

ISSUES AND CONSIDERATIONS

In those counties served by wholesale water providers with surplus supplies, irrigation contracts potentially could be expanded to aid in meeting the projected shortages. The current costs of contract irrigation water from various wholesale water providers are approximately $77 per acre-foot from Chocolate Bayou Water Company, $39.75 per acre-foot from Brazos River Authority, $87 per acre-foot from Gulf Coast Water Authority, and $85 per acre-foot from Chambers-Liberty Counties Navigation District. The cost per acre-foot of water saved due to irrigation conservation is similar to the cost of contracting additional irrigation water from the above wholesale water providers and therefore it currently appears that minimal motivation exists for implementing extensive irrigation conservation measures. However, as contract water supplies become more scarce and expensive to acquire, irrigation conservation may become more cost effective.

Interruptible supplies, where available, could potentially be a cost-effective strategy to meet irrigation demands in counties where shortages occur. In Waller County, the groundwater supply conserved by irrigation conservation could potentially be used to meet other WUG shortages within the County including municipal WUGs. However, the use of conservation as opposed to interruptible supplies has positive environmental impacts. Although there are no quantifiable negative environmental impacts, it is difficult to estimate the potential beneficial environmental impacts. Although specific on-farm and off-farm conservation BMPs were outlined in this strategy, irrigators that identify other BMPs specific (such as those listed in TWDB Report 362) to their irrigation conservation needs should utilize those measures.

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.

Table 1: Rice Irrigation Conservation

Brazoria	Irrigated Acres	18,910	acres	
	Rice Acres	17,163	acres	
	70% to be improved	12,014	acres	
	Savings @ 1.4 ac-ft / acre	16,820	ac-ft	
	Annual Cost @ $110 / ac-ft	$1,850,200	$/yr	
Chambers	Irrigated Acres	23,400	acres	
	Rice Acres	21,672	acres	
	70% to be improved	15,170	acres	
	Savings @ 1.4 ac-ft / acre	21,239	ac-ft	
	Annual Cost @ $110/ ac-ft	$2,336,290	$/yr	
Fort Bend	SW Irrigated Acres	4,731	acres	
	SW Rice Acres	4,731	acres	
	70% to be improved	3,312	acres	
	Savings @ 1.4 ac-ft / acre	4,636	ac-ft	
	Annual Cost @ $110 / ac-ft	$509,960	$/yr	
Galveston	Irrigated Acres	2,530	acres	
	Rice Acres	2,144	acres	
	70% to be improved	1,501	acres	
	Savings @ 1.4 ac-ft / acre	2,101	ac-ft	
	Annual Cost @ $110 / ac-ft	$231,110	$/yr	
Liberty	Irrigated Acres	19,775	acres	
	Rice Acres	19,386	acres	
	70% to be improved	13,570	acres	
	Savings @ 1.4 ac-ft / acre	18,998	ac-ft	
	Annual Cost @ $110 / ac-ft	$2,089,780	$/yr	
Waller	Irrigated Acres	7,031	acres	San Jacinto Basin only
	Rice Acres	6,741	acres	
	70% to be improved	4,719	acres	
	Savings @ 1.4 ac-ft / acre	6,606	ac-ft	
	Annual Cost @ $110 / ac-ft	$726,660	$/yr	

San Jacinto - Not a Rice Producing County

Note 1: Waller County has a surplus of potential irrigation water in the Brazos Basin. However, the surplus is in the Brazos River Aluvium and not the Gulf Coast Aquifer, and therefore not considered available in the San Jacinto Basin.

Table 2: Conservation from Lining Irrigation Canals

	Brazoria	Chambers	Fort Bend	Galveston	Liberty
SW Acres (Includes rice & row crops) (acres)	16,603	23,400	4,731	2,454	15,820
Canal length @ 16.5 feet/acre (miles)	51.9	73.1	14.8	7.7	49.4
Conservation Savings Rate (ac-ft/mile)	38	38	38	38	38
Partial lining saves (ac-ft)	1,972	2,779	562	291	1,879
Capital Cost @ $2916 / mile	$198,206	$279,169	$56,521	$29,406	$188,659
Annual Cost (20-year 6%) ($/yr)	($16,302.37)	($22,961.53)	($4,648.85)	($2,418.66)	($15,517.09)
Average Annual Water Cost per ac-ft ($/ac-ft)	$8.27	$8.26	$8.27	$8.31	$8.26

Table 3: Projected Implementation Dates and Balances

Brazoria	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	135,033	123,115	118,544	115,788	115,788	115,788
Supply	51,553	48,015	44,332	41,669	39,869	38,225
Rice Consv.	16,820	16,820	16,820	16,820	16,820	16,820
Canal Consv.	1,972	1,972	1,972	1,972	1,972	1,972
Balance w/o Cons.	-83,480	-75,100	-74,212	-74,119	-75,919	-77,563
Balance w/ Cons.	-64,688	-56,308	-55,420	-55,327	-57,127	-58,771

Chambers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	117,777	117,777	117,777	117,777	117,777	117,777
Supply	128,861	128,344	127,987	127,630	127,250	126,847
Rice Consv.	21,239	21,239	21,239	21,239	21,239	21,239
Canal Consv.	2,779	2,779	2,779	2,779	2,779	2,779
Balance w/o Cons.	-27,053	-27,277	-27,411	-27,534	-27,652	-27,753
Balance w/ Cons.	-20,376	-20,600	-20,734	-20,857	-20,975	-21,076

Fort Bend	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	53,455	53,455	53,455	53,455	53,455	53,455
Supply	53,455	53,455	53,455	53,455	53,455	53,455
Rice Consv.	4,636	4,636	4,636	4,636	4,636	4,636
Canal Consv.	562	562	562	562	562	562
Balance w/o Cons.	0	0	0	0	0	0
Balance w/ Cons.	5,198	5,198	5,198	5,198	5198	5,198

Galveston	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	10,342	10,342	10,342	10,342	10,342	10,342
Supply	1,162	1,162	1,162	1,162	1,162	1,162
Rice Consv.	2,101	2,101	2,101	2,101	2,101	2,101
Canal Consv.	291	291	291	291	291	291
Balance w/o Cons.	-9,180	-9,180	-9,180	-9,180	-9,180	-9,180
Balance w/ Cons.	-6,788	-6,788	-6,788	-6,788	-6,788	-6,788

Liberty	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	82,901	82,901	82,901	82,901	82,901	82,901
Supply	83,834	81,770	80,253	78,596	76,636	74,432
Rice Consv.	18,998	18,998	18,998	18,998	18,998	18,998
Canal Consv.	1,879	1,879	1,879	1,879	1,879	1,879
Balance w/o Cons.	-11,846	-12,444	-13,930	-15,555	-17,478	-19,640
Balance w/ Cons.	-6,657	-6,697	-6,732	-6,767	-6,805	-6,833

Table 3 - Continued

Waller	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Demand	22,978	22,978	22,978	22,978	22,978	22,978
Supply	22,978	22,504	22,978	22,965	22,662	22,114
Rice Consv.	6,606	6,606	6,606	6,606	6,606	6,606
Canal Consv.	0	0	0	0	0	0
Balance w/o Cons.	0	0	0	0	-316	-864
Balance w/ Cons.	6,606	6,606	6,606	6,606	6,290	5,742

Note 1: Waller County supply surpluses in the Brazos Basin are not included in the supply total. These surpluses exist in the Brazos River Aluvium and are not available to irrigators in the San Jacinto Basin.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: MUNICIPAL CONSERVATION

DATE: October 21, 2009

SUMMARY

STRATEGY DESCRIPTION: Implementation of "Water Conservation" management practices for Municipal WUG's.

SUPPLY QUANTITY: Potential Municipal demand reductions of:	45,605	ac-ft in 2010
	65,318	ac-ft in 2020
	75,696	ac-ft in 2030
	84,503	ac-ft in 2040
	94,392	ac-ft in 2050
	105,494	ac-ft in 2060

SUPPLY SOURCE: Savings from existing groundwater and surface water supplies

TOTAL STRATEGY COST:	$9,868,100 in 2010
(Costs rounded to nearest $100)	$14,139,900 in 2020
	$16,355,100 in 2030
	$18,245,200 in 2040
	$20,365,700 in 2050
	$22,750,300 in 2060

UNIT WATER COST: WUGs with Population < 3,301 - $202 per acre foot
WUGs with 3,300 < Population < 10,001 - $311 per acre foot
WUGs with Population > 10,000 - $213 per acre foot

Water Management Strategy Analysis Description

INTRODUCTION

Water conservation is a demand management strategy 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 the 1991 State Water-Efficient Plumbing Act.

The use of water conservation strategies/BMPs 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 WUG's that have projected water shortages.

The City of Houston volunteered to apply conservation as a management strategy even though they have no water shortage through the planning period. Based on information provided by the City of Houston, conservation for the City was estimated at 6.3 percent of the total projected demand for each planning decade. The City's voluntary municipal water conservation added approximately 37,603 acre-feet of water savings in the year 2060 for the region as compared to the 2060 estimated water savings resulting from water conservation for only those WUGs with projected shortages. This additional conservation savings, as a result of the City's voluntary program, equals approximately 36 percent of the total projected municipal water conservation savings for the region.

Water conservation is achieved through the use of various water conservation measures. There are in excess of 200 different types of conservation measures in use by public utilities within the United States. The Region H water demands are lower than they would otherwise have been because of anticipated water savings as a result of the 1991 State Water-Efficient Plumbing Act.

WUGs with water supply shortages reported in Chapter 3 of this report will be required to have a management strategy identified to meet this shortage. The Texas Water Development Board requires that the Region H Planning Group consider water conservation as a management strategy for WUGs with identified shortages. If the planning group determines that water conservation is not feasible, for any reason, it must be documented. The following sections discuss the application of municipal conservation as a management strategy within Region H.

TWDB WATER CONSERVATION BMPs AND ANALYSIS APPROACH

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 strategy.

The list of those municipal water conservation BMPs/strategies outlined in the TWDB Report 362 is as follows:

- System Water Audit and Water Loss
- Water Conservation Pricing
- Prohibition on Wasting Water
- Showerhead, Aerator and Toilet Flapper Retrofit
- Residential Ultra Low Flow Toilet Replacement Programs
- Residential Clothes Washer Incentive Program
- School Education
- Water Survey for Single-Family and Multi-Family Customers
- Landscape Irrigation Conservation and Incentives
- Water Wise Landscape Design and Conversion Programs
- Athletic Field Conservation
- Golf Course Conservation
- Metering of All New Connections and Retrofit of Existing Connections
- Wholesale Agency Assistance Programs
- Conservation Coordinator
- Water Reuse
- Public Information BMP
- Rainwater Harvesting and Condensate Reuse
- New Construction Graywater BMP
- Park Conservation BMP

Conservation Programs for Industrial, Commercial, and Institutional Accounts

In order to apply water conservation as a management strategy within Region H, an approach to develop estimates of savings and costs needed to be developed. The following paragraphs discuss the approach utilized to apply conservation.

For those WUGs with identified water shortages, a letter discussing conservation was mailed to each WUG. The conservation letter essentially ascertained whether or not the WUG currently has a conservation plan and requested information related to the effectiveness of existing conservation measures. The letter also contained a survey to determine which conservation BMPs (those identified by the Conservation Task Force) the WUGs currently use and those they would consider in the future.

To aid in the development of costs and savings associated with this strategy the TWDB Report 362 was supplemented with savings and costs identified in the COH water conservation plan.

Water conservation was applied prior to expanding contracts for those WUGs with existing contracts with wholesale water providers. This strategy was only applied to those WUGs with shortages as identified in Chapter 3. The WUGs were classified into four groups for purposes of applying this strategy. The first three classifications were based on WUG population and consisted of population less than 3,301 persons, population greater than 3,300 persons but less than 10,001 persons, and population greater than 10,000 persons. These three WUG size classifications were developed to recognize and account for the various degree by which WUGs of different sizes will likely implement advanced conservation measures. Larger WUGs with greater resources are more likely to be able to implement a comprehensive conservation program than a smaller WUG with lesser resources. Therefore, the expected water savings and costs for the region are also likely to differ depending on the relative size of the WUG. A fourth classification consisted of WUGs with conservation plans outlining specific conservation practices and water saving goals that were more aggressive than the expected water savings determined by classifying the WUG in one of the other three categories.

WATER CONSERVATION BMP SURVEY

A survey requesting information regarding water conservation was mailed to water utilities and Wholesale Water Providers (WWPs) in Region H. The survey asked each utility to provide information regarding recent per capita water use, current and future conservation strategies, efficacy of current strategies and the cost associated with each strategy.

The results of the survey were compiled to evaluate which conservation BMPs were currently being performed and which BMPs will most likely be evaluated by the WUGs for future use.

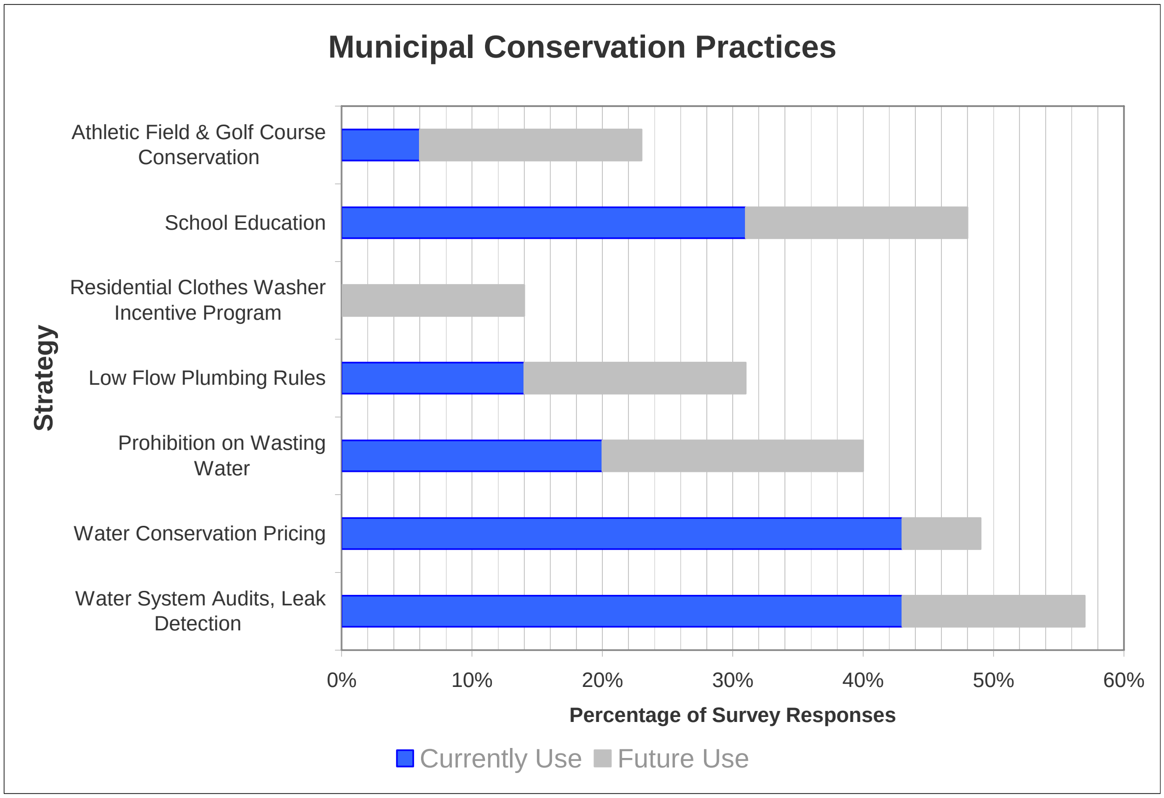
The evaluation of the returned surveys yielded the most-likely conservation BMPs to be considered for conservation management strategy. The WUGs were classified into four groups consisting of:

- Population less than 3,301 persons
- Population greater than 3,300 persons but less than 10,001 persons
- Population greater than 10,000 persons
- WUG specific Conservation Plans

Approximately 35 surveys were returned out of the 254 conservation letters mailed. Thirty-four surveys were returned by utilities detailing conservation practices for municipal, industrial and commercial customers. One survey was returned detailing agricultural conservation methods. The results described in the following paragraphs will focus on the utilities that have implemented water conservation measures for municipal, industrial, and commercial use. The utilities serving populations less than 3,301 persons consisted of approximately 17 percent of the survey responses. Utilities serving populations greater than 3,300 persons but less than 10,001 persons consisted of approximately 43 percent of the survey responses. The remaining 40 percent were from wholesale water providers or utilities serving populations greater than 10,000 persons.

The results of the survey are provided in Figure 1 below. It is recommended that all of the listed municipal conservation BMPs be considered by individual WUGs within Region H in the development of future water conservation plans.

Figure 1 – Potential Water Conservation Strategies



DEVELOPMENT OF COSTS AND SAVINGS FOR THE REGION

In general, Water Conservation practices, which are not linked to the 1991 State Water-Efficient Plumbing Act, are those that are more aggressive in terms of the timing of their usage (pro-actively managed to occur sooner in time) or the application of additional specific conservation practices. An estimate of water savings and expected costs is required to be developed for the region as a means to compare water conservation to other water management strategies. The TWDB Report 362, which provides detail information for municipal conservation BMPs, does not provide sufficient detail relating to projected water savings and costs for all the BMPs provided.

To aid in the development of costs and savings associated with this strategy the TWDB Report 362 was supplemented with savings and costs identified in the COH water conservation plan. For reference purposes, Figure 2 has been included to summarize the conservation practices contained within the current City of Houston water conservation program and the estimated costs and savings. The BMPs identified in the COH conservation plan were then used to assist in estimating savings and costs for the Region. This set of eight practices identified in the COH conservation plan is projected to result in an overall savings of approximately 6.3 percent of total water use by year 2005 and then be sustained at an annual level of approximately 6.3 percent. It can be anticipated that these and other similar practices could be used to accomplish similar conservation savings proposed for the Region H Municipal WUG's. The total projected water savings reduction by year for all of the Municipal WUG's with shortages is shown in Table 1.

The per unit cost of each of the COH conservation measures identified for estimating savings and costs for the region is shown below. For specific information used to estimate conservation BMP costs and savings, refer to Figure 2.

Cost Per Municipal Conservation Measure

- Water Audits ($639 per acre-foot)
- Commercial Indoor Audits ($285 per acre-foot)
- Cooling Tower Audits ($189 per acre-foot)
- Indoor/Exterior Audits ($212 per acre-foot)
- Pool/Fountain Standards ($56 per acre-foot)
- Pool/Fountain Audits ($109 per acre-foot)
- COH In-House Programs ($7 per acre-foot)
- Unaccounted-for-water ($94 per acre-foot)
- Public Education ($358 per acre-foot)
- Water Wise Program ($155 per acre-foot)

It is recommended that all the conservation BMPs outlined in TWDB Report 362 be utilized within Region H for those WUGs with shortages to meet conservation goals. However, for purposes of estimating water savings and costs for Region H the above COH BMPs were used as a basis for analysis. The following sections outline the COH BMPs utilized to estimate potential savings and costs.

RESULTS

Estimates of potential savings and costs for WUGs with shortages are presented below by population over the sixty-year planning period.

<u>Population < 3,301</u>

For those WUGs with populations less than 3,301 persons over the sixty-year planning cycle, the following COH conservation BMPs were chosen to estimate savings and costs:

- Unaccounted-for-water
- Public Education
- Water Wise Program

As shown, a large range of potential costs exists. A weighting of these per unit costs applied produces an average cost of $202 per acre-feet per year. This cost is proposed for use for the water conservation management strategy for the WUGs with populations less than 3,301 persons.

<u>3,300 < Population < 10,001</u>

For those WUGs with populations greater than 3,300 persons and less than 10,001 persons, the following COH conservation BMPs were chosen to estimate savings and costs:

- Unaccounted-for-water
- Public Education
- Water Wise Program
- Indoor/Exterior Audits

As shown, a large range of potential costs exists. A weighting of these per unit costs produces an average cost of $311 per acre-feet per year. This WUG classification includes additional public auditing water conservation measures than smaller (less than 3,301 population) WUGs. This cost is proposed for use for the water conservation management strategy for the WUGs with populations greater than 3,300 and less than 10,001 persons.

Population > 10,000

For those WUGs with populations greater than 10,000 persons, the following COH conservation BMPs were chosen to estimate savings and costs:

- Water Audits
- Indoor/Exterior Audits
- Pool/Fountain Standards
- Pool/Fountain Audits
- COH In-House Programs
- Unaccounted-for-water
- Public Education
- Water Wise Program

As shown, a large range of potential costs exists. A weighting of these per unit costs produces an average cost of $213 per acre-feet per year. This WUG classification includes additional public and commercial BMPs when compared to the BMPs outlined for WUGs with population ranging from 3,300 to 10,000 persons. This cost is proposed for use for the water conservation management strategy for the WUGs with populations greater than 10,000 persons.

Water User Group Application

Table 1 provides a listing of all of the Municipal and Municipal County-Other WUG's with shortages within Region H. This table shows the water demands for the 2011 Region H Water Plan , the expected conservation savings from implementing Strategies/BMPs, and the remaining shortage, if any. As shown, conservation savings as a percentage of total demand generally ranges up to approximately 6.3 percent. Based on this analysis, usage of Water Conservation could eliminate all projected shortages for the following WUGs.

WUG NAME	COUNTY	BASIN
COUNTY-OTHER	LEON	TRINITY
COUNTY-OTHER	WALKER	TRINITY
CROSBY MUD	HARRIS	SAN JACINTO
DEER PARK	HARRIS	SAN JACINTO
DEER PARK	HARRIS	SAN JACINTO-BRAZOS
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	TRINITY
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	WALKER	TRINITY
PRAIRIE VIEW	WALLER	SAN JACINTO

The remaining WUGs in Region H with projected shortages will require a combination of municipal conservation and some other water management strategy to meet shortages for each planning decade.

ISSUES AND CONSIDERATIONS

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 WUG's is one of the critical issues facing the success of this strategy.

It should be noted that some of the WUG's 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.

There are no negative environmental impacts associated with the conservation strategies outlined herein or that may results from implementation of the conservation management strategy. Large-scale structural modifications (constructing physical facilities) are not necessary to implement the water conservation management strategy. Therefore, the resultant type of construction impacts is not anticipated. However, conservation may create various types of social impacts. Notably, water conservation has the potential to increase water rates to compensate for a loss of revenue from water sales by each water utility. For instance, the City of Houston Water Conservation Plan discussed this issue and concluded that the rate of reduced water use from their anticipated program would have a minimal impact (1.5 percent) on the price of water to the customer. That report went on to state that reduced water sales would be offset from the positive impact of deferred capital cost expenditures of water and wastewater facilities that would have been required at an earlier date without water conservation.

Figure 1: City of Houston Conservation Alternatives

Residential	***Description***	***Savings (% of Total Water Demand)***	***Cost per Acre-Foot***
Water Audits[1,8]	Local officials would offer indoor/outdoor water audits to existing single-family & multi-family residential customers w/ high water use.	0.14%	$488.00
Public	***Description***	***Savings (% of Total Water Demand)***	***Cost per Acre-Foot***
Indoor/Exterior Audits[9,11,12,21]	Local officials would perform water audits at all public buildings focusing on indoor plumbing fixtures & irrigation water uses.	0.41%	$162.00
Pool/Fountain Audits	Local officials would provide audits on-site & produce a customized report that describes fixture & valve inspections, leak tests, retrofit possibilities, pool/fountain cleaning & backwashing operation & improvements, & recycling opportunities for each site. Leak detection by a private contractor would be provided if warranted.	0.08%	$83.00
Pool/Fountain Standards	All new publicly owned pools and fountains would be required to meet water efficiency minimum standards as established.	0.09%	$43.00
In-House Programs	Targets all local government departments not currently charged for water. Directors/managers of these would receive an "in-house" bill, detailing their water usage. A goal of 20% water usage (by a specific time period) would be established.	0.07%	$5.00
Other Programs	***Description***	***Savings (% of Total Water Demand)***	***Cost per Acre-Foot***
Unaccounted-for-Water[1]	Local officials would increase its leak protection & repair program w/ goal of reducing "lost-and-unaccounted-for" water to 10% (from current average of 17%).	3.90%	$72.00
Public Education[7]	Local officials would offer water conservation education to all schools, civic associations, Girl Scout & Boy Scout troops, etc.	1.51%	$273.00

Waterwise & Energy Efficient Program[4,7,17]	Local officials would maintain a partner w/ the Harris-Galveston Coastal Subsidence District to provide 5th grade students in the area w/ a 2-week conservation education program that provides retrofit devices (low-flow shower head, kitchen aerator, bathroom aerator, etc.).	0.14%	$118.00

As identified above the following notes relate portions of the TWDB Conservation Task Force identified water conservation measures to those utilized in the City of Houston's water conservation plan. They do not correlate directly, but an end user could if feasible utilize all or parts of the TWDB Conservation Task Force identified measures or other known BMPs or strategies.

[1]System Water Audit and Water Loss
[4]Showerhead, Aerator and Toilet Flapper Retrofit
[7]School Education
[8]Water Survey for Single-Family and Multi-Family Customers
[9]Landscape Irrigation Conservation and Incentives
[11]Athletic Field Conservation
[12]Golf Course Irrigation
[17]Public Information BMP
[21]Conservation Practices for Industrial, Commercial, and Institutional Accounts

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: San Jacinto River Authority/Trinity River Authority Contract Agreement

DATE: November 16, 2009

SUMMARY

STRATEGY DESCRIPTION: Transfer 53,000 acre-feet per year of SJRA-owned supplies in the Trinity River and 77,000 acre-feet per year of TRA supply in Lake Livingston to Montgomery County to meet projected shortages after in-basin supplies are fully utilized.

SUPPLY QUANTITY: Approximately 76,500 acre-feet per year (new TRA contract)

SUPPLY SOURCE: Lake Livingston (existing)

STARTING DECADE: 2050

TOTAL STRATEGY COST: $302,781,600 (Costs rounded to nearest $100)

UNIT WATER COST: $687 per ac-ft allocated

Water Management Strategy Analysis Description

Introduction

Montgomery County demands will exceed available groundwater and current surface water contracts beginning in year 2010. These water shortages are projected to grow from 17,000 acre-feet per year in 2010 to 180,000 acre-feet per year in 2060. Currently, the San Jacinto River Authority (SJRA) is the only Wholesale Water Provider for the majority of the county. Under this strategy, in-county and in-basin supplies are fully utilized, and the remaining shortage is met through the purchase and transfer of Trinity River Authority (TRA) supply in Lake Livingston by the SJRA. The strategy requires the combined use of supplies owned by the SJRA and the TRA.

Analysis

This strategy consists of first using unallocated supplies in Lake Conroe to meet Montgomery County needs. This may be accomplished through a water sales contract, either through SJRA as a wholesale water provider, or directly to a WUG such as Conroe, should it elect to construct an independent water treatment plant. This portion of the strategy carries no major infrastructure cost, because the supplies are located at the point of use. Treatment and transmission facilities costs would be reflected at the WUG level.

The second phase of this strategy requires the full utilization of SJRA supplies within the San Jacinto Basin. To provide treated water to the southern and eastern portions of Montgomery County, a treated water facility will need to be constructed in the vicinity of the existing SJRA pump station

The third phase of this strategy requires the transfer of SJRA supplies in the Trinity Basin to Montgomery County. One of the SJRA water rights (08-4279) is not yet permitted for use in the San Jacinto Basin. Unless an agreement could be reached to convey SJRA supplies through Luce

Bayou, a new conveyance would need to be constructed from the Trinity Basin to Montgomery County. There is the potential for alternate routes pass through the Sam Houston National Forest, which increases the risk of adverse environmental impacts due to construction and maintenance activities. The WWP-level cost of this conveyance is shown in Table 1.

Finally, to meet the shortages projected for the 2050 and 2060 decades, additional supplies must be obtained. The TRA is projected to have surplus supply remaining in Lake Livingston after other strategies are applied. This strategy proposes the SJRA entering into a contract for 59,000 acre-feet per year to meet the remaining Montgomery County demands, and conveying that supply via the new conveyance

Water User Group Application

The water conveyed into the San Jacinto River basin through this strategy would meet all projected shortages in Montgomery County throughout the planning period. Water available in Lake Conroe will be used to serve the northern portion of the county. New treatment and transmission facilities will be required at each reservoir. These costs will be reflected in the WWP infrastructure cost estimates once developed

Environmental Impact

Additional transfer of Trinity River water supplies into the San Jacinto River basin will decrease freshwater inflows into the upper Trinity Bay estuary. Riverine flows should remain unchanged between Lake Livingston and the Coastal Water Authority diversion point. Downstream of the CWA diversion point, instream flows will decrease by approximately 1.7% (based upon both diversions totaling 155 cfs, compared to a 20-year average flow of 9100 cfs). This reduction potentially affects White-faced Ibis, Wood Stork and Alligator Snapping Turtle habitats. Increased use of stored water from Lake Livingston may result in more frequent level fluctuations and prolonged low lake levels, which may adversely impact wetland areas along the lake perimeter. These fluctuations may also adversely affect property values and recreational revenues in Walker, Trinity, San Jacinto and Polk Counties.

Return flows from this supply (typically 60% of the total diverted) will return to Galveston Bay via the San Jacinto River and Houston Ship Channel, affecting the spatial distribution of freshwater inflows to the bay. If the transfer were to occur instantly at its full amount, the impact on estuary species might be severe, particularly to oyster beds located in Trinity Bay. However, the full transition of this supply from the Trinity Basin to the San Jacinto basin is projected to occur gradually over a 40-year period, allowing sufficient time for species to migrate within the 20-mile width of Galveston Bay. Additionally, the size of the target diversion (155 cfs) is well within the current range of variation in annual flows (standard deviation over the last 20-years is just over 4100 cfs).

The Dallas-Fort Worth Metroplex is also projected to grow throughout the planning period. Wastewater return flows from that area flow into the Upper Trinity River. The Region C Water Plan recommends wastewater reuse as a management strategy for the upper basin, but it is anticipated that the upper basin will continue to provide flows to the Trinity, which will further off-set the impacts of this strategy.

Issues and Considerations

Although the supply infrastructure (Lake Livingston) is in place, the conveyance required for this transfer is not. An inter-basin pipeline or must be constructed to move this supply into the San Jacinto Basin.

Table 1
Cost Estimate for TRA to SJRA Transfer Conveyance

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 200,077,774	$ 200,077,774
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$ 61,598,221	$ 61,598,221
3	LAND & EASEMENTS	600	AC	$ 8,300	$ 4,980,000
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 3,275,000	$ 3,275,000
5	INTEREST DURING CONSTRUCTION	1	LS	$32,850,602	$ 32,850,602
					$ 302,781,597

ITEM	DESCRIPTION	ANNUAL TOTAL					
1	DEBT SERVICE	$ -	$ -	$ -	$26,397,879	$26,397,879	
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ -	$ 2,473,244	$ 2,473,244	$ 2,473,244
3	PUMPING ENERGY COSTS	$ -	$ -	$ -	$ 8,230,738	$ 8,230,738	$ 8,230,738
4	PURCHASE OF WATER						
							$ 10,703,983

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	PUMP STATIONS	1	LS	$ 31,497,774	$ 31,497,774
2a	PIPELINES	1	LS	$ 168,036,000	$ 168,036,000
2b	PIPELINE CROSSINGS	1	LS	$ 544,000	$ 544,000
12	OTHER ITEMS	1	LS		$ -
					$ 200,077,774

ALL FACILITIES
OPERATIONS & MAINTENANCE (O&M) COSTS

Formula Basis for Estimating
Pipelines, Distribution Facilities, Tanks, & Wells O&M Cost = 0.010 * (Total Construction Cost)
Dams & Reservoirs O&M Cost = 0.015 * (Total Construction Cost)
Intake Structures & Pump Stations O&M Cost = 0.025 * (Total Construction Cost)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	PUMP STATIONS	0.025	%	$ 31,497,774	$ 787,444
2a	PIPELINES	0.010	%	$ 168,036,000	$ 1,680,360
2b	PIPELINE CROSSINGS	0.010	%	$ 544,000	$ 5,440
12	OTHER ITEMS	0.010	%	$ -	$ -
					$ 2,473,244

Table 1
Cost Estimate for TRA to SJRA Transfer Conveyance (continued)

PUMP STATIONS
CONSTRUCTION COSTS

Formula Basis for Estimating (same formula as Table uses)
Cost = 471,150 * (ln Horsepower)^2 - 1,885,353 * (ln Horsepower) + 1,305,839

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station #1	14000	HP	$ 26,248,145	$ 26,248,145
2	Pump Station #1 added Intake Structure	1	LS	$ 5,249,629	$ 5,249,629
3	Pump Station #1 added Standby Power	0	LS	$ 9,186,851	$ -
					$ 31,497,774

PIPELINES
CONSTRUCTION COSTS

Table Basis for Estimating

Formula Basis for Estimating (Cost Tables)

ITEM	DESCRIPTION	DIAMETER	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(IN)	(LF)			
1	Urban Pipeline	96	26400	LF	$ 1,590	$ 41,976,000
2	Rural Pipeline	96	132000	LF	$ 955	$ 126,060,000
						$ 168,036,000

PIPELINE CROSSINGS
CONSTRUCTION COSTS

Table Basis for Estimating

Formula Basis for Estimating (Cost Tables)

ITEM	DESCRIPTION	DIAMETER	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(IN)	(LF)			
1	Pipeline Crossing	96	200	LF	$ 2,720	$ 544,000
						$ 544,000

PUMP STATIONS
PUMPING ENERGY COSTS

Formula Basis for Estimating
Cost = $0.09 * 0.7457 kW/HP * 24 hrs/day * 365 days/yr * (Pump Station Horsepower)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station #1 Pumping Energy Costs	14000	HP	$ 8,230,738.32	$ 8,230,738
					$ 8,230,738

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City Of Houston/Trinity River Authority Contract Agreement

DATE: January 2, 2010

SUMMARY

STRATEGY DESCRIPTION: Surface water agreement by the City of Houston of some portion of the Trinity River Authority's water supplies from the Lake Livingston-Wallisville Salt Water Barrier system.

SUPPLY QUANTITY: Approximately 123,500 acre-feet per year

SUPPLY SOURCE: Lake Livingston-Wallisville Salt Water Barrier System

IMPLEMENTATION DECADE: 2030

TOTAL STRATEGY COST: None – water would be transferred through existing infrastructure or the Luce Bayou conveyance

UNIT WATER COST: Unknown – would be at contract rate

Water Management Strategy Analysis Description

Introduction:

Based on the Region H analysis, the Trinity River Authority (TRA) is projected to have uncommitted surface water supplies (approximately 290,000 acre-feet per year) from their water rights within the Lake Livingston-Wallisville Salt Water Barrier system through year 2060. This water supply exists as stored water located within Lake Livingston. According to the Region H water projections, there is no projected need for this water through year 2060 within the TRA service area.

Through financial considerations associated with the 1964 construction contract for the Lake Livingston-Wallisville Salt Water Barrier Project, the City of Houston (City) has a preferred position relative to purchase of uncommitted water supplies from TRA's share of the Livingston-Wallisville system. To date, the City has funded the cost of Lake Livingston including the TRA share. This strategy consists of defining that quantity of available water that could be purchased from the TRA and conveyed by the City of Houston into the San Jacinto River basin.

Analysis:

The City of Houston has sufficient water supplies to meet its own demand and current contracts through year 2050. Based on the regional planning analysis, the City will require additional supply in 2030 to meet project growth in customer WUG demands. Acquisition of some portion of the uncommitted TRA water supplies can occur through a water supply agreement executed between the City and TRA. An agreement of this type requires two willing parties. Additionally, the terms of a water agreement must be acceptable to both parties. As of the 2006 RWP, the City of Houston and TRA had initiated discussions to determine whether a water agreement could be formulated. For the current round of regional water planning, TRA is amenable to a transfer volume of 200,000 acre-feet per year including transfers to Houston and SJRA. Specific terms of the contract agreement have not been formulated at this time.

Assuming consummation of the agreement, the City of Houston has to determine how to convey these water supplies into their water supply system. Diversion of these water supplies can occur either directly from Lake Livingston or at any point downstream of Lake Livingston. Two potential diversion points and conveyance routes include use of the existing Coastal Water Authority (CWA) canal system at the Trinity River Pump Station and/or a new potential route from the Trinity River to Lake Houston via Luce Bayou. If the Luce Bayou route is utilized, then new facilities would have to be constructed which would include; a diversion structure on the Trinity River, a raw water pump station, and a conveyance pipeline and canal system. Definition of these facilities is discussed within the Luce Bayou water management strategy technical memorandum. Alternatively, it can be assumed that the Luce Bayou system is required just to provide supply to the Northeast Water Purification Plant, as is discussed within the Luce Bayou management strategy. The CWA canal system would then have sufficient excess capacity because previously utilized Lake Livingston flows would be diverted into a new Luce Bayou thereby freeing up capacity to convey up to the potential additional 200,000 acre-feet per year of supply.

Water User Group Application:

This management strategy will provide supply to meet the post-2020 demand growth for Houston's customer WUGs in Harris, Montgomery and Galveston counties.

Environmental Impact:

Additional transfer of Trinity River water supplies into the San Jacinto River basin will decrease freshwater inflows into the upper Trinity Bay estuary. Riverine flows should remain unchanged between Lake Livingston and the Coastal Water Authority diversion point. Downstream of the CWA diversion point, instream flows will decrease by approximately 3% (based upon full diversion at 276 cfs, compared to a 20-year average flow of 9100 cfs). This reduction potentially affects White-faced Ibis, Wood Stork and Alligator Snapping Turtle habitats. Increased use of stored water from Lake Livingston may result in more frequent level fluctuations and prolonged low lake levels, which may adversely impact wetland areas along the lake perimeter. These fluctuations may also adversely affect property values and recreational revenues in Walker, Trinity, San Jacinto and Polk Counties.

The blending of Trinity and San Jacinto river supplies in Lake Houston will affect the water quality, and could potentially introduce invasive species to Lake Houston.

Return flows from this supply (typically 60% of the total diverted) will return to Galveston Bay via the San Jacinto River and Houston Ship Channel, affecting the spatial distribution of freshwater inflows to the bay. If the transfer were to occur instantly at its full amount, the impact on estuary species might be severe, particularly to oyster beds located in Trinity Bay. However, the full transition of this supply from the Trinity Basin to the San Jacinto basin is projected to occur gradually over a 40-year period, allowing sufficient time for species to migrate within the 20-mile width of Galveston Bay. Additionally, the size of the target diversion (276 cfs) is well within the current range of variation in annual flows (standard deviation over the last 20-years is just over 4100 cfs).

The Dallas-Fort Worth Metroplex is also projected to grow throughout the planning period. Wastewater return flows from that area flow into the Upper Trinity River. The Region C Water Plan recommends wastewater reuse as a management strategy for the upper basin, but it is anticipated that the upper basin will continue to provide flows to the Trinity, which will further off-set the impacts of this strategy.

Issues and Considerations:

Although the supply infrastructure (Lake Livingston) is in place, the conveyance required for this transfer is not. The Luce Bayou transfer must be constructed to move this supply into the San Jacinto Basin. See the Luce Bayou Transfer technical memorandum for a discussion of those costs and impacts.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: WUG Contracts

DATE: November 17, 2009

SUMMARY

STRATEGY DESCRIPTION: Contractual agreements for water from WWPs to WUGs. Water for contracts would come from multiple sources, including other water management strategies (WMS).

SUPPLY QUANTITY: Varies by WUG

SUPPLY SOURCE: Varies by WUG

IMPLEMENTATION DECADE: Varies by WUG

TOTAL STRATEGY COST: Varies by conveyance – total estimated infrastructure cost of $2,390,273,157 associated with contractual volumes for all WUGs.

UNIT WATER COST: NA – based on contractual agreement

Water Management Strategy Analysis Description

Introduction:

Previous RWPs have reflected major WMS largely at the end-user (WUG) level. However, water reaching the WUG level from major management strategies may involve the facilities and services of one or more wholesale water providers (WWPs). A series of contractual agreements is necessary for water from WMSs to move from the sourer location to ultimate user. For example, the TRA to Houston Transfer strategy may involve the contractual transfer of water from TRA to the City of Houston, from the City of Houston to a smaller WWP, and finally from the smaller WWP to the WUG. Note that WWP and WUGs are not obligated by the RWP to increase existing contracts or enter into new contracts. Any additional contract amounts will require negotiation between the WUG and WWP. The “Expand/Increase Current Contracts” WMS indicates a contractual transfer of supplies from WWP to a WUG where there is an existing supply shown from the same WWP and source to the WUG. “New Contract from Existing Supply” indicates a contractual transfer from WWP to WUG where there is not already an existing supply an existing supply shown from the same WWP and/or source to the WUG. Both of these WMS are functionally identical and reflect contractual transfer of existing supplies rather than of new strategy water.

Analysis:

WWP to WUG Contracts are shown in Table 4A-8 in Appendix 4A.

Water User Group Application:

Contracts facilitate transfer of water from WWPs to WUGs.

Issues and Considerations:

The proper functioning of other WMS is contingent on contracts between WWPs and WUGs.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: WWP Contracts

DATE: November 14, 2009

SUMMARY

STRATEGY DESCRIPTION: Contractual agreements for water between WWPs. Water for contracts would come from multiple sources, including other water management strategies (WMS).

SUPPLY QUANTITY: Varies

SUPPLY SOURCE: Varies

IMPLEMENTATION DECADE: Varies

TOTAL STRATEGY COST: Varies by conveyance

UNIT WATER COST: NA – based on contractual agreement

Water Management Strategy Analysis Description

Introduction:

Previous RWPs have reflected major WMS largely at the end-user (WUG) level. However, water reaching the WUG level from major management strategies may involve the facilities and services of one or more wholesale water providers (WWPs). A series of contractual agreements is necessary for water from WMSs to move from the sourer location to ultimate user. For example, the TRA to Houston Transfer strategy may involve the contractual transfer of water from TRA to the City of Houston, from the City of Houston to a smaller WWP, and finally from the smaller WWP to the WUG. Thus, WWP contracts necessary to facilitate other WMS are included as a management strategy with no yield of its own. Note that WWP and WUGs are not obligated by the RWP to increase existing contracts or enter into new contracts. Any additional contract amounts will require negotiation between the WWPs.

Analysis:

Contracts between WWPs required to facilitate other WMS are shown in Table 1 below. Note that this list does not include contracts from WWPs directly to WUGs.

Table 1
WWP Contracts (ac-ft/yr)

Contracts by WWP and Supply Source	2010	2020	2030	2040	2050	2060
BRA to Brazosport Water Authority						
ALLENS CREEK	0	116	124	1,557	3,183	5,435
TOTAL	0	116	124	1,557	3,183	5,435

Contracts by WWP and Supply Source	2010	2020	2030	2040	2050	2060
BRA to GCWA						
ALLENS CREEK	0	12,165	27,627	31,782	37,777	42,624
BRA SYSTEM OPERATIONS PERMIT	0	1,290	8,057	14,099	14,099	14,099
FORT BEND OCR	0	0	0	0	0	4,517
BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM[1]	0	4,324	4,324	4,324	4,324	4,324
TOTAL	0	17,779	40,008	50,205	56,200	65,564
BRA to NRG						
FORT BEND OCR	0	0	0	0	0	8,500
TOTAL	0	0	0	0	0	8,500
BRA to Richmond-Rosenberg						
ALLENS CREEK	0	0	0	1,091	2,970	1,848
FORT BEND OCR	0	0	0	0	90	3,797
TOTAL	0	0	0	1,091	3,060	5,645
BRA to Sugar Land						
BRA SYSTEM OPERATIONS PERMIT	0	1,027	2,947	3,385	3,385	3,385
ALLENS CREEK	0	0	0	231	490	449
FORT BEND OCR	0	0	0	0	0	922
TOTAL	0	1,027	2,947	3,616	3,875	4,756
COH to Baytown Area Water Authority						
LIVINGSTON-WALLISVILLE SYSTEM	0	26	262	398	535	692
TOTAL	0	26	262	398	535	692
COH to BRA						
ALLENS CREEK	0	27,498	25,201	57,886	69,755	69,755
TOTAL	0	27,498	25,201	57,886	69,755	69,755
COH to CHCRWA						
HOUSTON LAKE/RESERVOIR	0	977	862	720	631	546
LIVINGSTON-WALLISVILLE SYSTEM	0	794	1,552	1,711	1,800	1,885
TOTAL	0	1,771	2,414	2,431	2,431	2,431
COH to City of Pasadena						
LIVINGSTON-WALLISVILLE SYSTEM	1,865	2,278	2,665	3,153	3,579	4,068
TOTAL	1,865	2,278	2,665	3,153	3,579	4,068

Contracts by WWP and Supply Source	2010	2020	2030	2040	2050	2060
COH to North Channel Water Authority						
LIVINGSTON-WALLISVILLE SYSTEM	1,954	2,392	2,869	3,511	4,157	4,912
TOTAL	1,954	2,392	2,869	3,511	4,157	4,912
COH to NFBWA						
LIVINGSTON-WALLISVILLE SYSTEM	0	444	17,971	31,161	41,172	50,442
TOTAL	0	444	17,971	31,161	41,172	50,442
COH to NHCRWA						
HOUSTON LAKE/RESERVOIR	0	30,880	30,880	32,734	29,030	25,398
HOUSTON INDIRECT REUSE	0	0	0	18,130	31,629	0
LIVINGSTON-WALLISVILLE SYSTEM	0	25,573	52,161	32,177	17,382	57,643
TOTAL	0	56,453	83,041	83,041	78,041	83,041
COH to SJRA						
CONROE LAKE/RESERVOIR	0	36,377	55,538	54,582	53,581	52,534
TOTAL	0	36,377	55,538	54,582	53,581	52,534
COH to WHCRWA						
LIVINGSTON-WALLISVILLE SYSTEM	1,241	31,837	46,324	52,759	55,549	58,402
TOTAL	1,241	31,837	46,324	52,759	55,549	58,402
GCWA to City of Galveston						
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	0	677	677	677	677	677
BRAZOS RIVER RUN-OF-RIVER	0	5,360	5,360	5,360	5,360	5,360
BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	0	1,225	1,225	1,225	1,225	1,225
TOTAL	0	7,262	7,262	7,262	7,262	7,262
GCWA to Fort Bend County WCID #2						
BRA SYSTEM OPERATIONS PERMIT	0	491	1,092	1,092	1,092	1,092
TOTAL	0	491	1,092	1,092	1,092	1,092
GCWA to Galveston County WCID #1						
SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	0	59	59	59	59	59
BRAZOS RIVER RUN-OF-RIVER	0	469	469	469	469	469
BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	0	107	107	107	107	107
ALLENS CREEK	0	131	274	305	340	379
FORT BEND OCR	0	0	0	0	0	0
TOTAL	0	766	909	940	975	1,014

Contracts by WWP and Supply Source	2010	2020	2030	2040	2050	2060
GCWA to Missouri City						
ALLENS CREEK	0	0	68	321	571	594
BRA SYSTEM OPERATIONS PERMIT	0	713	6,262	10,340	10,340	10,340
FORT BEND OCR	0	0	0	0	0	4,501
TOTAL	0	713	6,330	10,661	10,911	15,435
SJRA to COH						
HOUSTON LAKE/RESERVOIR	0	0	1,356	5,300	3,872	2,428
TOTAL	0	0	1,356	5,300	3,872	2,428
TRA to COH						
LIVINGSTON-WALLISVILLE SYSTEM	0	0	116,738	123,524	123,524	123,524
TOTAL	0	0	116,738	123,524	123,524	123,524
TRA to SJRA						
LIVINGSTON-WALLISVILLE SYSTEM	0	0	0	7,935	39,096	76,476
TOTAL	0	0	0	7,935	39,096	76,476

[1]Reflects water already contracted but unused prior to water treatment expansion

Water User Group Application:

Contracts facilitate transfer of water among WWPs for ultimate delivery to WUGs.

Issues and Considerations:

The proper functioning of other WMS is contingent on contracts between the proper WWPs.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Expanded Use of Groundwater

DATE: July 20, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Increased use of existing groundwater supplies, within the limits of the sustainable yield, groundwater reduction plan limitations or groundwater conservation district rules.

SUPPLY QUANTITY:

County (Aquifer):	Projected Increase from 2010 to 2060 (acre-feet/year)
Austin (GC)	1,865
Brazoria (GC)	16,209
Chambers (GC)	1,010
Fort Bend (GC)	4,413
Galveston (GC)	1,352
Harris (GC)	27,550 (maximum in 2050)
Leon (CW, SP, QC)	908
Liberty (GC)	12,388
Madison (CW, SP, QC)	450
Montgomery (GC)	11,820
Polk (GC)	513
San Jacinto (GC)	1,060
Trinity (GC)	36 (in 2020, demands decline in 2030 – 2060)
Walker (GC, SP, YJ)	2,843
Waller (GC)	7,431

SUPPLY SOURCE: Gulf Coast (GC), Carrizo-Wilcox (CW), Sparta (SP), Queen City (QC), and Yegua-Jackson Aquifers (YJ).

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $589,500 per typical 1 mgd well (1,000 ft deep) – total infrastructure capital cost share associated with this WMS is $165,929,000. (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $205 per acre-foot (average, treated and delivered)

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Region H Water Plan anticipates the continued use of available groundwater to meet demands, unless such use is limited by groundwater conservation district rules or local water quality concerns. By fully utilizing this supply, the diversion and movement of surface water can be minimized. 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, and this increased use is reflected in Chapter 3, Available Water Supplies. However, the additional wells and related infrastructure required to obtain this water must be reflected in the plan as a management strategy.

Water User Group Application:

Expanded use of groundwater is recommended as a management strategy in all counties where increased use is projected. This expanded use is subject to local subsidence or groundwater conservation district rules and permitting practices. The RHWPG recognizes that Harris, Galveston and Fort Bend Counties have groundwater reduction plans that will result in decreasing groundwater use during the planning period. However, it is anticipated that many existing wells will continue to be used in conjunction with surface water to serve certain areas or to meet peak day demands. Three counties in the region (Fort Bend, Galveston and Harris) are projected to decrease their use of groundwater during the planning period due to Groundwater Reduction Plans enacted by the local Subsidence Districts. However, within these counties new wells will still be constructed and existing wells maintained or replaced in areas where surface water is not yet available, or where groundwater remains a portion of the overall community supply.

Issues and Considerations:

This expanded use of groundwater is not anticipated to have significant environmental effects. 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, unless or until reuse strategies are implemented. The expanded use is within the estimated sustainable yield of the Gulf Coast, Carrizo-Wilcox, Sparta, Queen City and Yegua-Jackson Aquifers, making it a preferred alternative to moving and treating additional surface water. Surface water diversions may reduce in-stream flows during drought periods, potentially affecting aquatic and riparian wildlife species. The costs for expanded use of groundwater will vary slightly from site to site, but it may generally be assumed that a 1 mgd well will cost approximately $589,500 to construct. If the total increase in groundwater demand for a WUG is less than one-quarter mgd (280 acre-feet/year), it can be assumed to be met by increased pumping of existing wells. All wells are assumed local, within a nominal 1-mile radius of the intended point of use, due to the extent of the Gulf Coast Aquifer under the region.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Interim Strategies

DATE: November 13, 2009

SUMMARY

STRATEGY DESCRIPTION: Increased use of existing groundwater supplies beyond projected availability or allowable pumpage on a temporary basis to meet 2010-2019 shortages for Brazoria, Chambers, and Montgomery Counties for manufacturing and municipal needs. In Galveston and Harris Counties, the over-pumping of groundwater is not a feasible alternative in 2010. However, other options exist for short-term supplies to these WUGs with groundwater supplies

SUPPLY QUANTITY:

County:	Volume (acre-feet/year)
Brazoria	24,916
Chambers	903
Galveston	6,410
Harris	15
Montgomery	13,268

SUPPLY SOURCE: Gulf Coast Aquifer

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST: $86,701,500 capital cost for all implementing WUGs (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $788 per acre-foot average cost (varies by WUG), interim groundwater

Water Management Strategy Analysis Description

Introduction:

Demand projections from the 2011 Planning Round for Region H indicate Year 2010 shortages for over 150 WUGS. For a majority of these WUGs, near-term needs can be met through conservation, expansion of current contracts, and expansion of groundwater use within groundwater conservation district rules and groundwater reduction plan limits, or ongoing small local projects. However, for 55 WUGs in Brazoria, Chambers, Harris, Galveston, and Montgomery Counties, there is no management strategy available in 2010 to meet needs.

One potential option available to meet the near-term shortages anticipated for these WUGs is interim pumping of groundwater above regulated limits. After 2020, the interim groundwater strategy will not be needed as other management strategies will be available to meet demands. In Brazoria, Chambers, and Montgomery Counties, there is no regulation in place for the year 2010 that prevents the sue of additional groundwater on a limited basis to meet these needs before other strategies can be developed.

In Harris and Galveston Counties, the shortage in 2010 can not be easily made up with additional groundwater usage. Regulated groundwater pumpage in the areas experiencing these near-term shortages is limited to 10 percent of total demand. Exceeding this limit under extreme demand scenarios considered in this plan would violate the Harris-Galveston Subsidence District regulatory plan. However, other options may exist for these WUGs. Typically, WUGs in this region convert to a point that meets less than 10 percent of their demand from groundwater. This over-conversion provides for conversion credits that may be used to offset excess pumping in later years and provide an optional source of supply for these WUGs until strategies can be implemented in the 2020 decade.

Water User Group Application:

Interim groundwater pumping is recommended as a management strategy in counties where 2010 needs cannot be met by another water management strategy. This additional pumping would not be expected to occur on a constant basis through 2019 but rather would only occur during dry conditions coinciding with peak demands. Between dry periods, pumping would return to normal levels, allowing aquifer recovery. In the event of prolonged near-term drought, additional groundwater wells may be required for some WUGs in order to increase pumping capacity. For WUGs with excess pumping capacity, this strategy would not include a capital cost.

Issues and Considerations:

Impacts of this strategy have not been investigated in detail. Under prolonged drought conditions, the pumping of groundwater in excess of sustainable levels would be expected to create a decline in static water levels. There is also the potential for some subsidence depending on the location and volume of interim groundwater use.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: New Groundwater Wells for Livestock

DATE: November 11, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Development of new groundwater wells to meet livestock needs in Brazoria and Galveston County

SUPPLY QUANTITY:

County:	Volume (acre-feet/year)
Brazoria	27
Galveston	14

SUPPLY SOURCE: Gulf Coast Aquifer

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $18,635

ANNUAL UNIT WATER COST: $37 per acre-foot average

<u>Water Management Strategy Analysis Description</u>

Introduction:

Demand projections from the 2011 Planning Round for Region H indicate Year 2010 shortages for Livestock in Brazoria County (San Jacinto-Brazos Basin) and Galveston County (Neches-Trinity Basin). These Livestock WUGs are dependent on local livestock supply (stock ponds) as well as groundwater from the Gulf Coast Aquifer. The only management strategy feasible for these two WUGs is development of additional groundwater pumping capacity.

Water User Group Application:

New groundwater wells are recommended as a management strategy for Livestock in Brazoria County (San Jacinto-Brazos Basin) and Galveston County (Neches-Trinity Basin). This additional pumping is within the projected availability of the aquifer for the Galveston County Livestock WUG; the Brazoria County Livestock WUG need exceeds groundwater availability by 27 acre-feet per year in 2020.

Issues and Considerations:

Impacts of this strategy have not been investigated in detail. Effects of exceeding projected groundwater availability for Brazoria County in 2020 are expected to be small, as the overpumping is 0.08 percent of the total local groundwater availability.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Missouri City GRP

DATE: November 30, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the City of Missouri City Joint Ground Water Reduction Plan (GRP) will reduce ground water use by implementing surface water conversion. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Conversion volume of 3,392 AFY in 2013 and 15,844 AFY in 2025

SUPPLY SOURCE: Surface water conversion

IMPLEMENTATION DECADE:	30% reduction – 2013 60% reduction – 2025

TOTAL STRATEGY COST: (Costs rounded to nearest $100)	$1,281,500 to $2,301,800 annual operation cost $51,260,490 capital cost, Phase I surface water plant and transmission $40,810,500 capital cost, Phase II surface water plant

ANNUAL UNIT WATER COST: $378 per ac-ft (WWP cost only for Region H allocated SW volumes - excludes infrastructure cost of customer WUGs / GRP participation)

<u>Water Management Strategy Analysis Description</u>

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a GRP which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

The City of Missouri City has 24 active Utility Districts operating in the City Limits/Extra Territorial Jurisdiction (ETJ), 19 of which operate within the City limits. In addition, the City has 11 Utility Districts within the City Limits/ETJ that are not yet active, but will become active in the future. The Joint GRP brings together the city and 40 other entities. The entities included in the Joint GRP are listed in Table 1.

Table 1
Participants in GRP

WUG Name	Listed as a WUG in Regional Water Plan
City of Missouri City	Yes
Blue Ridge West MUD	No
Estates of Silver Ridge	No
First Colony MUD No. 9	Yes
Fort Bend County MUD No. 23	Yes
Fort Bend County MUD No. 24	No
Fort Bend County MUD No. 26	No
Fort Bend County MUD No. 42	No
Fort Bend County MUD No. 46	No
Fort Bend County MUD No. 47	No
Fort Bend County MUD No. 48	No
Fort Bend County MUD No. 49	No
Fort Bend County MUD No. 115	No
Fort Bend County MUD No. 129	No
Fort Bend County MUD No. 149	No
Lake Olympia	No
Lake Shore Harbour	No
Manors of Silver Ridge POA	No
Meadow Creek MUD	No
Mustang Bayou Phase I	No
Mustang Bayou Phase II	No
Palmer Plantation MUD No. 1	No
Palmer Plantation MUD No. 2	No
Quail Valley Utility District	No
Riverstone	No
Sienna Point	No
Sienna Plantation MUD No. 1	No
Sienna Plantation MUD No. 2	Yes
Sienna Plantation MUD No. 3	No
Sienna Plantation MUD No. 4	No
Sienna Plantation MUD No. 5	No
Sienna Plantation MUD No. 6	No
Sienna Plantation MUD No. 7	No
Sienna Plantation MUD No. 8	No
Sienna Plantation MUD No. 10	No
Sienna Plantation MUD No. 12	No
Sienna Plantation MUD No. 13	No
Sienna Plantation POA	No
Sienna Plantation RAI	No
Silver Ridge HOA	No
Thunderbird Utility District	No
Waterbrook Community Association	No

Analysis:

The Joint GRP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. The City is partnering in this endeavor with 40 other entities. These participants include mostly entities lying within the city limits of Missouri City as well as some entities within the City's ETJ and outlying areas. All wells of the stakeholders will be aggregated to expedite the administrative process of administrating the plan.

Population projections and subsequent water demand projections were made for each individual stakeholder group based on current build-out density, City planning documents, and acreage estimates.

The Missouri City Joint GRP will meet these requirements through the conversion of some entities, largely those lying to the southern portion of the City and its ETJ entirely to surface water, while most entities lying to the northern portion of the City will remain on ground water supplies. The basic philosophy associated with this conversion plan is that those entities in the area are also largely undeveloped. This should limit the cost impact associated with abandoning groundwater infrastructure upon conversion. Additionally, this plan considers that there are few interconnections within the built-out entities, thereby making it quite difficult to provide surface water to these entities without the construction of an entirely new transmission system throughout the City.

As the converting entities are not yet built-out, there is some risk associated with this plan, as the City is still required to meet the conversion percentages outlined by the Subsidence District, regardless of whether growth projections occur. As a contingency, the City has entered into inter-local agreements with every participant on the system requiring them to convert to surface water if and when directed by the City. The City would convert entities one by one beginning in the southern portion of the City, and working in a generally northerly direction.

Initial raw supplies would be obtained through a pre-existing agreement the City of Missouri City has with the Gulf Coast Water Authority (GCWA). The City is currently identifying additional sources of raw water.

The City will own and operate the plant. Further, the City of Missouri City has been appointed the GRP administrator. As the GRP administrator, among other things, the City will see that the overall project is meeting conversion requirements, is providing required reporting to the Subsidence District and will also oversee the financial cost sharing program of the project. The cost share program involves an annual calculation of a pumpage fee to be assessed to each participant based on their respective groundwater pumpage. An end of the year “true-up” will be performed to assure that no single one entity would bear any more risk than the other participating entities.

Based on current demand projections the initial plant will have a design capacity of 10 MGD and employ membrane filtration technology. The plant will be located on the Briscoe canal in the southern portion of the Joint GRP service area near the Gulf Coast Water Authority existing intake structure on the Brazos River. From this point, treated water will be delivered to the converting entities existing ground storage facilities.

Water User Group Application:

The City of Missouri City Joint GRP has starting implementation of this strategy, specifically construction of the surface water treatment plant. The initial plant size will be 10 MGD, which is projected to meet the City’s required maximum demand through 2018, at which time the plant will be expanded to its ultimate capacity. The GRP also includes reuse and aquifer storage and recovery.

Issues and Considerations:

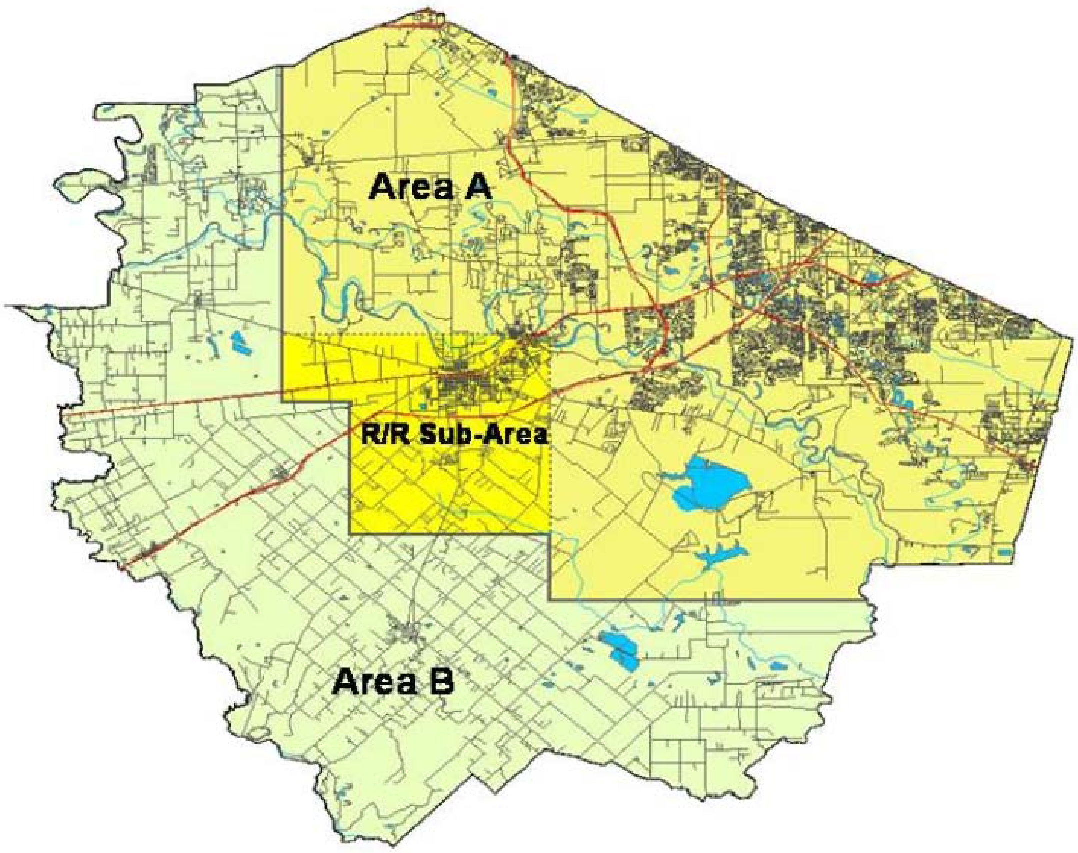
In Fort Bend County, the potential reduction in groundwater demand may be used to offset subsidence but the demand must be fulfilled by alternative supplies, which are primarily surface water supplies. Should this strategy be adopted, all of the implementation cost will be borne by the City of Missouri City Joint GRP. One of the impacts associated with the strategy outlined herein or that may result from implementation of the water management strategy is the increase in permitted GCWA diversions. Otherwise the water management strategy should produce minimal environmental impacts.

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

City of Missouri City Joint Groundwater Reduction Plan, City of Missouri City, October 30, 2008

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Fort Bend Municipal Utility District No. 25 GRP
DATE: November 22, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Fort Bend Municipal Utility District No. 25 (MUD 25) Ground Water Reduction Plan (GRP) will reduce ground water use by implementing reuse. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Reuse volume of up to 589 AFY

SUPPLY SOURCE: Reuse of WWTP discharge

IMPLEMENTATION DECADE: 30% reduction – 2013
60% reduction – 2025

TOTAL STRATEGY COST: $776,100 capital cost (estimated as $564 per acre-foot of plant capacity based on Wastewater Reuse for Municipal Irrigation WMS). (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $499 per acre-foot based on assumption above.

<u>Water Management Strategy Analysis Description</u>

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a GRP which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

MUD 25 is partnering with the Shadow Hawk Golf Course and the Orchard Lakes Development for purposes of meeting the required groundwater reduction. Effluent from Mud 25's WWTP will be used for irrigation and filling of amenity lakes in the Shadow Hawk Golf Course and the Orchard Lakes Development instead of existing groundwater wells.

Analysis:

The GRP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. MUD 25 is partnering in this endeavor with Shadow Hawk Golf Course and the Orchard Lakes Development (the Group).

Historical groundwater use, along with per-capita usage rates and growth projections, were analyzed. 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. Surface water credit requirements will be re-examined five years prior to the projected surface water conversion for the realistic scenario. MUD 25 also has surface water conversion credit agreements with the City of Sugar Land. The MUD also has a backup provision to participate in the regional surface water plant in west Fort Bend County. The district also participates in conservation education measures.

Water User Group Application:

MUD 25 has started implementation of this strategy, with reuse beginning in January 2008. Between January and October of 2008, over 142 million gallons (436 acre-feet) of water has been reused by the GRP participants.

Issues and Considerations:

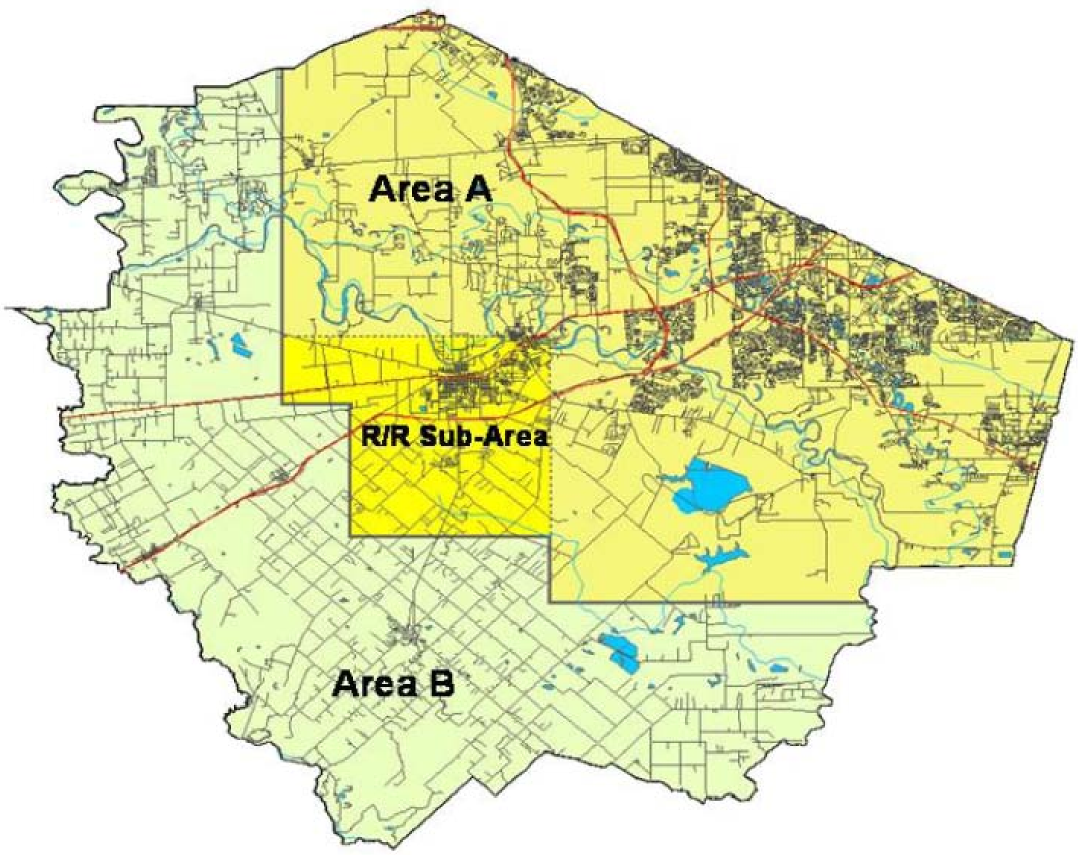
The timing of surface water credit accumulation depends on general trends in irrigation / amenity lake demands and reuse availability, which will be driven largely by weather conditions.

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

Groundwater Reduction Plan, Fort Bend County MUD No. 25, October 30, 2008

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Pecan Grove GRP

DATE: November 11, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Pecan Grove Municipal Utility District Ground Water Reduction Plan (GRP) will reduce ground water use by implementing surface water conversion. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Conversion volume of 866 AFY in 2013 and 1,731 AFY in 2025

SUPPLY SOURCE: Surface water conversion

IMPLEMENTATION DECADE: 30% reduction – 2013
60% reduction – 2025

TOTAL STRATEGY COST: $442,000 - $884,000 annual operating cost
(Costs rounded to nearest $100) $15,960,000 capital cost, treatment plant and transmission

ANNUAL UNIT WATER COST: $865 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a GRP which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

Pecan Grove Municipal Utility District (MUD) GRP includes two participants: Pecan Grove MUD and the Pecan Grove Plantation Country Club (PGPCC), which is entirely within the MUD. Note that PGPCC is not a separate named WUG and hence its demands are included with Pecan Grove MUD.

Analysis:

The GRP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for the mandated deadlines for partial conversion to non-groundwater sources. The MUD is partnering in this endeavor with PGPCC, representing a total of two individual wells and five private wells. Water demand projections for the MUD show only slight growth, due to near build-out conditions.

The Pecan Grove MUD GRP will meet these requirements through the construction of a surface water treatment plant (SWTP) with sufficient capacity to meet conversion requirements for the MUD and

PGPCC through 2030; existing distribution infrastructure will be used for delivery to customers. Pecan Grove MUD has obtained an annual raw water supply agreement from the Brazos River Authority to provide source water to the SWTP. The existing groundwater supply system will be maintained and operated to meet demands in excess of the SWTP capacity. The MUD will continue the use of reclaimed effluent for process and cleaning water. The MUD will also, at the discretion of the Pecan Grove MUD Board of Directors, continue public education in water conservation.

Water User Group Application:

The Pecan Grove MUD GRP has started implementation of this strategy with source water testing and site acquisition shown as scheduled fort 2008. SWTP design and permitting are schedule to be completed in 2010. Construction of the SWTP and conversion of existing disinfection facilities to chloramines are scheduled for completion by 2013. The GRP-proposed measures have the potential to reduce shortages by 866 AFY in 2013 and 1,731 AFY in 2025. The initial plant size will be 2 MGD, which is projected to meet the City's required maximum demand through 2030.

Issues and Considerations:

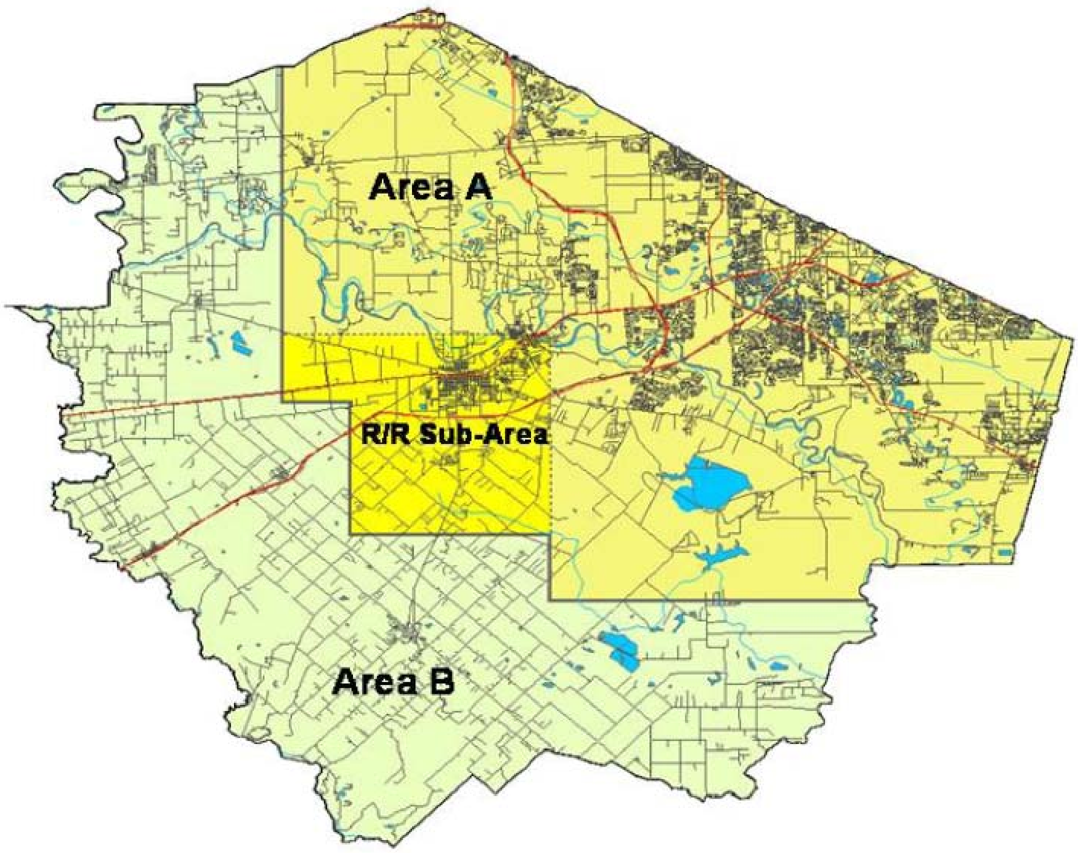
In Fort Bend County, the potential reduction in groundwater demand may be used to offset subsidence but the demand must be fulfilled by alternative supplies, which are primarily surface water supplies. Should this strategy be adopted, all of the implementation cost will be borne by the GRP Participants.

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

Pecan Grove Municipal Utility District Groundwater Reduction Plan, Pecan Grove MUD, October 2007

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Richmond and Rosenberg GRP

DATE: November 23, 2009

SUMMARY

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Sugar Land Coalition will reduce groundwater demands by implementing surface water conversion. Groundwater reduction measures will address Municipal WUG shortages and reduce water shortages through reduction of projected demands.

SUPPLY QUANTITY: 7,500 afy (reflected as an existing contract supply in database)

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE:	30% reduction – 2013 60% reduction – 2025

TOTAL STRATEGY COST:	$4,136,000 - $15,006,000 annual operation cost
(Costs rounded to nearest $100)	$43,205,000 capital cost, Phase I (2015)
	$29,963,000 capital cost, Phase II (2025)
	$29,898,000 capital cost, Phase III (2033)
	$14,153,000 capital cost, Phase IV (2052)

ANNUAL UNIT WATER COST: $1,491 per ac-ft for existing 7,500 ac-ft contract

Water Management Strategy Analysis Description

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a Groundwater Reduction Plan (GRP) which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

The Cities of Richmond and Rosenberg, in conjunction with Fort Bend County MUD No. 25, are participating in a planned West Fort Bend County Regional Surface Water Treatment Plant (WFB SWTP).

Analysis:

The preliminary engineering report (PER) for the WFB SWTP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. The Cities of Richmond and Rosenberg, in conjunction with Fort Bend County MUD No. 25, are participating in the planned WFB SWTP. Plant sizing was governed by the need to meet at least the minimum reduction in groundwater usage required by FBSD rules. Several scenarios were considered, including a base condition (each utility taking their required volume at their defined take point), overconversion of the Pecan Grove MUD service area (no longer a participating entity), overconversion of the Richmond-Rosenberg service area, and a two-plant scenario. Subsequent to Pecan Grove MUD no longer participating in the joint plant development, the most likely scenario is a single southern plant serving Richmond and Rosenberg. Initial plant capacity would be 4 MGD, increasing to 16 MGD over the course of several expansion phases. The plant facility is intended to serve the Richmond-Rosenberg area through 2065.

Issues and Considerations:

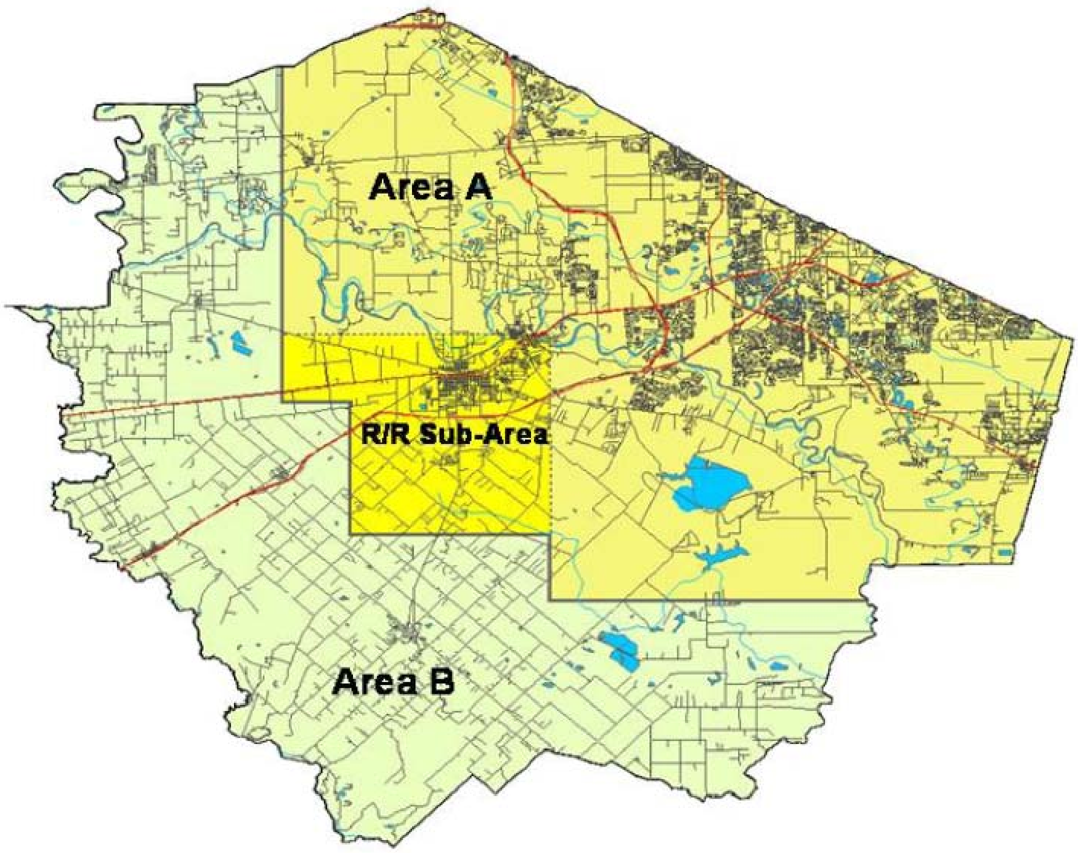
Critical path items for implementation of the WFB SWTP described in the preliminary engineering report include contract development, land purchase for facilities, raw water quality sampling, and evaluation of RO concentrate disposal options.

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

West Fort Bend County Regional Surface Water Treatment Plant – Preliminary Engineering Report, July 2007.

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: San Jacinto River Authority- Water Resources Assessment Plan[1]

DATE: July 9, 2010

SUMMARY

STRATEGY DESCRIPTION: Conversion from existing groundwater supplies to new surface water supplies to meet current and future water demands within Montgomery County and reduce overreliance on insufficient groundwater supplies.

SUPPLY QUANTITY: 20,164 ac-ft/yr (18 mgd) – 129,010 ac-ft/yr (115 mgd) Supply includes 52,534 ac-ft/yr from SJRA WRAP (Lake Conroe Supply) and additional 76,476 TRA to SJRA Contract (Lake Livingston Supply).

SUPPLY SOURCE: Lake Conroe Surface Water

TOTAL STRATEGY COST[2]: $900,000,000 capital cost (Costs rounded to nearest $100)

UNIT WATER COST: $649 per acre-foot

WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION

INTRODUCTION
The purpose of this analysis is to incorporate the San Jacinto River Authority's Joint Water Resources Assessment Plan as a water management in the development of new surface water supplies within the Region H Planning Group.

ANALYSIS

Scientific studies conducted by the Lone Star Groundwater Conservation District (LSGCD) have shown that the demand for groundwater in many areas within Montgomery County is exceeding the sustainable yield of the aquifers, and is leading to alarming declines in water level throughout the county. Modeling of future population and water demand has shown that this continued reliance on groundwater would lead to significant problems for water suppliers within the county as well as continued water level decline in aquifers.

In an effort to meet a larger portion of the county's water demand with surface water, allowing for the decrease in use and reliance on groundwater, the LSGCD adopted the District Regulatory Plan (DRP) "to create a regulatory framework for the District to responsibly regulate and conserve the use of groundwater in Montgomery County. The DRP requires Large Volume Groundwater Users (LVGU) to conduct long-term planning in order to assess their future water needs, and to describe how they will obtain alternative water supplies such that future demands can be met whilst adhering to groundwater reduction requirements adopted by the LSGCD. The DRP established an aquifer sustainable yield of 64,000 acre-feet per year, and requires groundwater use to be reduced to this annual volume by January of 2015.

[1] This memorandum was prepared using information in the *Joint Water Resources Assessment Plans* prepared by Brown & Gay for the San Jacinto River Authority.

The LVGUs are defined as entities that produce over 10 million gallons per year, but exclude single family residences and agricultural use of water. There are 201 LVGUs in Montgomery County and include everything from large municipal systems to smaller public and private utilities, as well as individual industries, businesses, golf courses, and homeowner associations. Of these 201 LVGUs, 197 are participating in the SJRA Joint Wrap, leaving Conroe Country Club, Wedgewood Golf Course, River Plantation MUD, and the City of Houston to develop and submit their own WRAPs.

As the DRP established a single management zone which encompasses the entire county, a group participation approach has been used in order to efficiently meet reduction requirements established by LSGCD. In an effort to fully utilize the economic benefits of regionalization and economies of scale, the San Jacinto River Authority (SJRA) developed a Joint Water Resources Assessment Plan (WRAP) and offered participation and inclusion to all LVGUs within the county. The key benefit of combining individual users' projected water demands into a regional WRAP is the ability to achieve tremendous cost savings by utilizing a "group compliance" concept in which some participants are partially of fully converted to surface water while other participants remain on groundwater supplies. As a group, the participants can cost-effectively meet the regulatory requirements of the LSGCD by over converting the more densely populated areas to an alternative water supply while more sparsely populated areas remain on groundwater, avoiding the costly necessity of physically delivering alternative supplies to every participant.

Population and Demand Projections

Population projections in the Joint WRAP were initially derived by comparing both Texas Water Development Board (TWDB) and Houston-Galveston Area Council (HGAC) population projections. While both data sources have traditionally underestimated growth in Montgomery County, the HGAC projections (which are done at a regional as opposed to state level) have been more accurate in projecting population growth. However, the LSGCD DRP requires that population (and therefore demand) projections be from the TWDB. Therefore, in accordance with the LSGCD DRP, as well as to align with the Region H population projections, projections for countywide total population are constrained using the Region H/TWDB numbers. **Table 1** below presents the population and water demand projections for Montgomery County.

Table 1
Montgomery County Population and Water Demand Projections

	2015	**2025**	**2035**	**2045**
Population	479,872	617,300	775,479	967,800
Demand (Acre-Feet/Year)	89,546	113,716	137,435	166,175

Region H demand projections were used for estimating Montgomery County total demand through 2045. Further analysis was conducted in the Joint WRAP to estimate the individual contributions of both participants and non-WRAP participants.

Table 2 below shows total water demand for SJRA Joint WRAP Participants, and is based on Region H/TWDB projections. The projected water demand for existing and future Joint WRAP Participants exceeds 99% of the total county demand throughout the planning period.

Table 2
Total Water Demand for SJRA and WRAP Participants

	Demand (Acre-Feet/Year)				
	2007	**2015**	**2025**	**2035**	**2045**
Existing and Future Participant Demand	70,385	89,209	113,290	136,877	165,453
Non-WRAP Participants*	248.0	333.5	426.0	557.5	722.0
TOTAL COUNTY DEMAND	**70,633**	**89,543**	**113,716**	**137,435**	**166,175**

*Represents City of Houston, Conroe Country Club, and Wedgewood Golf Course. River Plantation MUD has elected not to participate in the SJRA WRAP after the publication of the SJRA WRAP Part II, and is included in "Existing and Future Participant Demand".

Similar to planning conducted by Region H, unit demand is assumed to decrease over time due to future changes in technology, water use management, and conservation efforts. Unit demand decreases by roughly 2% over each ten year period from 2015 to 2045.

Supply

The preliminary estimate of 64,000 acre feet per year (afpy) has been developed as the sustainable yield of the Gulf Coast Aquifer within Montgomery County based on an assumed recharge rate of approximately 1.1 inches per year over the 697,600 acre area of the county. The LSGCD has adopted the 64,000 afpy estimate for the purposes of its Groundwater Management Plan (GMP), and is currently awaiting the results of a three year US Geological Survey (USGS) study of the recharge rate, to be completed in 2010. .The LSGCD DRP requires that groundwater supplies total no more than 70 percent of total water demands on January 1, 2015, and that the average groundwater use for the Joint WRAP planning period of 2015 through 2045 be no more than the current annual yield of the Gulf Coast Aquifer in the region of 64,000 acre-feet per year.

The SJRA conducted a "Potential Source Study" to identify potential alternative surface water sources that could be utilized in Montgomery County in order to reduce current groundwater use as well as meet increasing demands. The study concluded that the most cost-effective alternative was to utilize the full permitted yield of Lake Conroe by way of SJRA's existing water rights, as well as the City of Houston's water rights in Lake Conroe via a long term contract.

A key to the Joint WRAP approach is the benefit of removing the burden of compliance from smaller entities not equipped to meet the regulatory requirements on their own, and allows participants to develop the most cost-effective solution to meet regulatory goals by taking advantage on the economy of scale that can be realized by building larger treatment and transmission facilities at a lower cost per unit of capacity. The most cost-effective solution is based on over-converting large concentrations of groundwater use for the benefit of all Participants, especially small, remote, users to which it would be cost prohibitive to convey surface water.

Currently, the average groundwater pumpage in Montgomery County is 4.4 mgd, but this varies seasonally from 1.0 mgd in winter months to as high as 12.0 mgd in the summer months. In order to meet all of the annual demand with surface water, treatment and transmission facilities would need to be sized for 12 mgd, 2.7 times the average daily flow. It was determined that sizing a system this way would be cost prohibitive, and that treatment and transmission facilities should provide sufficient surface water in order to meet regulatory conversion requirements without the unnecessary over-sizing of infrastructure, a capacity equal to roughly 125% of average daily demands. It was estimated that by providing surface water at a maximum rate equal to the Participant's average daily demand, roughly 80% of the annual water demand would be met by surface water. The use of groundwater to meet peaking demands is allowed within the DRP guidelines, so long as average use over the planning period is less than 64,000 acre-feet per year.

In order to meet initial groundwater reduction requirements it was determined that the most economical option was to over-convert the more densely populated areas of Conroe and the Woodlands, the two largest groundwater producers in the county, by adding capacity to a treatment and transmission system until that supply of surface water lowered the total WRAP Participant's use of groundwater to 62,446 ac-ft in 2015. The Woodlands is converted to approximately 80% surface water by delivering surface water to all five existing water plants in The Woodlands. In addition, the majority of the City of Conroe's water demands west of Interstate Highway 45 are converted to surface water by delivering enough surface water to replace approximately 80% of the annual water production of the City's water plants west of IH 45. For conversions after 2015, projected 2045 water demands were considered in the determination of facilities to add to the ultimate conversion strategy. In this alternative, there will ultimately be three primary surface water transmission lines:

- To the east, serving the City of Conroe and other adjacent or nearby Participants to the north, south and east of Conroe.
- To the south, serving The Woodlands and other adjacent or nearby Participants to the north, east, south, and west of The Woodlands.
- To the west, serving Participants on the west side of Lake Conroe, including the City of Montgomery.

For the purposes of this Joint WRAP, the average surface water to be delivered at 10 year milestones is estimated to be 20,164 afpy in 2015, 60,492 afpy in 2025, 80,656 afpy in 2035, and 100,000 afpy in 2045. These capacities coincide with the assumed 80% conversion of annual volume described earlier.

Table 3
Groundwater Reduction Strategy

	Demand (Acre-Feet/Year)			
	2015	**2025**	**2035**	**2045**
Existing and Future Participant Demand	89,209	113,290	136,877	165,453
Power Generation Estimated Surface Water Demand	7,033	8,452	10,054	12,007
Average Treated Surface Water to be Delivered	20,164	60,492	80,656	100,000
Total Groundwater Use	62,012	44,346	46,167	53,446

Numerous potential users of reclaimed wastewater have been identified among the 197 Participants in the Joint WRAP. Possible users of reclaimed water that provide the greatest potential include golf courses, property owners associations, MUDs that currently use groundwater for amenity lake maintenance and/or irrigation, and other irrigated areas such as school athletic fields, and public and commercial landscaping. In addition, numerous potential users of untreated Lake Conroe raw surface water for irrigation purposes were identified.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Sugar Land GRP

DATE: July 6, 2009

SUMMARY

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Sugar Land Coalition will reduce groundwater use by implementing surface water conversion. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Conversion volume of 10,080 AFY in 2013 and 24,640 AFY in 2025

SUPPLY SOURCE: Surface water conversion

IMPLEMENTATION DECADE:	30% reduction – 2013 60% reduction – 2025
TOTAL STRATEGY COST: (Costs rounded to nearest $100)	$59,550,000 capital cost, surface water plant, Phase 1 $23,275,000 capital cost, transmission line, Phase 1 $66,739,700 capital cost, surface water plant, Phase 2 $11,795,400 capital cost, transmission line, Phase 2
UNIT WATER COST:	$1,234 per acre-foot allocated in 2011 RWP

Water Management Strategy Analysis Description

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a Groundwater Reduction Plan (GRP) which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

The Sugar Land Coalition brings together the city and 17 other entities to implement their GRP. The entities included in the Sugar Land Coalition are listed in Table 1. The GRP also utilizes water reuse and efficient and water conservation management practices, including participation in the FBSD's WaterWise program.

Table 1
Participants in GRP

WUG Name	Listed as a WUG in Regional Water Plan
City of Sugar Land	Yes
Fort Bend County MUD No. 112 (New Territory)	No
Fort Bend County MUD No. 106 (Greatwood)	Yes
Fort Bend County MUD No. 1 (River Park)	No
Plantation MUD	Yes
Royal Valley Utilities, Inc.	No
Texas Department of Criminal Justice (TDCJ)	No
Avalon CAI	No
New Territory Residential Community Association	No
Sugar Lakes Homeowners Association	No
River Park HOA	No
Royal Lake Estates HOA	No
First Colony Community Service Association	No
Sugar Mill Community Association	No
WSG Sweetwater IV, LP (Sweetwater Golf)	No
River Point Golf Course	No
Texas Par Golf Academy, Inc.	No
Schlumberger Technology Corporation	No

Analysis:

The GRP lays out the City of Sugar Land's planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. The City is partnering in this endeavor with 17 other entities, our combined systems representing 67 wells in total. These entities include extraterritorial jurisdiction (ETJ) communities and select private well owners in the City and ETJ.

This GRP is the culmination of many years of planning and several studies evaluating the City's potential conversion strategies. The final supply and demand projections, infrastructure sizing and cost estimates, and selection of comprehensive conversion strategies are the result of the City's Water Master Plan 2007 Update. The Water Master Plan Update, the bulk of which being the demand and supply projections, hydraulic modeling, water quality analysis and infrastructure planning for the GRP, was approved by the City Council on December 12, 2007.

The primary strategy used has been to over-convert densely populated areas, making use of existing potable water infrastructure. The primary source of their non-groundwater supplies will be the phased implementation of a City-owned surface water treatment plant. Treated surface water from this plant will be piped to existing water plants, mixed with groundwater based on seasonal usage patterns, and then pumped into our existing City water system, and eventually out to select areas of the ETJ at later conversion milestones. The Brazos River/Oyster Creek surface water the City will utilize in these efforts is currently under contract with the Gulf Coast Water Authority and Fort Bend County Water Control and Improvement District No. 1.

The preliminary plant design and sizing are both conservative estimates. The City has incorporated all available data regarding regional water quality issues into the considerations of our treatment design. The plant cost is currently based on a MF/UF Membrane treatment plant with the option for potential implementation of a Reverse Osmosis (RO) side stream. We feel this combination of treatment technologies and distribution strategies is sufficiently conservative to allow for unforeseen future changes in water quality or regulatory compliance.

To complement our surface water plant, the City is investing in the planning and implementation of nonpotable water projects using both raw surface water and treated wastewater effluent. Additionally, the

City is participating in the Subsidence District's WaterWise program and working on a series of water conservation efforts. To be conservative, our demand projections and preliminary plant sizing consider only those nonpotable projects and credit volumes that are either already being implemented or are designated projects. However, it is the City's intent to utilize its nonpotable supplies to the greatest extent feasible, and potential future projects are also identified in this report.

The timelines for the infrastructure projects necessary to implement these conversion strategies is included in this report. The City has created a surface water enterprise fund to pay for the costs of the conversion process, which will be funded by a mix of revenue bonds and system revenues.
The system revenues are supplied via a pumpage fee (currently $0.25/1000 gallons of water whether pumped groundwater or supplied alternative sources) that the City has already implemented for itself and its GRP participants.

Water User Group Application:

The Sugar Land Coalition has starting implementation of this strategy, specifically construction of the surface water treatment plant. This method has the potential to reduce shortages by 10,080 AFY in 2013 and 24,640 AFY in 2025. The preliminary plant sizing calculations are shown in Table 2.

Table 2
Preliminary Plant Sizing Calculations

Preliminary Plant Sizing Calculations - Phase I		
Year 2024 Average Daily Flow	31.81 MGD	
Add: Over Conversion for Private Well Owners ADF:	1.69 MGD	
Subtotal of All Users:	33.50	
Conversion to Surface Water Basic Requirement:	10.05 MGD	
Less Non-Potable Water Usage:	2.00 MGD	at 1:1 Ratio
Subtotal Adjusted Surface Water Requirement:	8.05 MGD	
Plant Oversizing Percentage:	10%	
Phase I Plant Size:	**8.85** MGD	
Recommend:	**9.00 MGD**	
Preliminary Plant Sizing Calculations - Phase II		
Ultimate Average Daily Flow	33.07 MGD	
Add: Over Conversion for Private Well Owners ADF:	1.69 MGD	
Subtotal of All Users:	34.76	
Conversion to Surface Water Basic Requirement:	20.86 MGD	
Less Non-Potable Water Usage:	2.00 MGD	at 1:1 Ratio
Subtotal Adjusted Surface Water Requirement:	18.86 MGD	
Oversizing Percentage:	15%	
Needed Plant Size, Total:	21.68 MGD	
Less Phase I Construction	9.00	
Phase II Plant Expansion:	**12.68** MGD	
Recommend:	**13.00 MGD**	

Issues and Considerations:

In Fort Bend County, the potential reduction in groundwater use may be used to offset subsidence but the demand must be fulfilled by alternative supplies, which are primarily surface water supplies. Should this strategy be adopted, all of the implementation cost will be borne by the Sugar Land Coalition. Accomplishing the water conservation demand reductions requires pro-active implementation. One of the impacts associated with the strategy outlined herein or that may result from implementation of the water management strategy is the increase in permitted GCWA diversions. Otherwise the water management strategy should produce minimal environmental impacts.

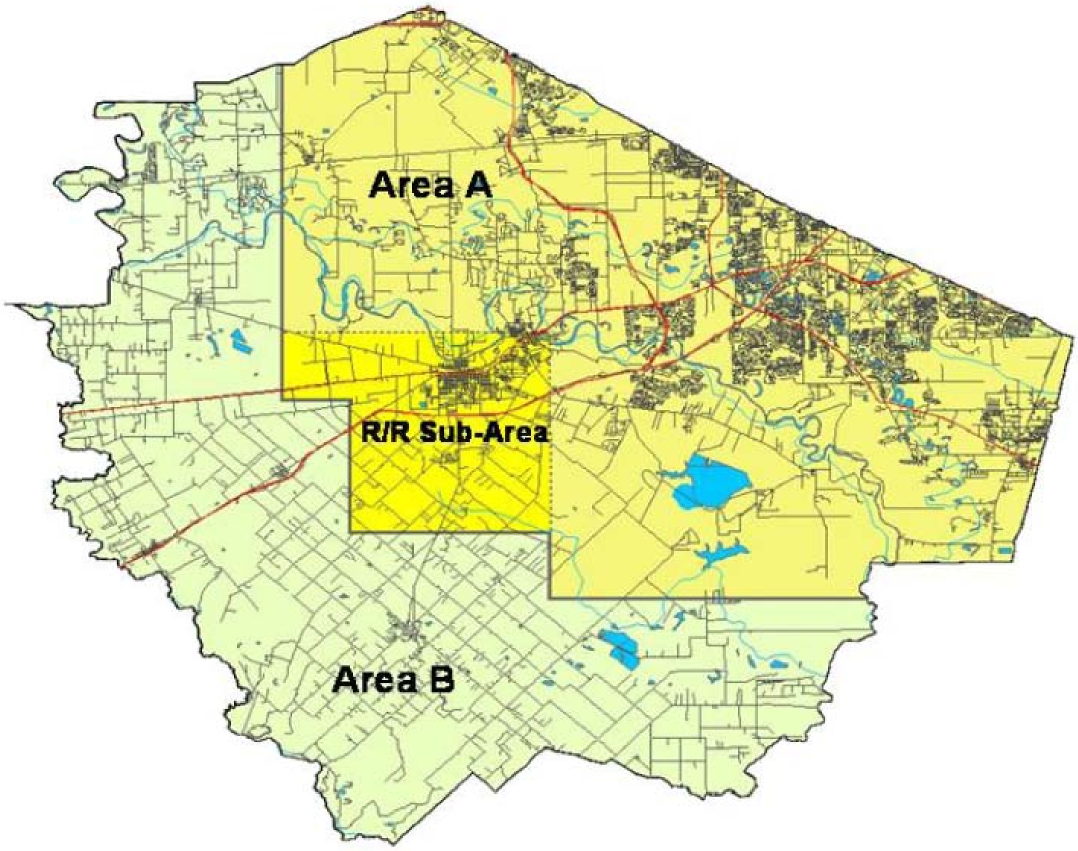
References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

City of Sugar Land Groundwater Reduction Plan, City of Sugar Land, March 2008

City of Sugar Land 2010-2014 Capital Improvement Program – Surface Water

Figure 1. Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Transmission Line to CHCRWA Municipal WUG and WWP

DATE: September 3, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: The transmission of Lake Houston surface water supplies via the Northeast Water Purification Plant (NEWPP) to the Central Harris County Regional Water Authority (CHCRWA) to meet projected shortages.

SUPPLY QUANTITY: Approximately 4,800 acre-feet per year (CHCRWA Portion Only). Note that this is not a new supply but rather represents conveyance of a volume reflected under other WMS.

SUPPLY SOURCE: Surface water from Lake Houston and Lake Livingston via NEWPP.

IMPLEMENTATION DECADE: 2010 – Greens Road Transmission line, Phase I and Major Distribution Infrastructure

TOTAL STRATEGY COST: TBD

UNIT WATER COST: TBD

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Authority was created in 2005 to prepare and implement a plan to construct and operate the necessary public water transmission facilities to convert an area in central Harris County, Texas, comprised of eleven (11) conservation and reclamation districts from groundwater to surface water. The Authority will wholesale treated surface water to connected participants. Surface water will be purchased from the City of Houston (COH) and is conveyed to participants' water plant facilities.

Analysis:

To meet the 2010 to 2019 water demands, the COH will provide a transmission line from the NEWPP to the intersection of the Sam Houston Toll Road (Beltway 8) and US 59 (Eastex Freeway). The North Harris County Regional Water Authority (NHCRWA) will connect at this point and construct its own transmission line. The transmission line will be a 60-inch diameter pipe traveling through easements north to Greens Road. At Greens Road, the pipeline will be constructed in the right-of-way of Greens Road. The pipeline would then turn north to meet the Spears Road Regional Pump Station, where the water will discharge into groundwater storage tanks at a proposed pump station. The 2020 through 2030 proposed transmission system, from the NEWPP to the proposed pump stations, will convey only water for wholesale customers within the NHCRWA.

CHCRWA is also responsible for the construction of a transmission line to the take point from the NHCRWA transmission line and secondary surface water transmission system to its member districts. In order to secure treated capacity, the CHCRWA will participate in the Northeast Water Purification Plant (NEWPP) for a portion equal to their need for treated surface water.

Water User Group Application:

The water conveyed into the San Jacinto River Basin through this strategy would meet all projected shortages in CHCRWA throughout the planning period. The Greens Road transmission line will be completed in a cost sharing program with North Harris County Regional Water Authority. The preliminary estimate of capital costs are shown in Table 1.

Issues and Considerations:

Although the supply infrastructure (Lake Houston via NEWPP) is in place, the conveyance required for this transfer is not. The NHCRWA transmission lines or similar transmission lines must be constructed to move this supply into the San Jacinto River Basin.

References:

North Harris County Regional Water Authority Groundwater Reduction Plan, Central Harris County Regional Water Authority, May 2003

"Texas Water Development Board Approves $22,050,000 Loan to the Central Harris County Regional Water Authority for Water Project Construction." TWDB Press Release, http://www.twdb.state.tx.us, March 25, 2008, accessed July 9, 2009.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: CLCND West Chambers System

DATE: November 24, 2009

SUMMARY

STRATEGY DESCRIPTION: Development of additional infrastructure to treat and distribute surface water to western Chambers County

SUPPLY QUANTITY: TBD – up to approx. 2,800 afy allocated in DB12. Right holder has substantial remaining water in right.

SUPPLY SOURCE: Trinity River

IMPLEMENTATION DECADE: 2020 (2014)

TOTAL STRATEGY COST: $20,380,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $408 (for allocated portion of right)

Water Management Strategy Analysis Description

Introduction:

This WMS consists of allowing the Chambers-Liberty County Navigational District (CLCND) treatment and distribution system to provide run-of-river supply diverted from the Trinity River to users in western Chambers County.

Analysis:

The project would use existing canals to convey raw surface water from a new diversion point on the Trinity River (under the existing CLCND right) to a proposed surface water treatment plant. Water would be used by municipal WUGs in western Chambers County. This WMS would reduce groundwater use.

Water User Group Application:

Treated water will be delivered to municipal WUGs in western Chambers County.

Issues and Considerations:

A Certificate of Adjudication Amendment is required to add a diversion point for the CLCND water right.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Houston Treatment and Distribution Expansion

DATE: November 30, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Expansion of City of Houston treatment and distribution capacity to meet Harris-Galveston Subsidence District Regulations as well as increasing customer demands.

SUPPLY QUANTITY: Enhanced treatment and distribution; new supply is from other strategies

SUPPLY SOURCE: Lake Houston, Lake Livingston

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST:	$66,895,500 capital cost, 2010 treatment
(Costs rounded to nearest $100)	$975,979,500 capital cost, 2020 treatment
	$446,248,900 capital cost, 2030 treatment
	$223,261,800 capital cost, 2040 treatment
	$166,643,200 capital cost, 2050 treatment
	$166,643,200 capital cost, 2060 treatment
	$118,060,000 capital cost, 2011-2015 transmission expansion

UNIT WATER COST: $1,003 per ac-ft for treatment

<u>Water Management Strategy Analysis Description</u>

Introduction:

The City of Houston (COH) is among the largest providers of surface water to customers in Region H. COH currently treats water originating in Lakes Houston and Livingston at three treatment plants prior to distribution to customers. The three plants are the Northeast Water Purification Plant (NEWPP), the East Water Purification Plant (EWPP), and the Southeast Water Purification Plant (SEWPP). Over the course of RWP planning period, increasing COH and customer demands as well as Harris-Galveston Subsidence District requirements will drive the need for additional surface water treatment and distribution capacity.

Analysis:

Increasing need for treated surface water throughout the COH service area will require development of additional treatment and distribution capacity. The City currently operates three surface water treatment plants (NEWPP, SEWPP, and EWPP). Primary customers for the NEWPP are NHCRWA, CHCRWA, WHCRWA (after 2020), and NFBWA (after 2025). Source water for the NEWPP is from Lake Houston with Trinity River water delivered to Lake Houston through Luce Bayou beginning in 2020. The City will also need to treat water at the NEWPP for COH needs. The SEWPP serves Clear Brook City MUD, Pearland, Friendswood, and Webster as well as WUGs served by the City of Pasadena, Clear Lake City Water Authority, and the La Porte Area Water Authority. Water is supplied to the SEWPP via the

Southwest Lateral of the CWA canal system. Remaining demand for COH is assigned to the EWPP, including much of the demand for COH itself. The EWPP is also supplied by the CWA canal system.

In order to estimate the future treated capacity needs for the COH, existing contracts and future water management strategy allocations (with COH as the WWP) were assigned to the appropriate water treatment plant. Demands for each plant are assumed to peak at a multiplier of 1.4. Capacity requirements for each plan are shown in Tables 1 through 3. Note that for the EWPP, required capacity was estimated as the total demand on COH supplies from Lakes Houston and Livingston less raw water needs for industry and the capacity already handled at the other two plants. Due to limitations on available information, capacity estimates have not been made for pump stations or internal distribution.

Table 1
NEWPP Required Capacity by Decade (ac-ft)

Authority	WWP No.	2010	2020	2030	2040	2050	2060
NHCRWA	999904	34,714	91,167	117,755	99,625	81,126	117,755
CHCRWA	999902	2,375	4,146	4,789	4,806	4,806	4,806
WHCRWA	999907	0	30,596	45,083	51,518	54,307	57,161
NFBWA	999901	0	0	17,527	30,717	40,728	49,998
COH[1]	396200	0	44,830	44,830	68,000	68,000	68,000
TOTAL		37,089	170,739	229,984	254,666	248,967	297,720
Peaking Factor		*1.40*	*1.40*	*1.40*	*1.40*	*1.40*	*1.40*
PEAKED TOTAL		***55,634***	***233,694***	***322,561***	***347,999***	***339,451***	***412,580***

[1]Assuming 40 MGD for COH from Luce Bayou through 2030 and 60.7 MGD after 2030.

Table 2
SEWPP Required Capacity by Decade (ac-ft)

Authority	WWP No.	2010	2020	2030	2040	2050	2060
Clear Brook City	084063000	1,680	1,680	1,680	1,680	1,680	1,680
City of Pasadena	651900	40,379	40,792	41,179	41,667	42,093	42,582
Clear Lake City Water Authority	159000	17,866	17,866	17,866	17,866	17,866	17,866
Pearland	080457000	16,235	16,235	16,975	18,597	20,720	23,148
Friendswood	080219000	6,719	6,719	6,719	6,719	6,719	6,719
Webster	080635000	9,010	9,010	9,010	9,010	9,010	9,010
La Porte	080346000	8,190	8,186	8,190	8,177	8,175	8,173
South Houston	080569000	4,199	4,199	4,199	4,199	4,199	4,199
TOTAL		104,278	104,687	105,818	107,915	110,462	113,377
Peaking Factor		*1.40*	*1.40*	*1.40*	*1.40*	*1.40*	*1.40*
PEAKED TOTAL		***145,989***	***146,562***	***148,145***	***151,081***	***154,647***	***158,728***

Table 3
EWPP Required Capacity by Decade (ac-ft)

Authority	WWP No.	2010	2020	2030	2040	2050	2060
COH L Houston		140,957	176,100	176,056	178,600	175,772	172,928
COH L Livingston		764,699	896,602	1,002,238	1,029,324	1,064,324	1,064,324
Manufacturing[1]	081001101	-384,899	-389,274	-393,021	-391,622	-390,987	-322,393
Mining[1]	081003101	-143	-279	-365	-464	-556	-641
Steam Electric [1]	081002101	-14,769	-21,565	-25,213	-25,454	-26,194	-29,756
NEWPP Total		-37,089	-170,739	-229,984	-254,666	-248,967	-297,720
SEWPP Total		-104,278	-104,687	-105,818	-107,915	-110,462	-113,377
TOTAL		364,478	386,158	423,893	427,803	462,930	473,365
Peaking Factor		*1.40*	*1.40*	*1.40*	*1.40*	*1.40*	*1.40*
PEAKED TOTAL		***510,269***	***540,621***	***593,450***	***598,924***	***648,102***	***662,711***

[1]Raw water demands met by the City of Houston.

Table 4 shows current (2009) plant capacities for each plant along with COH projections of future plant capacity by decade. These capacities are compared to the required capacities above to determine if expansion in excess of that already anticipated by COH will be required (see Table 5).

Table 4
Planned Treatment Plant Capacity by Decade

Plant	Unit	Current	2010	2020	2030	2040	2050	2060
NEWPP	MGD	80	80	280	440	520	580	640
	ac-ft	89,600	89,600	313,600	492,800	582,400	649,600	716,800
SEWPP	MGD	120	120	200	200	200	200	200
	ac-ft	134,400	134,400	224,000	224,000	224,000	224,000	224,000
EWPP	MGD	260	280	350	350	350	350	350
	ac-ft	291,200	313,600	392,000	392,000	392,000	392,000	392,000

Table 5. Projected Capacity and Additional Plant Capacity Requirements (ac-ft)

Plant	Capacity	2010	2020	2030	2040	2050	2060
NEWPP	Peaked Demand	55,634	233,694	322,561	347,999	339,451	412,580
	Projected Capacity	89,600	313,600	492,800	582,400	649,600	716,800
	Addl Capacity Reqd.	***-33,967***	***-79,907***	***-170,239***	***-234,401***	***-310,150***	***-304,220***
SEWPP	Peaked Demand	145,989	146,562	148,145	151,081	154,647	158,728
	Projected Capacity	134,400	224,000	224,000	224,000	224,000	224,000
	Addl Capacity Reqd.	***11,589***	***-77,438***	***-75,855***	***-72,919***	***-69,353***	***-65,272***
EWPP	Peaked Demand	510,269	540,621	593,450	598,924	648,102	662,711
	Projected Capacity	313,600	392,000	392,000	392,000	392,000	392,000
	Addl Capacity Reqd.	***196,669***	***148,621***	***201,450***	***206,924***	***256,102***	***270,711***
TOTAL Additional COH Capacity Needed		**174,292**	**-8,724**	**-44,644**	**-100,396**	**-123,401**	**-98,781**

It is the City's official position that they will be able to take from the NEWPP all they need to meet growing demands; that is, they are operating as a unified system and can shift demands from one plant to another. Past a certain point, this will involve additional pipeline capacity to move water from one location to another. Thus, the extra capacity projected for the NEWPP and SEWPP (negative values in Table 5) will be able to meet the excess demand indicated for the EWPP.

The exception to this is the period for 2010 through 2019, for which total demands are shown to exceed total system treatment capacity. However, note that the required capacities estimated from Region H data reflect contract amounts and WMS allocations rather than actual demands. While the Authorities (NHCRWA, NFBWA, WHCRWA, CHCRWA) are beginning to take surface water beyond their demands to expedite surface water conversions, not all COH customer WUGs will be using their full contracted volume beginning in 2010. Thus, the required treatment capacity in early decades is overly conservative, but becomes more accurate with time as WUG demands meet or exceed current contract amounts. For this reason, it is expected that the treatment capacities listed in Table 4 will be adequate to meet needs through 2060.

Costs were estimated for plant expansions using the Region H cost estimation criteria (Appendix 4C). Treatment plant expansion cost was estimated as $2,000,000 per MGD of added capacity. Engineering and contingency costs were assumed to be 35 percent of the capital cost for construction. Interest during construction is calculated, according to TWDB guidelines, as the total interest accrued by a 6 percent annual interest rate on the total borrowed funds at the end of the construction phase less a 4 percent annual rate of return on investment of unspent funds. A standard construction period of 2 years is used to calculate interest. Annual costs calculated consisted of debt service and operations and maintenance costs (assumed at 2.5 percent of construction cost).

Table 6
Estimated Cost of COH Surface Water Treatment Capacity Expansion

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$1,350,907,294	$ 1,350,907,294
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES (30% OF ENGINEERING COST)	1	LS	$ 472,817,553	$ 472,817,553
3	LAND & EASEMENTS	1	LS	$ -	$ -
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ -	$ -
5	INTEREST DURING CONSTRUCTION	1	LS	$ 221,947,314	$ 221,947,314
	PROJECT COST				**$ 2,045,672,161**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ 5,832,257	$90,922,599	$123,996,351	$ 58,370,987	$33,993,695	$29,057,434
2	OPERATION & MAINTENANCE (O&M)	$ 1,104,401	$ 17,217,171	$ 24,584,442	$ 28,270,345	$31,021,514	$33,772,682
3	PUMPING ENERGY COSTS	$ 733,376	$ 13,567,456	$ 19,434,464	$ 22,367,968	$24,568,096	$26,768,224
	TOTAL ANNUAL COST	**$ 7,670,034**	**$121,707,226**	**$168,015,257**	**$ 109,009,300**	**$89,583,305**	**$89,598,340**

Near-term costs for City of Houston transmission and distribution expansions were provided in the COH's proposed Adjusted Water Capital Improvements Program for Surface Water Transmission (CIP). The CIP included proposed capital spending levels for the period from 2011 through 2022. Based on the data from the CIP, costs for the RWP are estimated as $229,390,000 for 2020 and $31,650,000.

Water User Group Application:

The planned expansions of the NEWPP, SEWPP, and EWPP will enable the COH to meet increasing needs for itself and customer WUGs and WWPs as well as enabling the COH and customers to meet groundwater reduction mandates established by the Fort Bend Subsidence District and the Harris-Galveston Subsidence District.

Issues and Considerations:

The ability of the COH to meet growing demands for surface water is contingent on timely completion of the Luce Bayou interbasin transfer.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Harris County MUD No. 50 Water Treatment Plant

DATE: November 24, 2009

SUMMARY

STRATEGY DESCRIPTION: A surface water treatment plant for Harris County MUD No. 50

SUPPLY QUANTITY: 632 acre-feet per year. Since this volume is from an existing contract, it is listed in the water planning database as an existing supply.

SUPPLY SOURCE: San Jacinto Basin (via canal)

IMPLEMENTATION DECADE: 2020 (2013)

TOTAL STRATEGY COST: $6,131,600 capital cost, treatment plant construction (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $736 per ac-ft

Water Management Strategy Analysis Description

Introduction:

The Harris-Galveston Subsidence District regulatory plan mandates that encompassed municipalities and utility districts limit groundwater use to 20 percent of their total demand through 2030. In order to meet this requirement, Harris County Municipal Utility District No. 50 (MUD No. 50) pursuing the development of a surface water treatment plant.

Analysis:

MUD No. 50 proposes having a 1 MGD surface water treatment plant active by July 2013. The San Jacinto River Authority has provided MUD No. 50 with a letter of availability to provide surface water. Raw water would be received via a canal near the proposed plant site. The City of Houston has provided the MUD with a quality analysis of the raw water source.

Water User Group Application:

Raw water will be treated and used to meet demands for the Harris County MUD No. 50 WUG.

Issues and Considerations:

None.

References:

Harris County MUD No. 50 Surface Water Treatment Plant Preliminary Engineering Report, June 2007.

Harris-Galveston Coastal Subsidence District – District Regulatory Plan, Harris-Galveston Subsidence District, September 2001.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Luce Bayou Interbasin Transfer

DATE: November 18, 2009

SUMMARY

STRATEGY DESCRIPTION: Construction of a raw water pumping station, pipelines, canal, and rectification of the Luce Bayou channel to convey a portion of the City of Houston's Trinity River water supply to Lake Houston to supply demands in northern and western Harris County and northern Fort Bend County.

SUPPLY QUANTITY: Up to 329,000 acre-feet per year through 2040[1]
Up to 450,000 acre-feet per year (current permit) ultimate capacity

SUPPLY SOURCE: Trinity River

IMPLEMENTATION DECADE: 2020 (pump station phasing for 2040 and ultimate development)

TOTAL STRATEGY COST: $253,917,000 capital cost (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $90 per acre-foot in 2040

Water Management Strategy Analysis Description

Introduction

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 2020 and 2025, respectively.

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 strategy 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.

[1] *Luce Bayou Interbasin Transfer Project DRAFT Preliminary Engineering Report*, October 2009

This project is currently in the preliminary engineering phase of development, funded by the Water Development Board Water Infrastructure Funding. The description of the project contained within this memorandum is subject to revision as details of the design are worked out prior to completion by 2020.

Analysis

The recommended concept for the Luce Bayou project consists of a raw water pump station at Capers Ridge on the Trinity River, three miles of pipeline leading to a sedimentation basin, followed by approximately 23.6 miles of canal that will lead to an outfall in Lake Houston. The conveyance facilities for the project will be built to ultimate capacity in the first phase of the project, while pump station facilities at Capers Ridge will be phased, with the first phase of development provided to meet year 2040 demands. These needs are shown in *Table 1*, below.

Table 1
Luce Bayou ADF Demands for Year 2040

NHCRWA	117,755
CHCRWA	4,806
WHCRWA [1]	39,000
NFBWA [1]	30,717
COH (NEWPP) [2]	44,800
COH (EWPP) [3]	22,400
Industrial Customers	89,499
TOTAL DEMANDS	**348,977**
Lake Houston Supply [4]	173,300
REMAINING ADF NEEDS	**175,677**

1 Portion of demand not met by EWPP supply.
2 Portion of NEWPP capacity required by COH (40 MGD).
3 20 MGD of supplied to EWPP through West Canal.
4 Includes COH portion of Lake Houston additional yield.

Peaking in the system will affect the needs for the maximum capacity of the conveyance. Current studies underway have identified a peak rate of 329,000 Ac-Ft/Yr for meeting demands in 2040. This factor accounts for the potential loss of up to 15% of the conveyed capacity through evaporation and channel losses. Final needs over time will vary based on the needs of participants and these projections are being further studied in the preliminary engineering phases of the project.

Water User Group Application

The water supplied by the Luce Bayou strategy 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.

Environmental Impact

Construction of Luce Bayou will require the development of pipeline and canal structures through a stretch of mixed land cover ranging from undeveloped forest near the Trinity River, to agricultural fields, to more developed areas near Lake Houston. Although this plan represents a disturbance along the alignment, this solution was identified as a preferable alternative to the improvement to the actual Luce Bayou channel in order to convey the volume of water needed. Luce Bayou is identified as a stream segment with high ecological function and the current alternative represents a favorable alternative to disturbance of this channel. The construction of an engineered channel also provides the greatest flexibility in minimizing environmental impacts by routing the conveyance around sensitive areas.

Impacts from the Luce Bayou strategy has been modeled in both the 2009 *Environmental Flows Study* conducted by Region H and the decadal analysis presented in *Appendix 4D* of this Plan. The project, along with other Region H strategies and the impacts of upstream influences were shown to have minor impacts on overall frequency of target attainment for Galveston Bay. Additional information can be found in the above-referenced studies.

It is not anticipated that the mixing of Trinity and San Jacinto River water within Lake Houston will result in a significant impact to water quality to the lake. However, the import of water has the potential to introduce foreign species to the basin.

Further environmental studies are currently being conducted as the preliminary engineering for the study continues.

Issues and Considerations

The City of Houston is expanding its Trinity River Pump Station below Livingston to realize the full permitted diversion rate. The addition of the Luce Bayou Diversion would give the City excess capacity, which could be used in conjunction with the Trinity River Pump Station to meet additional future needs and lend flexibility to Houston’s raw water conveyance capacity.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: NFBWA GRP/Transmission/Distribution

DATE: September 3, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: The transmission of 65,000 acre-feet per year of Lake Houston surface water supplies via the East Water Purification Plant (EWPP) and Northeast Water Purification Plant (NEWPP) to the North Fort Bend Water Authority (NFBWA) to meet projected shortages.

SUPPLY QUANTITY: Approximately 71,900 acre-feet per year transmission (NFBWA portion only), and approximately 106,400 acre-feet per year internal distribution. Note that this is not a new supply but rather represents conveyance / distribution of a volume reflected under existing and future contract water from the City of Houston.

SUPPLY SOURCE: Surface water from Lake Houston via East Water Purification Plant (EWPP) and Northeast Water Purification Plant (NEWPP).

IMPLEMENTATION DECADE: 2013 – Phase I Transmission line from EWPP
2025 – Phase II Transmission line from NEWPP

TOTAL STRATEGY COST: $225,000,000 capital cost, treatment and distribution
(Costs rounded to nearest $100) $213,000,000 capital cost, transmission line (NFBWA share)

UNIT WATER COST: $150 per acre-foot for transmission
$85 per acre-foot for distribution

<u>Water Management Strategy Analysis Description</u>

Introduction:

The North Fort Bend Water Authority (NFBWA) is a regional water authority created by the 79th Texas Legislature, with the passage of Senate Bill 1798 in May 2005. The primary reason for NFBWA's creation was to facilitate compliance with the Fort Bend Subsidence District's groundwater reduction mandates by creating a viable single entity to acquire, develop and deliver a long term supply of potable surface water to the water users in the NFBWA's Groundwater Reduction Plan (GRP). The water supply must come from an alternative supply, typically surface water.

Analysis:

The NFBWA has identified the City of Houston (COH) as the preferred source of water for long-term surface water supply. Water from the COH is projected to be available in sufficient quantities to meet the regulatory requirements of NFBWA throughout the planning horizon. The infrastructure to deliver this water will be built in two phases to facilitate conversion.

For the 2013 conversion, water will be supplied from the vicinity of the intersection of Bellaire Boulevard and South Dairy Ashford Street. Water received at the above location is treated at the COH East Water Purification Plant (EWPP) and conveyed through the COH transmission system.

For the 2025 conversion, the amount of water required by the NFBWA exceeds the capacity of the COH's existing system. The second take point will be from a proposed shared water supply line across the COH that will be built and operated jointly with the West Harris County Regional Water Authority (WHCRWA). The take point will be near the intersection of Clay and Peek Roads.

NFBWA is also responsible for the construction of a transmission line to the take point from the North Harris County Regional Water Authority (NCHRWA) transmission line and secondary surface water transmission system to its member districts.

Water User Group Application:

The water conveyed into the San Jacinto River Basin through this strategy would meet all projected shortages in NFBWA throughout the planning period. NFBWA plans to participate in the WHCRWA pipeline to bring water from the COH across town to the north of NFBWA. This pipeline will provide the water for NFBWA's second take point in 2025. The preliminary estimate of capital costs are shown in Table 1.

Issues and Considerations:

Although the supply infrastructure (Lake Houston via NEWPP) is in place, the conveyance required for this transfer is not. The WHCRWA transmission lines or similar transmission lines must be constructed to move this supply into the San Jacinto River Basin.

References:

North Fort Bend Water Authority Groundwater Reduction Plan, North Fort Bend Water Authority, March 2008

North Fort Bend Water Authority Website, http://www.nfbwa.com/, assessed July 10, 2009.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Transmission Line to NHCRWA Municipal WUG and WWP

DATE: September 3, 2009

SUMMARY

STRATEGY DESCRIPTION: The transmission of 164,900 acre-feet per year of Lake Houston surface water supplies via the Northeast Water Purification Plant (NEWPP) to the North Harris County Regional Water Authority (NHCRWA) to meet projected shortages.

SUPPLY QUANTITY: Approximately 117,800 acre-feet per year (does not includes CHCRWA shared capacity). Note that this is not a new supply but rather represents conveyance of a volume reflected under other WMS.

SUPPLY SOURCE: Surface water from Lake Houston via Northeast Water Purification Plant (NEWPP).

IMPLEMENTATION DECADE: 2010 – Greens Road Transmission line, Phase I and Major Distribution Infrastructure
2020 – Transmission line from NEWPP, Phase II and Major Distribution Infrastructure
2030 – Major Distribution Infrastructure

TOTAL STRATEGY COST:
(Costs rounded to nearest $100)
$153,149,600 capital cost, surface water plant, Phase I
$345,292,000 capital cost, surface water plant, Phase II
$80,690,000 transmission line, Phase I
$172,558,500 transmission line, Phase II
$37,439,500 infrastructure improvements

ANNUAL UNIT WATER COST: $106 per ac-ft transmission, $222 per ac-ft distribution

Water Management Strategy Analysis Description

Introduction:

On June 18, 1999, the bill that created the North Harris County Regional Water Authority (HB 2965) was signed into law. NHCRWA's primary assignment is to develop and implement a strategy for complying with the Harris-Galveston Subsidence District's Regulatory Plan that requires a reduction in groundwater usage to no more than 20 percent of total water demand by the year 2030. Its boundaries are essentially US 290 on the west, the Harris County line on the north (Spring Creek), FM 1960 and Bammel-North Houston on the south and the western shores of Lake Houston on the east. The NHCRWA is comprised of approximately 335 square miles and includes approximately 600,000 residents. NHCRWA has 160 political subdivisions within its boundaries that include municipal utility districts, public utility districts, water control and improvement districts, fresh water supply districts, water supply corporations, and municipalities.

Analysis:

To meet the 2010 to 2019 water demands, the City of Houston (COH) has provided a transmission line from the NEWPP to the intersection of the Sam Houston Toll Road (Beltway 8) and US 59 (Eastex Freeway). The NHCRWA connected at this point and has constructed, in conjunction with the COH, a transmission main line. The transmission line will be a 60-inch diameter pipe traveling through easements north to Greens Road. At Greens Road, the pipeline will be constructed in the right-of-way of Greens Road. The pipeline would then turn north to meet the Spears Road Regional Pump Station, where the water will discharge into groundwater storage tanks at a proposed pump station.

The 2020 through 2030 proposed transmission system, from the NEWPP to the proposed pump stations, will convey only water for wholesale customers within the NHCRWA, as did the 2010 system. A 102-inch diameter line is planned from a shared transmission line with the COH around US59 to Hardy Road. At this intersection, the NHCRWA proposes a portion of the water would be diverted north along the right-of-way of Hardy Road through a 54-inch diameter pipe to discharge into ground storage tanks at the proposed pump station near the intersection of Hardy Road and Candleridge Street. The remaining water will be diverted through an 84-inch diameter pipeline extending west from Hardy Road along the right-of-way of Beltway 8. This pipeline ultimately terminates near SH249. This line would discharge into the ground storage tanks at the proposed pump station near this latter intersection.

Water User Group Application:

The water conveyed into the San Jacinto River Basin through this strategy would meet all projected shortages in NHCRWA throughout the planning period. The Greens Road transmission line was completed in a cost sharing program with Central Harris County Regional Water Authority.

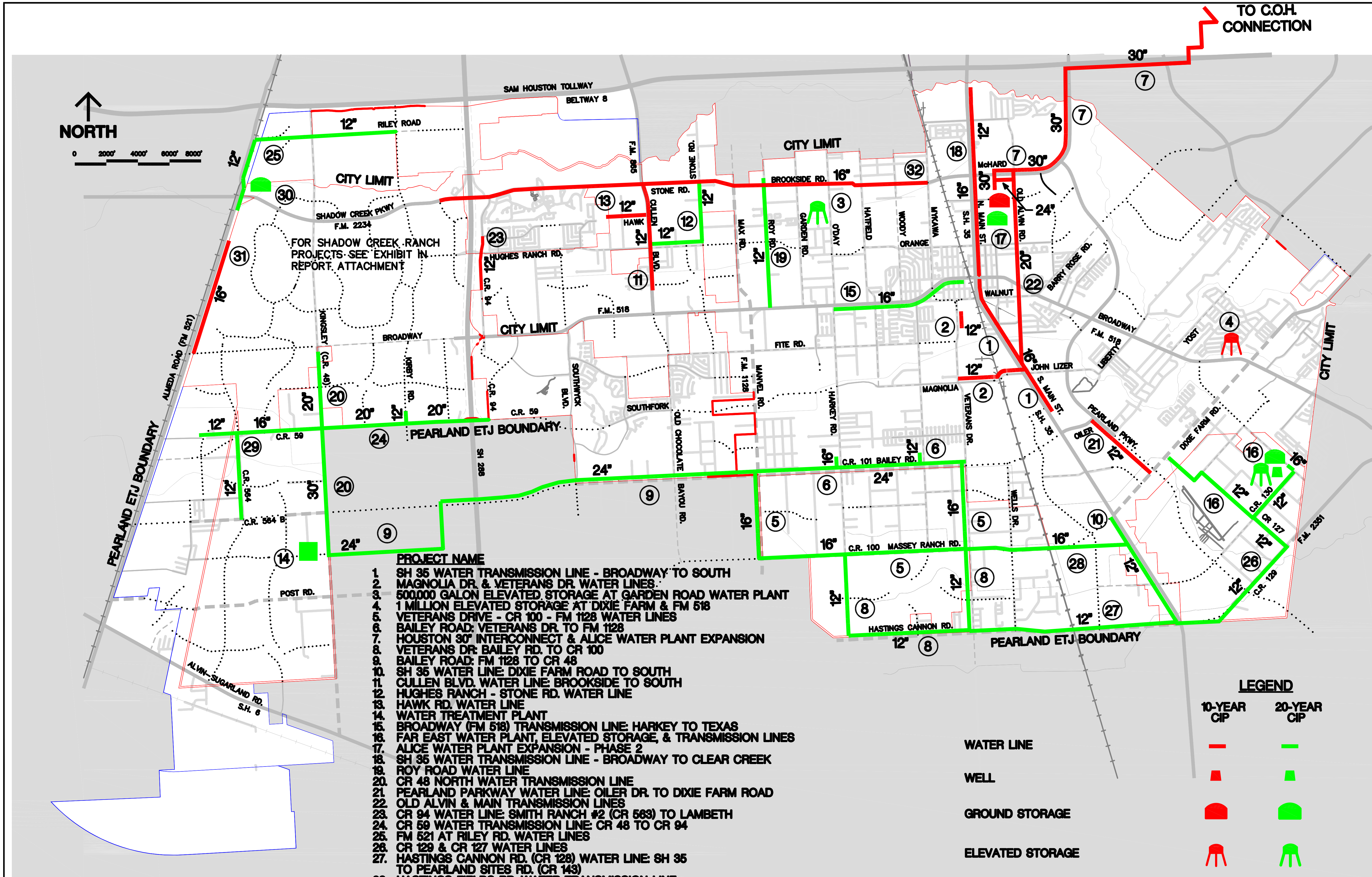
Issues and Considerations:

Providing adequate supply into the future will require the introduction of additional raw water supply to Lake Houston. The Luce Bayou project will be required beginning in 2020 to serve all of the customers of the NEWPP, including NHCRWA.

References:

North Harris County Regional Water Authority Groundwater Reduction Plan, North Harris County Regional Water Authority, May 2003

North Harris County Regional Water Authority Website, http://www.nhcrwa.com/, assessed July 9, 2009.



PROJECT NAME

1. SH 35 WATER TRANSMISSION LINE - BROADWAY TO SOUTH
2. MAGNOLIA DR. & VETERANS DR. WATER LINES
3. 500,000 GALON ELEVATED STORAGE AT GARDEN ROAD WATER PLANT
4. 1 MILLION ELEVATED STORAGE AT DIXIE FARM & FM 518
5. VETERANS DRIVE - CR 100 - FM 1128 WATER LINES
6. BAILEY ROAD: VETERANS DR. TO FM 1128
7. HOUSTON 30" INTERCONNECT & ALICE WATER PLANT EXPANSION
8. VETERANS DR: BAILEY RD. TO CR 100
9. BAILEY ROAD: FM 1128 TO CR 48
10. SH 35 WATER LINE: DIXIE FARM ROAD TO SOUTH
11. CULLEN BLVD. WATER LINE: BROOKSIDE TO SOUTH
12. HUGHES RANCH - STONE RD. WATER LINE
13. HAWK RD. WATER LINE
14. WATER TREATMENT PLANT
15. BROADWAY (FM 518) TRANSMISSION LINE: HARKEY TO TEXAS
16. FAR EAST WATER PLANT, ELEVATED STORAGE, & TRANSMISSION LINES
17. ALICE WATER PLANT EXPANSION - PHASE 2
18. SH 35 WATER TRANSMISSION LINE - BROADWAY TO CLEAR CREEK
19. ROY ROAD WATER LINE
20. CR 48 NORTH WATER TRANSMISSION LINE
21. PEARLAND PARKWAY WATER LINE: OILER DR. TO DIXIE FARM ROAD
22. OLD ALVIN & MAIN TRANSMISSION LINES
23. CR 94 WATER LINE: SMITH RANCH #2 (CR 563) TO LAMBETH
24. CR 59 WATER TRANSMISSION LINE: CR 48 TO CR 94
25. FM 521 AT RILEY RD. WATER LINES
26. CR 129 & CR 127 WATER LINES
27. HASTINGS CANNON RD. (CR 128) WATER LINE: SH 35 TO PEARLAND SITES RD. (CR 143)
28. HASTINGS FIELDS RD. WATER TRANSMISSION LINE: SH 35 TO PEARLAND SITES RD. (CR 143)
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31. FM 521 WATER TRANSMISSION LINE: BROADWAY TO MOORING POINTER DR.
32. McHARD ROAD: BUSINESS CENTER DRIVE TO MYKAWA ROAD

LEGEND

	10-YEAR CIP	20-YEAR CIP
WATER LINE		
WELL		
GROUND STORAGE		
ELEVATED STORAGE		
WATER SUPPLY CONNECTION		
SURFACE WATER PLANT		

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CITY OF PEARLAND

WATER CAPITAL IMPROVEMENTS

DATE: JUNE 2010

EXHIBIT NO. 1

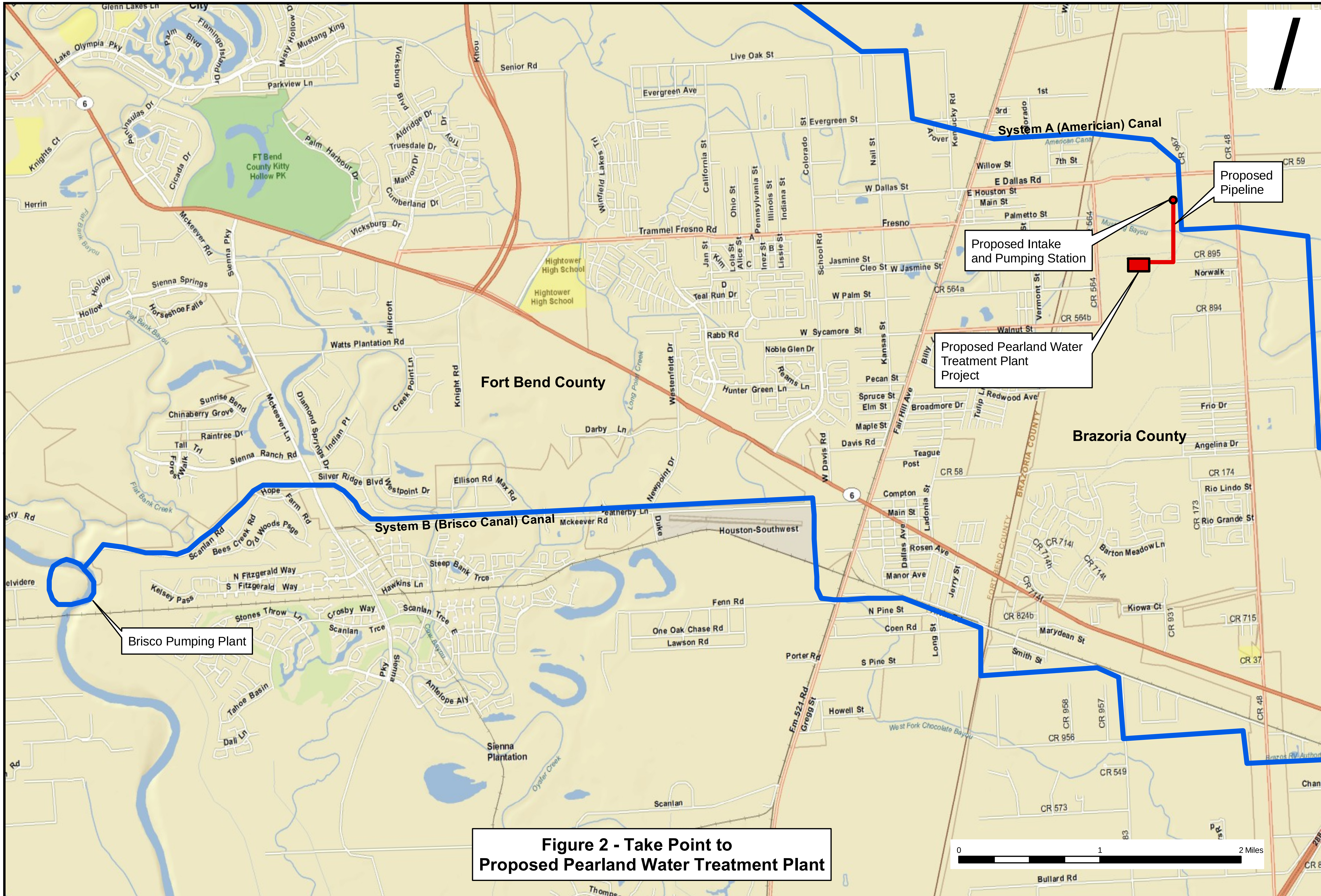


Figure 2 - Take Point to Proposed Pearland Water Treatment Plant

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Pearland Surface Water Treatment Plant and Conveyance System

DATE: December 3, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Development of a raw water conveyance system and surface water treatment plant for the City of Pearland to meet projected shortages and reduce dependence on groundwater.

SUPPLY QUANTITY: 6,720 ac-ft per year (10 mgd) in 2010
13,420 ac-ft per year (20 mgd) in 2040 (ultimate capacity)

SUPPLY SOURCE: Gulf Coast Water Authority (GCWA) Brazos River Supplies through a take point off GCWA's American Canal

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST: Annual Operation Cost TBD
$ 46,500,000 - 2010 phase
$ 218,500,000 – 2020 phase

TBD

<u>Water Management Strategy Analysis Description</u>

Introduction:

The City of Pearland, Texas is located just south of Houston along the Gulf Coast and encompasses an area of approximately 48 square miles. Most of Pearland lies in northern Brazoria County with portions extending into Harris and Fort Bend Counties. Population estimates increased five-fold from 18,700 in 1990 to 92,600 in 2009 and is projected to double by 2026.

To plan for future growth and reduce dependence on groundwater, 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.

Analysis:

Pearland's current water facilities include groundwater wells, storage tanks, booster pumps, pipelines, and imported water connections. Pearland has in their 10 and 20 year Capital Improvement Plans to add facilities in order to serve future growth particularly the west side where there is more open land for future development. The demand/balance and resulting shortages is shown in Table 1.

Table 1
Supply/Demand Balance for Pearland in Brazoria and Harris Counties

		Brazoria						Harris					
		2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
	Demand	11,965	14,925	17,508	19,949	22,681	25,525	445	513	579	646	717	788
Existing Supply	Existing GCWA Supplies[1]	15,112	15,155	15,174	15,184	15,195	15,205	563	520	501	491	480	470
Existing Supply	Existing COH Supplies[2]	540	541	542	542	543	543	20	19	18	18	17	17
Existing Supply	Existing Groundwater[3]	0	0	0	0	0	0	89	103	116	116	116	116
Minor WMS	Conservation	216	538	631	719	817	920	8	18	21	23	26	28
Minor WMS	Expanded Use of Groundwater	0	0	421	1,142	1,692	2,074	0	14	27	27	27	27
Minor WMS	Expand / Increase Current Contracts[4]	0	0	201	294	325	0	0	0	0	0	4	0
	Remaining Shortage/Surplus[5]	***-3,903***	***-1,309***	***539***	***2,068***	***4,109***	***6,783***	***-235***	***-161***	***-104***	***-29***	***47***	***130***

Notes:
1. Brazos run-of-river supplies from water rights 5168 and 5322.
2. From the Livingston-Wallisville System.
3. Source is the Gulf Coast Aquifer.
4. Additional allocation out of Livingston-Wallisville supply.
5. Negative numbers indicate a surplus. This value represents the remaining amount that must be supplied through major WMS to meet shortages after minor WMS.

There is no supply shortage anticipated until 2030. However, the City of Pearland is planning on reducing their dependence on groundwater, utilizing surface water supplies currently contracted, and to begin conversion to surface water supply to meet a portion of their total demands. To facilitate this plan, Pearland does require additional facilities to convey and treat the raw water and distribute to the users. Pearland is responsible for the intake, pump station and transmission system from the take point from GCWA's American Canal to their surface water treatment plant site. The associated transmission and distribution systems are shown in Figure 1. A diagram of a possible conveyance route is shown in Figure 2. The projected cost of the conveyance system, water treatment plant , and the associated transmission and distribution systems is estimated to be a total of approximately $265,000,000 as provided in Table 2.

Table 2
Project Cost Estimate

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	10 MGD WATER TREATMENT PLANT, RESERVOIR, INTAKE PUMP STATION AND TRANSMISSION	1	EA	$ 122,131,350	$ 122,131,350
2	RAW WATER RESERVOIR, INTAKE AND PUMP STATION	1	EA	$ 34,342,100	$ 34,342,100
3	ASSOCIATED TRANSMISSION AND DISTRIBUTION SYSTEM	1	EA	$ 108,493,500	$ 108,493,500
	TOTAL PROJECT COST				$ 264,966,950

Water User Group Application:

With the goal of reducing the consumption of groundwater, the City of Pearland has started implementation of this strategy, specifically through the contractual agreements for water supply with the GCWA, acquisition of the surface water treatment plant site and stabilization of the future raw water reservoir. Water conveyed through this strategy would meet all projected shortages in the City of Pearland and area within its extraterritorial jurisdictional (ETJ) throughout the planning period.

Issues and Considerations:

One impact associated with the implementation of this water management strategy 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 strategy. Otherwise implementation of this strategy should produce minimal environmental impacts.

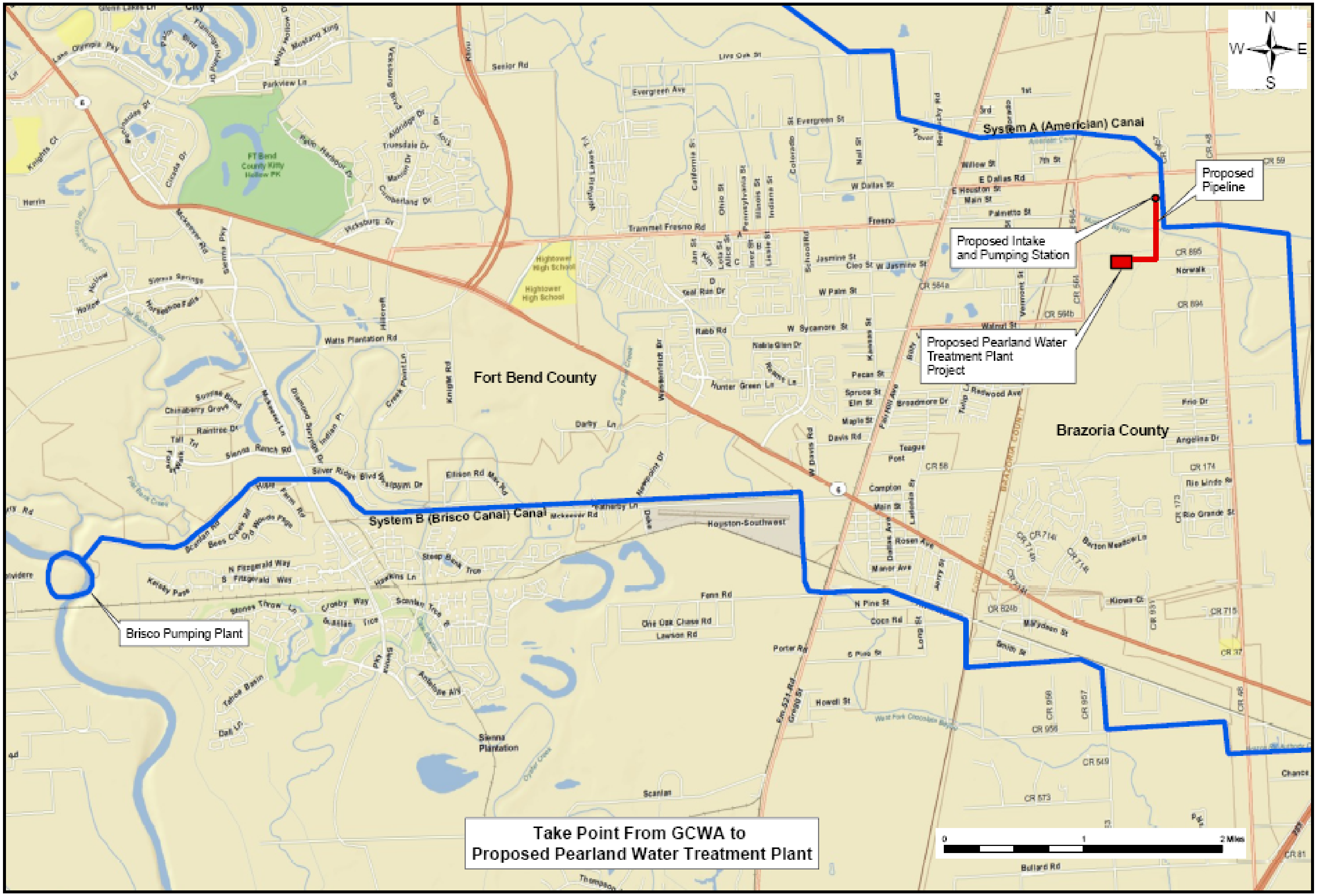
References:

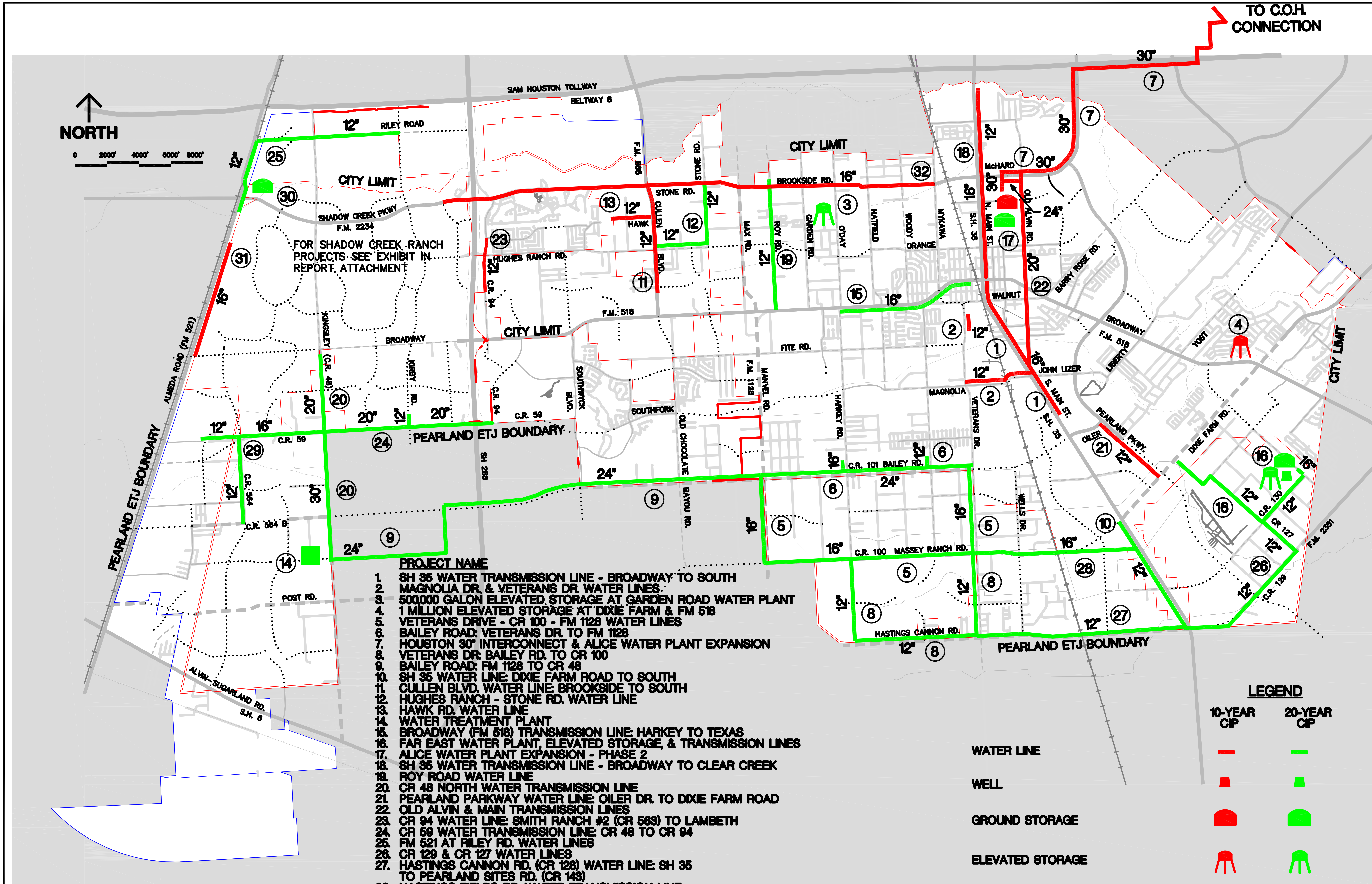
City of Pearland Water Model Update, MWH Americas, Inc., April 2007

City of Pearland Water and Wastewater Impact Fee Study 2007 Update, Freese and Nichols, Inc., May 2008

City of Pearland, Final Preliminary Engineering Report for the Construction of the New Surface Water Treatment Plant Raw Water Reservoir, Camp Dresser & McKee, Inc., May 2009

Figure 1: Potential Conveyance Route





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CITY OF PEARLAND

WATER CAPITAL IMPROVEMENTS

DATE: JUNE 2010

EXHIBIT NO. 1

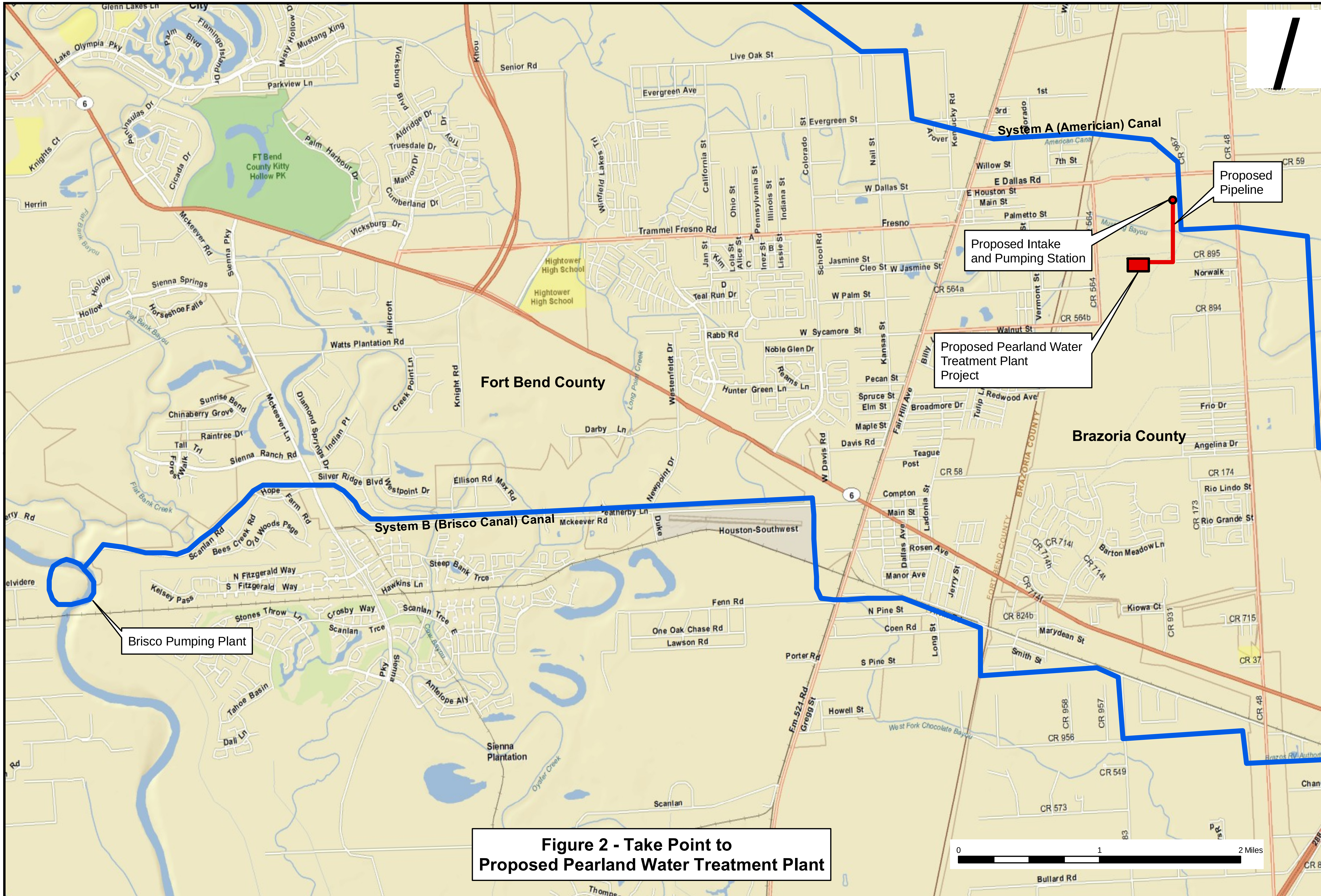


Figure 2 - Take Point to Proposed Pearland Water Treatment Plant

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Allens Creek Reservoir

DATE: November 13, 2009

SUMMARY

STRATEGY DESCRIPTION: Construction of an off-channel reservoir in Austin County, to hold peak flows diverted from the Brazos River. Run-of-river diversions to the reservoir are indexed to in-stream flow levels. Water would be available to meet demands in Austin, Brazoria, Fort Bend, Galveston, Harris and Waller Counties.

SUPPLY QUANTITY: 99,650 acre-feet

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $222,752,400 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $168 per acre-foot allocated

Water Management Strategy Analysis Description

Introduction:

The Allens Creek Reservoir site is located on Allens Creek, a tributary to the Brazos River in Austin County, 1 mile north of the City of Wallis (see Figure 1). 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 and the City of Houston. A water right permit has been issued for this project to the Texas Water Development Board, Brazos River Authority (BRA) and the City of Houston for use of 99,650 acre-feet per year for municipal, industrial and irrigation purposes. The water is permitted for inter-basin transfer to the San Jacinto and San Jacinto-Brazos basins. 70% of the permit (69,750 acre-feet per year) is owned by the City of Houston, and 30% 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.

Analysis:

This project is configured as a scalping reservoir that would divert peak (storm water) flows from the Brazos River and impound these flows into the reservoir to create storage yield. The permit conditions are based upon the consensus criteria for environmental flow needs. Specifically when monthly flows in the Brazos River before this diversion are above the naturalized median flow, diversions shall not cause the flow to fall below that naturalized median flow. When monthly flows in the Brazos River before this diversion are below median but above the above the naturalized 25th percentile flow, diversions shall not cause the flow to fall below that naturalized 25th percentile flow. When monthly flows in the Brazos River before this diversion are less than the naturalized 25th percentile flow, diversions shall not cause the flow to fall below 734 cfs. Additionally, the permit requires the following instantaneous flow rates to be met immediately downstream of the diversion point before diversions may be made.

Table 1
Required Minimum Downstream Flow Rates (cfs)

JAN	FEB	MAR	APR	MAY	JUN
795	795	812	882	882	1,017
JUL	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
1,017	1,017	882	812	812	795

The Brazos River Authority has applied to the TCEQ for a Systems Operations Permit, which would increase the yield of their reservoir system. Currently, the Allens Creek Reservoir is included in the BRA System model, potentially generating additional system yield (in addition to the original 99,650 acre-feet per year yield). The cost data used in this plan was obtained from the permitting studies for Allens Creek Reservoir, adjusted to September 2008 prices.[1]

Water User Group Application:

The water from the Allens Creek Reservoir may be used to serve municipal, industrial and irrigation customers in Austin, Brazoria, Fort Bend, Galveston, Harris and Waller Counties. The water may be diverted directly from the reservoir. Delivery to downstream customers using the bed and banks of the Brazos River would require a subsequent permit.

Environmental Impact:

Approximately 7,000 acres of land will be inundated, and the overall site will impact approximately 1,700 acres of cropland, 2,000 acres of bottomland forest, 100 acres of bluff forest, 3,900 acres of grass. The most significant wetland area on the site is Alligator Hole, which contains approximately 600 acres of the largest remaining tract of bottomland forest[1]. The dam face has been configured to minimize wetlands associated impacts, and specifically excludes Alligator Hole from the project area.

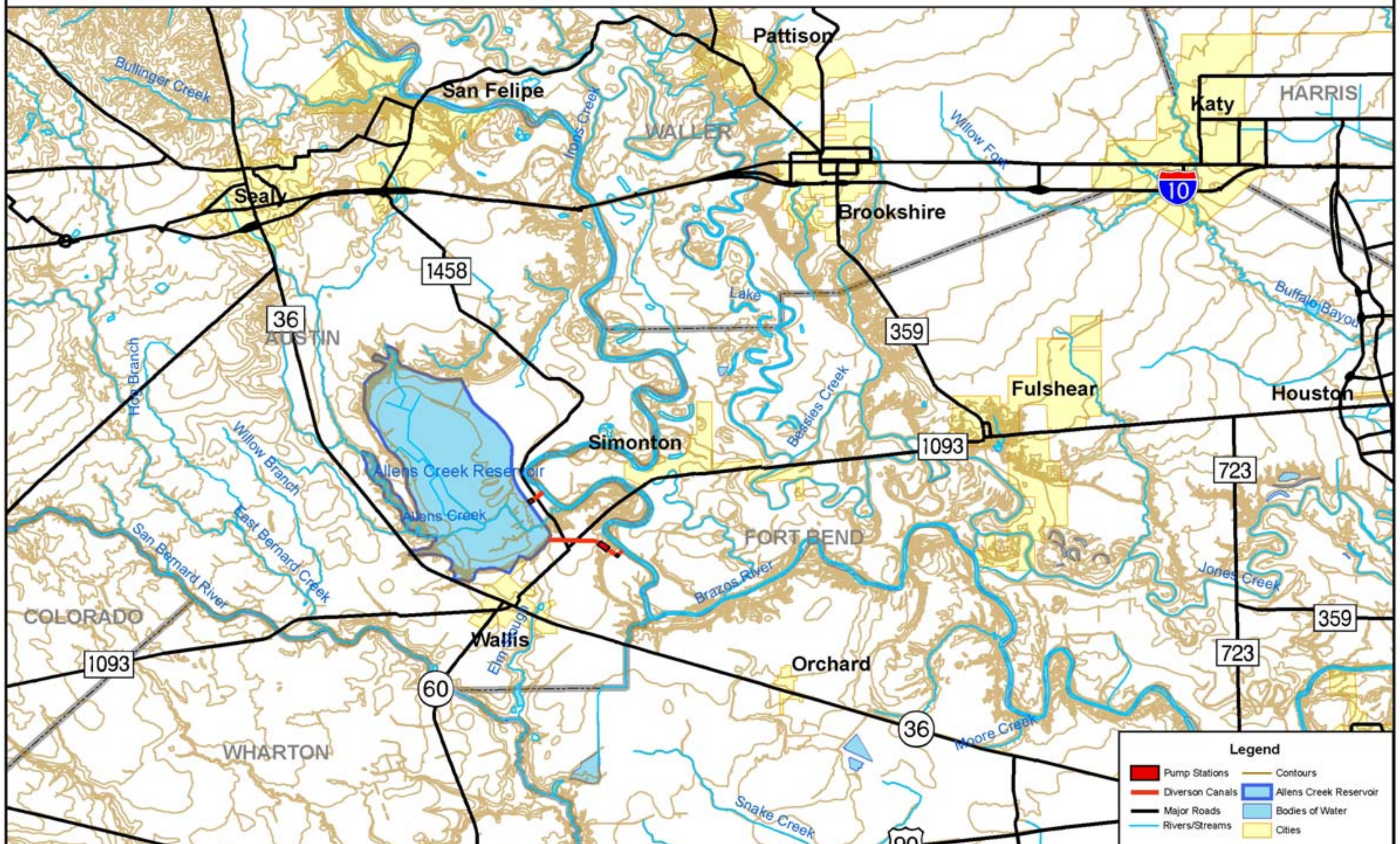
A Wildlife Habitat Appraisal was performed for the Texas Parks and Wildlife Department. No threatened or endangered species have been found on the site. The quality of the habitat at the reservoir site is mostly degraded by extensive agriculture usage. Environmental impacts were rated as moderate to small.

Issues and Considerations:

This location has been designated as a unique reservoir site by the Texas Legislature. The project sponsors have obtained a water right permit. There are two designated diversion points on for the Allens Creek Reservoir. The nearer, upstream point is located on an oxbow of the Brazos River, which is at risk of becoming isolated from the main stem of the river at some point in the future. The lower diversion point is farther away, requiring approximately one mile of intake canal between the pump station and the reservoir. The canal will require a two road crossings (inverted siphons).

[1] Wildlife Habitat Appraisal for The Proposed Allens Creek Reservoir Site.; University of Houston Clear Lake 1995 for Texas Parks and Wildlife Department (TPWD), Resource Protection Division.

Region H
Water Planning Group
Allens Creek Reservoir



Source: TWDB, TCEQ
Kellogg Brown & Root, Inc. Turner Collie & Braden Inc.
JOINT VENTURE

0 6 Miles

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: GCWA Off-Channel Reservoir

DATE: July 22, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Construction of an off-channel reservoir in Brazoria County, to hold peak flows diverted from the Brazos River to increase the firm yield of GCWA water rights. Water would be available to meet demands in Brazoria County.

SUPPLY QUANTITY: 39,500 acre-feet

SUPPLY SOURCE: Brazos River via GCWA canal system

IMPLEMENTATION DECADE: 2030

TOTAL STRATEGY COST: $197,448,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $827 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

Currently, a portion of the water rights held by GCWA are not firm on a monthly basis during the summer months. This period of interruptible reliability coincides with high demands driven by summer flooding of rice fields. The GCWA Off-Channel Reservoir is proposed for construction in Brazoria County and would store peak flows in the GCWA canal system diverted from the Brazos River in order to increase the firm yield of GCWA water rights.

Analysis:

The GCWA Off-Channel reservoir was analyzed using the Water Rights Analysis Package (WRAP) to determine the potential increase in firm yield. The reservoir was assumed to be a large square ring-dike structure with a storage depth of approximately 30 feet and 1:6 sideslope. Total project size was varied to determine a volume-yield relationship. The optimum volume-yield relationship was found to occur for and 82,500 ac-ft reservoir, which resulted in an increase in firm yield of 39,500 acre-feet. Costs were developed assuming the reservoir as described with a small on-channel weir and 20 MGD pump station. Costs are shown in greater detail in Table 1.

Water User Group Application:

The water from the GCWA Off-Channel Reservoir would be expected to serve manufacturing demands in Brazoria County in the Brazos and San Jacinto Brazos basins. Delivery of water would be via the GCWA canal system.

Environmental Impact:

The Gulf Coast Water Authority (GCWA) Off-channel Reservoir was developed using diversions from current GCWA run-of-river rights in the Brazos and San Jacinto-Brazos Basins using existing environmental flow restriction present in the WAM models. Additional environmental flow restrictions were not included in the evaluation since the strategy was developed to optimize the yield of existing water rights and did not consider a new water right or diversion point. As no project site assessment has been performed to date, no location-specific environmental assessment is available. The initial proposed reservoir configuration would impact approximately 3,000 acres.

Issues and Considerations:

No location-specific issues have been identified at this time. The estimated unit cost of water for this WMS is above the cost level that could be supported by an agricultural customer base; the reservoir would not be suitable to meet the needs of the local rice industry. Manufacturing is the most likely customer for this project as it can support the unit cost and is projected to have needs during the planning period.

Table 1
GCWA Off-Channel Reservoir Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$86,542,053	$ 86,542,053
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$35,196,653	$ 35,196,653
3	LAND & EASEMENTS	1	LS	$27,143,490	$ 27,143,490
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$27,143,490	$ 27,143,490
5	INTEREST DURING CONSTRUCTION	1	LS	$21,422,326	$ 21,422,326
	PROJECT COST				**$ 197,448,012**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ -	$ -	$ 13,122,698	$ 13,122,698	$ 13,122,698	$ 13,122,698
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ 2,781,000	$ 2,781,000	$ 2,781,000	$ 2,781,000
3	PUMPING ENERGY COSTS	$ -	$ -	$ 16,775,272	$ 16,775,272	$ 16,775,272	$ 16,775,272
4	PURCHASE OF WATER						
	TOTAL ANNUAL COST	**$ -**	**$ -**	**$ 32,678,970**	**$ 32,678,970**	**$ 32,678,970**	**$ 32,678,970**

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$ 4,091,321	$ 4,091,321
2a	PIPELINES	0	LS	$ -	$ -
2b	PIPELINE CROSSINGS	0	LS	$ -	$ -
3	WATER TREATMENT PLANTS	0	LS	$ -	$ -
4	WATER STORAGE TANKS	0	LS	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1	LS	$81,749,282	$ 81,749,282
6	WELL FIELDS	0	LS	$ -	$ -
7	DAMS & RESERVOIRS	1	LS	$701,449.56	$ 701,450
8	RELOCATIONS	0	LS	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0	LS	$ -	$ -
10	STILLING BASINS	0	LS	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS	0	LS	$ -	$ -
12	OTHER ITEMS	0	LS	$ -	$ -
	PROJECT COST				**$ 86,542,053**

Table 1
GCWA Off-Channel Reservoir Cost (continued)

ALL FACILITIES
OPERATIONS & MAINTENANCE (O&M) COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	0.015	%	$ 4,091,321	$ 61,370
2a	PIPELINES	0.010	%	$ -	$ -
2b	PIPELINE CROSSINGS	0.010	%	$ -	$ -
3	WATER TREATMENT PLANTS (see page before previo	1	LS	$ -	$ -
4	WATER STORAGE TANKS	0.010	%	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	0.025	%	$81,749,282	$ 2,043,732
6	WELL FIELDS	0.010	%	$ -	$ -
7	DAMS & RESERVOIRS	0.025	%	$ 701,450	$ 17,536
8	RELOCATIONS	0.010	%	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0.010	%	$ -	$ -
10	STILLING BASINS	0.010	%	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS (see previous	1	LS	$ -	$ -
12	OTHER ITEMS	0.010	%	$ -	$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 2,122,638**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Millican Reservoir – Panther Creek Dam Site[1]

DATE: January 2, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Construction of a reservoir on the Navasota River in Brazos, Grimes, and Madison Counties.

SUPPLY QUANTITY: 194,500 acre-feet per year

SUPPLY SOURCE: Navasota River / Brazos River Basin

IMPLEMENTATION DECADE: 2040

TOTAL STRATEGY COST: $1,159,907,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $1,241 per acre-foot (for Region H allocated portion only – full utilization would reduce annual unit cost to $424 per acre-foot)

<u>Water Management Strategy Analysis Description</u>

Introduction:

The dam site is located on the Navasota River due east of Bryan-College Station at Highway 30. This site is primarily in Brazos, Grimes, Madison counties. It exists within the Brazos basin and is located within Regions G and H. This site was investigated for flood control and water supply and water supply only. The Panther Creek site was evaluated as part of the U.S. Army Corps of Engineers report entitled Millican Lake, Texas Design Memorandum No. 3, General Phase 1 – Plan Formulation. It has an upstream drainage area of approximately 1,821 square miles. The dam is proposed with a top of conservation pool at 263.0 feet. This reservoir site was considered in the 2006 RWP over the Millican Reservoir Bundic site because of its greater yield.

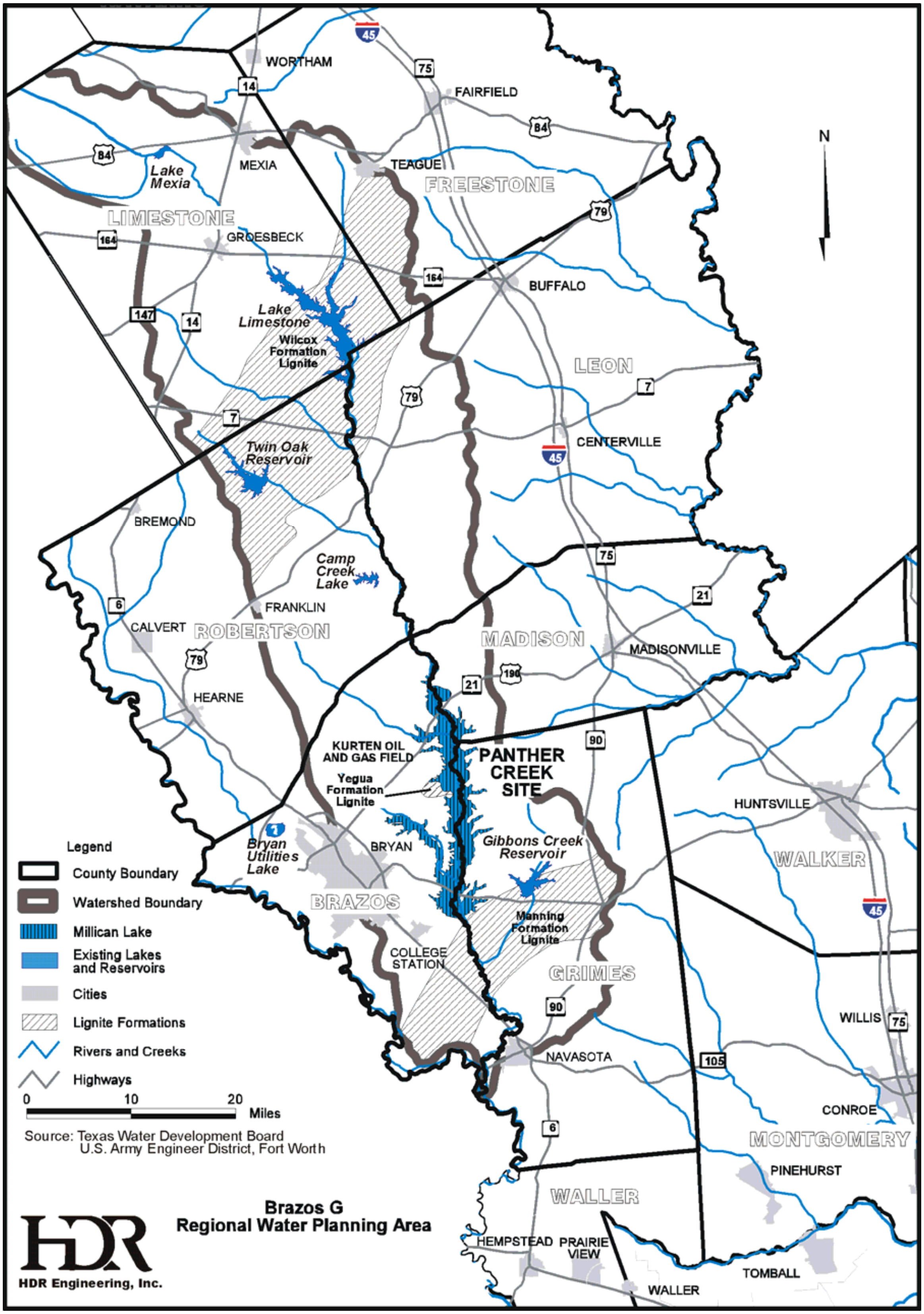
Analysis:

Analysis of the Millican Reservoir (Panther Creek Dam) site was carried out as part of the Region G 2001 RWP. This study determined a yield of 235,200 acre-feet per year. A subsequent study in the Region G 2011 RWP revised this estimate to 194,500 acre-feet per year, which would be shared between Regions G and H. *Figure 1* shows the area of the envisioned project.

Project costs for the Panther Creek project were developed by Region G for the Region G 2011 Draft IPP.

[1] This memorandum was prepared using information in the 2001 and 2011 Region G Regional Water Plans.

Figure 1
Millican Reservoir – Panther Creek Dam Site



Water User Group Application:

The water from Millican Reservoir may be used to serve municipal, industrial and irrigation customers in Brazoria, Fort Bend, Galveston, and Harris Counties.

Environmental Impact:

The Millican Reservoir – Panther Creek Dam Site was preliminarily found to involve moderate to high environmental effects:

- Probable high impact on environmental water needs and instream flows in the Navasota River, below the reservoir, and Brazos River below the Navasota River confluence.
- Probable high impact on fish and wildlife habitat in general, including one federally listed endangered plant species. Inundated area would include 17,000 acres of mixed bottomland hardwood.
- Probable high impact on cultural resources.
- Mitigation would require acquisition of at least 64,000 acres of additional land with very high costs.

A summary of environmental issues for the Panther Creek Dam Site is presented in *Table 1*.

Table 1
Environmental Issues: Millican Reservoir – Panther Creek Dam Site

Water Management Option	Millican Reservoir (Navasota River in Brazos, Grimes, and Madison Counties)
Implementation Measures	Dam and reservoir covering 71,032 acres;
Environmental Water Needs / Instream Flows	Probable high impact on instream flows in Navasota River below the dam and reservoir and Brazos River below confluence;
Bays and Estuaries	Probable cumulative impact to limited areas of coastal marsh;
Fish and Wildlife Habitat	Probable high impact to species in general, possible low impact to State-listed species: White-tailed hawk, White-faced ibis, American swallow-tailed kite, Wood stork, Bachmans sparrow, Arctic peregrine falcon, Texas horned lizard, Blue sucker, Creek chubsucker, Timber rattlesnake;
Cultural Resources	Probable high impact
Threatened and Endangered Species	Probable high impact on: Navasota ladies-tresses,
Comments	Inundated area includes 17,000 acres of mixed bottomland hardwood; Mitigation requirements: May require over 64,000 acres with very high costs.[1]

[1] Texas Parks and Wildlife Department, "An Assessment of Direct Impacts to Wildlife Habitat from Future Water Development Projects," 1990.

Issues and Considerations:

Inundation of the Yegua Lignite, Kurten oil and gas field, inundation of marsh areas. At a minimum, implementation steps for the project include the following:

- TCEQ Water Right and Storage Permit
- U.S. Army Corps of Engineers Sections 10 and 404 dredge and fill permits for reservoirs and pipelines impacting wetlands or navigable waters of the U.S
- TPWD Sand, Gravel, and Marl Permit for construction in state owned streambeds
- NPDES Storm Water Pollution Prevention Plan
- GLO easement for use of the state-owned streambed
- Section 404 certification from the TCEQ related to the Clean Water Act

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Potential Reservoir Sites

DATE: November 3, 2009

Introduction:

Although Region H is projected to have a net water supply surplus throughout the majority of the planning period, the surplus is predominantly located in the northern and eastern portions of the region. The projected supply shortages are located in the western and southern portions of the region. Texas law allows for establishment of groundwater planning districts. Within Region H, the Harris-Galveston Coastal Subsidence District requires by 2010 that no more than 20% of the water supply can be from groundwater within those counties. The Fort Bend subsidence District requires that by 2025 no more than 40% of their Area A's supply can be from groundwater. The reduction in groundwater use must be made up by increase in surface water. Constructing new reservoirs is one potential strategy to meet the projected shortages.

Analysis:

A review of previously published reservoir studies and basin master plans was conducted to identify potential water supply reservoirs which could serve Region H. These reports are summarized in the attached Potential Reservoir Site Descriptions. The water quantities shown reflect the firm yield of the proposed reservoir.

The development of any new reservoir project will involve extensive technical planning, environmental studies, and permitting (state and federal) prior to construction. The locations of potential reservoir sites are shown in Figure 1. The planning upon which the following technical memos are based is at an initial conceptual level to simply compare and contrast multiple potential projects. No detailed environmental analysis has been performed at this time except for the Allens Creek Reservoir project. Additional engineering and environmental investigations will be performed on any of the projects which are selected for further analysis.

The Texas Water Code offers an opportunity to designate sites of unique value for use as surface water supply reservoirs within a planning region. Two surface water reservoir projects were recommended in the 2006 Regional Water Plan. These two are Allens Creek Reservoir and Little River Off-Channel Reservoir.

Allens Creek Reservoir

DESCRIPTION: The Allens Creek Reservoir site is located on Allens Creek, a tributary to the Brazos River in Austin County, 1 mile north of the City of Wallis (see Figure 1). 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 and the City of Houston. A water right permit has been issued for this project to the Texas Water Development Board, Brazos River Authority (BRA) and the City of Houston for use of 99,650 acre-feet per year for municipal, industrial and irrigation purposes. The water is permitted for inter-basin transfer to the San Jacinto and San Jacinto-Brazos basins. 70% of the permit (69,750 acre-feet per year) is owned by the City of Houston, and 30% 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.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $222,752,400 (Costs rounded to nearest $100)

QUANTITY OF WATER: 99,650 acre-feet per year

LAND IMPACTED: 7,000 acres

PURPOSE: Municipal, Industrial, and Irrigation Water Supply and Recreation

ENVIRONMENTAL IMPACT: The dam face has been configured to minimize wetlands associated impacts. No endangered species have been found on the site. Environmental impacts can be rated as moderate to small. A more recent detailed study has been completed and additional data can be provided as required.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: This project has been designated as a unique reservoir site by the Texas Legislature. The project sponsors have initiated the water rights permitting process.

Description	Cost*
Total Project Cost	$222,752,400
Annual Cost (6%, 40 Years)	$14,804,467
Annual O&M	$3,341,286
Total Annual Cost	$18,145,753
Unit Cost of Water (per acre-foot)	$182

* Cost data from TNRCC Permit Application for Allens Creek Reservoir. Please note that unit cost assumes full allocation of reservoir supply.

Bedias Reservoir

DESCRIPTION: This site is located principally within Madison County about 3.5 miles west of Hwy. 75 crossing. The site includes Bedias and Caney Creeks. This site exists within the Trinity River Basin and is in Regions G and H. The upstream drainage area is approximately of 395 square miles. The dam is proposed with a maximum height of 45 feet and a normal pool elevation of 230.0 feet msl. The reservoir would have conservation storage of 192,700 acre-feet and would inundate about 10,000 acres. This project is currently included within the TRA Trinity River Basin Master Plan. As planned, the Trinity River Authority and the San Jacinto River Authority would jointly develop this project for their water users within the lower Trinity and San Jacinto river basins, respectively.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $247,241,628

QUANTITY OF WATER: 75,430 acre-feet per year

LAND IMPACTED: 27,400 acres

PURPOSE: Municipal Water Supply and Flood Control

ENVIRONMENTAL IMPACT: Some endangered species have been identified. There are about 7,300 acres of bottomland hardwoods, 7,000 acres of grasslands, and 7,000 acres of post oak-elm-hackberry forest. Probable moderate to high impacts on wildlife habitats.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: This project requires an interbasin transfer to the San Jacinto Basin.

Description	Cost*
Total Project Cost	$247,241,628
Annual Cost (6%, 40 Years)	$16,432,058
Annual O&M	$1,415,877
Total Annual Cost	$17,847,935
Unit Cost of Water (per acre-foot)	$237

* Cost data from TWDB Report 370.

Little River Reservoir

DESCRIPTION: This site is located on the main stem of the Little River just upstream from its confluence with the Brazos River. It would be near the City of Cameron, Texas, within Milam County. It is located within the Brazos River basin within Region G. The site would have a surface area of 35,000 acres and a storage volume of about 930,000 acre-feet. The approximately 7,500 square mile upstream drainage area is uncontrolled which produces a significant yield. The fully developed site would have a yield of about 119,000 acre-feet per year. The Brazos River Authority and the Gulf Coast Water Authority propose this project for joint development for their water customers within the Brazos and the San Jacinto-Brazos river basins. Brazos River Authority customers would exist within both Regions G and H, making this project truly regional in scope.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $556,520,000 (Costs rounded to nearest $100)

QUANTITY OF WATER: 119,000 acre-feet per year

LAND IMPACTED: 35,600 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: Probable moderate to high impacts on environmental water needs and instream flows on the Little River. Reservoir would conflict with a Potential Unique Stream Segment on Little River in Milam County. Possible low to moderate impacts on fish and wildlife habitat, including possible low impact on one federally listed bird species and an endangered amphibian species. Probable high impact on cultural resources, especially near the City of Cameron.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Opposition to the project has arisen among landowners and citizens in Bell and Milam Counties because of the inundation of prime farmland, anticipated condemnation of land for the reservoir, disruption of riparian habitat, and social and economic impacts in the area of the proposed reservoir.

Description	Cost*
Total Project Cost	$556,520,000
Annual Cost (6%, 40 Years)	$36,986,000
Annual O&M	$2,307,000
Total Annual Cost	$39,293,000
Unit Cost of Water (per acre-foot)	$328

* Cost data from Region G 2011 Draft IPP

(Lower) Lake Creek Reservoir

DESCRIPTION: Approximately 5 miles southwest of Conroe on Lake Creek within southern Montgomery County. The site is located within the San Jacinto River Basin and is in Region H. The dam is proposed with a maximum height of 69 feet and a normal pool elevation of 194.0 feet msl. The reservoir would have conservation storage of approximately 411,900 acre-feet and would inundate about 13,100 acres. This project was studied by the Bureau of Reclamation in 1988 for the SJRA and deemed the preferred site of all the potential San Jacinto River basin sites. Bureau of Reclamation concluded that this site has a positive benefit-to-cost (B/C) ratio.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $480,777,860

QUANTITY OF WATER: 67,200 acre-feet per year

LAND IMPACTED: 19,400 acres

PURPOSE: Municipal Water Supply and Recreation

ENVIRONMENTAL IMPACT: Some endangered species have been identified. There are about 2,200 acres of bottomland hardwoods, 7,000 acres of oak, hickory, pine forest, and 1,800 acres of shrubland and grasses. Probable high environmental impacts.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Significant clearing and relocation of utilities and roadways is required.

Description	Cost*
Total Project Cost	$480,777,860
Annual Cost (6%, 40 Years)	$31,953,235
Annual O&M	$7,211,668
Total Annual Cost	$39,164,903
Unit Cost of Water (per acre-foot)	$583

*Information collected from River Authorities, 1999.

Millican (Panther Creek Dam) Reservoir

DESCRIPTION: The dam site is located on the Navasota River due east of Bryan-College Station at Highway 30. This site is primarily in Brazos, Grimes, Robertson and Leon counties. It exists within the Brazos basin and is located within Regions G and H. This site was investigated for flood control and water supply and water supply only. The Panther Creek site was evaluated as part of the U.S. Army Corps of Engineers report entitled Millican Lake, Texas Design Memorandum No. 3, General Phase 1 – Plan Formulation. It has an upstream drainage area of approximately 1,821 square miles. The dam is proposed with a top of conservation pool at 263.0 feet.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $1,159,907,000 (Costs rounded to nearest $100)

QUANTITY OF WATER: 194,500 acre-feet per year

LAND IMPACTED: 71,000 acres

PURPOSE: Municipal Water Supply and Flood Control

ENVIRONMENTAL IMPACT: Some endangered species have been identified. There are about 17,000 acres of bottomland hardwoods, 28,400 acres of grassland, and 500 acres of emergent wetland. Probable high environmental impacts.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Inundation of the Yegua Lignite, Kurten oil and gas field, inundation of marsh areas.

Description	Cost*
Total Project Cost	$1,159,907,000
Annual Cost (6%, 40 Years)	$77,087,000
Annual O&M	$5,401,000
Total Annual Cost	$82,488,000
Unit Cost of Water (per acre-foot)	$424

* Cost data from Region G 2011 Draft IPP. Note that calculated unit cost assumes full use of reservoir supply.

Millican (Bundic Crossing Dam) Reservoir

DESCRIPTION: The dam site is located on the Navasota River, immediately north of Highway 190, northeast of Bryan-College Station. The site is primarily within Brazos, Madison, Robertson and Leon counties. It exists within the Brazos basin and is located within Regions G and H. The Panther Creek site was evaluated as part of the U.S. Army Corps of Engineers report entitled Millican Lake, Texas Design Memorandum No. 3, General Phase 1 – Plan Formulation. It had historically been titled the Navasota Reservoir project. This site is smaller in configuration than the Millican-Panther Creek site with an upstream drainage area of about 1,418 acres. The dam height is 84.0 feet with a top of conservation pool at 277 msl.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $720,224,000 (Costs rounded to nearest $100)

QUANTITY OF WATER: 36,990 acre-feet per year

LAND IMPACTED: 14,630 acres

PURPOSE: Municipal Water Supply and Flood Control

ENVIRONMENTAL IMPACT: Avoids Manning and Yegua lignite, avoids Kurten oil and gas field, avoids the Wilcox lignite in the upper river reaches and avoids significant bottomland hardwood population. Size of lake would be constrained by the Wilcox lignite, and inundation of marsh area upstream of Old San Antonio Road. Probable moderate to high environmental and instream flows impacts. The inundation area impacts approximately and 9,210 acres of mixed Bottomland Hardwood Forest, 4,086 acres of Grasses/Forbs, and 1,334 acres of Post Oak Woods.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Limited information is available. There are a small number of oil wells in the inundation footprint.

Description	Cost*
Total Project Cost	$720,224,000
Annual Cost (6%, 40 Years)	$47,867,000
Annual O&M	$5,084,000
Total Annual Cost	$52,951,000
Unit Cost of Water (per acre-foot)	$1,431

* Cost data from Region G 2011 Draft IPP. Note that calculated unit cost assumes full use of reservoir supply.

Tehuacana Reservoir

DESCRIPTION: This site is located primarily within Freestone County north of Fairfield off FM 488. The site is located on Tehuacana Creek within the Trinity River basin. It exists within Region C. The project would have an upstream drainage basin of about 350 square miles. It is proposed to have conservation storage of about 337,000 acre-feet. The dam height would be 81 feet with a normal pool elevation of 315 feet. The reservoir would inundate about 14,900 acres. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $198,149,831

QUANTITY OF WATER: 41,900 acre-feet per year

LAND IMPACTED: 19,000 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: Some endangered species have been identified. Major ecological concerns have been expressed. There are approximately 7,000 acres of bottomland hardwoods. Probable moderate to high environmental impacts.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced Report (Region C 2006 RWP).

Description	Cost*
Total Project Cost	$198,149,831
Annual Cost (6%, 40 Years)	$13,169,342
Annual O&M	$639,269
Total Annual Cost	$13,808,611
Unit Cost of Water (per acre-foot)	$330

* Cost data from Region C 2001 Water Plan.

Tennessee Colony Reservoir

DESCRIPTION: Project is located in Anderson and Freestone Counties, about 22 miles west of Palestine, Texas. It exists within the middle Trinity basin within Regions C and I. This project is on the main stem of the Trinity River so the upstream drainage area is approximately 12,700 square miles. The reservoir would inundate approximately 80,000 acres at a normal pool elevation of 265.0 msl. The total controlled storage is about 1,290,000 acre-feet. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $2,918,602,710

QUANTITY OF WATER: 405,800 acre-feet per year

LAND IMPACTED: 147,200 acres

PURPOSE: Municipal Water Supply and Recreation

ENVIRONMENTAL IMPACT: Some endangered species have been identified. Major ecological concerns have been expressed. A large lignite deposit is located on the reservoir site. There are 34,800 acres of bottomland hardwoods. Probable high environmental and instream flow impacts.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: Development of this project would significantly reduce the current yield of Lake Livingston.

Description	Cost*
Total Project Cost	$2,918,602,710
Annual Cost (6%, 40 Years)	$193,974,819
Annual O&M	$43,779,041
Total Annual Cost	$237,753,860
Unit Cost of Water (per acre-foot)	$586

*Cost data from Water for Texas, A Concensus-Based Update to the State Water Plan, TWDB, 1997

Caney Reservoir

DESCRIPTION: This site is located within Trinity County about 10 miles east of the town of Trinity. The project is on Caney Creek about 5 miles from the confluence of the Trinity River. It is in the Trinity River Basin and exists within Region H. This project would have an upstream drainage area of approximately 68 square miles. The conservation storage is about 31,000 acre-feet. The dam would have a maximum height of about 42 feet and the normal pool elevation is at about 166.0 feet msl. The reservoir would inundate a minimum of about 2,000 acres. This project is included within the TRA Trinity River Basin Master Plan. This project has historically been considered a local project suited for water users within Trinity County.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 15,700 acre-feet per year

LAND IMPACTED: 2,000 acres

PURPOSE: Water Users within Trinity County

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost*
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Cleveland Reservoir

DESCRIPTION: This site is located in San Jacinto County approximately 8 miles northwest of Cleveland on the East Fork of the San Jacinto River. It exists within the San Jacinto River Basin and is located within Region H. The upstream drainage area is about 310 square miles. The dam height is proposed at an elevation of 71.0 feet msl.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $281,805,890

QUANTITY OF WATER: 65,900 acre-feet per year

LAND IMPACTED: 33,000 acres

PURPOSE: Municipal Water Supply and Flood Control

ENVIRONMENTAL IMPACT: This site is partially located within the Sam Houston National Forest. Some endangered species have been identified. There are about 2,300 acres of bottomland hardwoods, 7,000 acres of oak-hickory-pine forest, 2,000 acres of grassland.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost*
Total Project Cost	$281,805,890
Annual Cost (6%, 40 Years)	$18,729,252
Annual O&M	$4,227,088
Total Annual Cost	$22,956,340
Unit Cost of Water (per acre-foot)	$348

*Cost data from Water for Texas, A Consensus-Based Update to the State Water Plan, TWDB, 1997

Harmons Reservoir

DESCRIPTION: This site is located within Walker County about 6 miles northeast of the City of Huntsville. The project is on Harmons Creek within the Trinity River Basin. It is located within Region H. The upstream drainage area is approximately 43 square miles creating conservation storage of about 20,000 acre-feet. The dam would have a height of about 45 feet and the normal pool elevation would be at about 188.0 feet msl. This reservoir would inundate approximately 1,100 acres. This site has historically been considered for local water supply purposes within Walker County. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 10,100 acre-feet per year

LAND IMPACTED: 1,100 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Humble Reservoir

DESCRIPTION: This site is located near the confluence of Spring and Cypress creeks about one mile northwest of the City of Humble on the West Fork of the San Jacinto River. This site is located within Harris and Montgomery Counties within the San Jacinto River basin and exists within Region H. This site was studied by Bureau of Reclamation for the SJRA and eliminated from detailed analysis due to high development costs, per unit costs of water and/or environmental impacts.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER:

LAND IMPACTED: 35,800 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: This site now exists within the backwater of Lake Houston and within highly developed urban landuses.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Hurricane Bayou Reservoir

DESCRIPTION: This site is located within Houston County about 6 miles west of the City of Crockett. The project exists on Hurricane Bayou about four miles east of its confluence with the Trinity River. It exists within the Trinity River basin and within Region I. This project has an upstream drainage basin of about 109 square miles and it would have conservation storage of about 50,000 acre-feet. The dam would have a proposed height of about 40 feet and the normal pool elevation would be at elevation 210.0 feet msl. The reservoir would inundate about 3,200 acres. This project has historically been viewed to serve local municipal water supply users within Houston County. This project is currently included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 17,900 acre-feet per year

LAND IMPACTED:

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Long King Reservoir

DESCRIPTION: This site is located within Polk County about 6 miles north of the City of Livingston. The project is on Long King Creek within the Trinity River basin and exists within Region H. The upstream drainage basin is about 96 square miles, which would produce conservation storage of about 44,000 acre-feet. The dam would have a maximum height of about 40 feet. This site would inundate about 3,200 acres. This project has been historically viewed to serve local municipal water users within Polk County. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 20,200 acre-feet per year

LAND IMPACTED:

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Lower Keechie Reservoir

DESCRIPTION: This site is located in Leon County about 10 miles southeast of Centerville. This site exists on Lower Keechi creek within the Trinity River basin and it is within Region H. The dam site is about 4 miles upstream from the confluence of Lower Keechi Creek and the Trinity River. The upstream drainage area is about 160 square miles and it would have conservation storage of approximately 74,000 acre-feet. The dam would have a height of about 55 feet with a normal pool elevation of about 225.0 feet msl. This reservoir would inundate approximately 4,000 acres. This project has historically been viewed to serve local municipal water supply users within Leon County. This project is currently included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 25,800 acre-feet per year

LAND IMPACTED:

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Mustang Reservoir

DESCRIPTION: This site is located in Houston County about 12 miles southeast of Crockett. The dam site is on Mustang Creek within the Trinity River basin. The project exists within Regions H and I. The upstream drainage basin is about 70 square miles and would create conservation storage of about 32,000 acre-feet. The dam is proposed with a height of about 48 feet and the normal pool elevation would be at about 233.0 feet msl. The reservoir would inundate about 2,900 acres. This site has historically been viewed to serve local municipal water users within Houston County. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 15,700 acre-feet per year

LAND IMPACTED: 2,900 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Nelsons Reservoir

DESCRIPTION: This site is located in Walker County about 8 miles due north of the City of Huntsville. The project exists on Nelsons Creek within the Trinity River basin about 4 miles upstream of the confluence with the Trinity River. This site is within Region H. The upstream drainage basin is about 77 square miles and would create conservation storage of about 35,000 acre-feet. The dam would have a height of 28 feet and the normal pool elevation would be at about 201.0 feet msl. This project would inundate about 3,200 acres. This project has been historically viewed to serve local municipal water users within Walker County. This project is included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 17,900 acre-feet per year

LAND IMPACTED: 3,200 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Upper Keechi Reservoir

DESCRIPTION: This site is located within Freestone County near its boundary with Leon County. The project is on Upper Keechi Creek about 8 miles upstream of its confluence with the Trinity River. The dam site is about 2 miles upstream of Highway 79. It is within the Trinity River basin and within Region C. The upstream drainage basin is about 98 square miles and the project would have about 45,000 acre-feet of conservation storage. The dam height would be about 40 feet and the normal pool elevation would be at 308.0 msl. The reservoir would inundate approximately 3,300 acres. This site has been viewed to serve local municipal water users within Freestone County. The project is currently included within the TRA Trinity River Basin Master Plan.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: Detailed costs have not been developed.

QUANTITY OF WATER: 15,700 acre-feet per year

LAND IMPACTED: 3,300 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$
Annual Cost (6%, 40 Years)	$
Annual O&M	
Total Annual Cost	
Unit Cost of Water (per acre-foot)	

Spring Creek Reservoir

DESCRIPTION: This site is located on Spring Creek on the Harris and Montgomery County border, approximately 4 miles southwest of the Woodlands. This site exists within the San Jacinto River basin and is located within Region H. Due to its relatively small yield, it is limited for use within Montgomery County.

FACTORS AFFECTING COST, QUANTITY, AND LAND IMPACTED

COST: $31,409,870

QUANTITY OF WATER: 7,500 acre-feet per year

LAND IMPACTED: 1,000 acres

PURPOSE: Municipal Water Supply

ENVIRONMENTAL IMPACT: None identified in referenced report.

SIGNIFICANT ISSUES AFFECTING FEASIBILITY: None identified in referenced report.

Description	Cost
Total Project Cost	$31,409,870
Annual Cost (6%, 40 Years)	$2,087,548
Annual O&M	$471,148
Total Annual Cost	$2,558,696
Unit Cost of Water (per acre-foot)	$341

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Fulshear Reuse

DATE: July 20, 2010

SUMMARY

STRATEGY DESCRIPTION: Development of a direct reuse system to provide reclaimed water to Fulshear and surrounding communities.

SUPPLY QUANTITY: Up to 287 acre-ft/year in 2020 and 430 acre-ft/year in 2030 and beyond

SUPPLY SOURCE: Groundwater and surface water based WWTP discharges in Fort Bend County (1 MGD estimated wastewater flow in 2020 and 1.5 MGD estimated wastewater flow in 2030-2060)

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $566,600 capital cost (estimated as $564 per acre-foot of plant capacity based on Wastewater Reuse for Municipal Irrigation WMS). (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $502 per ac-ft based on assumption above.

Water Management Strategy Analysis Description

Introduction:

The Fort Bend Subsidence District (FBSD) has mandated the reduction in groundwater withdrawals in an effort to curb subsidence within the county. The North Fort Bend Water Authority (NFBWA) has provided incentive to communities who implement reclaimed water strategies in an effort to reduce the overall need for surface water conversion.

Fulshear, in conjunction with the Cross Creek Ranch development have chosen to pursue a reuse strategy in order to offset total surface water demand. This strategy is in the beginning phase of development and is expected to be implemented by the year 2020.

Analysis:

A preliminary study of this WMS has been carried out based on the build-out population of the Cross Creek Ranch development. This build-out will occur in 2025 and approximately two-thirds of the community is expected to be contributing wastewater flows to the proposed reuse system by the year 2020.

Water User Group Application:

City of Fulshear

Issues and Considerations:

This strategy is in the early phases of development and will require permitting through Section 210 in addition to conceptual and detailed design.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Houston Indirect Reuse

DATE: November 13, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Wastewater reclamation for municipal and industrial reuse from 35 City of Houston wastewater treatment plants in the City of Houston service area.

SUPPLY QUANTITY: Up to 160,000 ac-ft per year plus any future flows from WWTP facility expansions

SUPPLY SOURCE: Effluent from thirty-five City of Houston wastewater treatment plants as listed below A percentage of up to 580,923 ac-ft per year of effluent is assumed to be available.

TOTAL STRATEGY COST: Based on relative location of reuse water source and need

ANNUAL UNIT WATER COST: $402 to $1,232 per ac-ft.

<u>WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION</u>

INTRODUCTION

The purpose of this analysis is to address the potential use of reclaimed wastewater to meet projected water shortages in Region H. This study investigates using reclaimed wastewater effluent to supplement existing water supplies that serve municipal and industrial demands within the City of Houston service area. Under this strategy, wastewater currently discharged into 7 area watersheds will receive further treatment and will be offered as an additional supply sources to area municipal and industrial users.

ANALYSIS

A review of the *Application for Authorization to Divert Existing and Future Return Flows* City of Houston Permit Application is the basis for this analysis. The project calls for collecting effluent from 35 of the city's wastewater treatment plants and using bed and banks permits to transmit the water to diversion locations. Both the discharge locations and diversion locations are listed below. Figure 1 provides a graphical representation of the potential reclaimed wastewater system.

The amount of estimated future flows through the 35 WWTPs is unknown, but future plant expansions could increase the amount of water available for reuse downstream.

List of WWTP Facilities (by Watershed):

Brays Bayou Watershed

- Southwest Wastewater Treatment Plant
- Keegans Bayou Wastewater Treatment Plant
- Beltway Wastewater Treatment Plant
- Upper Brays Wastewater Treatment Plant
- WCID 111 Wastewater Treatment Plant

Buffalo Bayou Watershed

- 69th Street Wastewater Treatment Plant
- West District Wastewater Treatment Plant
- Turkey Creek Wastewater Treatment Plant
- Park Ten Wastewater Treatment Plant

Greens Bayou Watershed

- Northeast Wastewater Treatment Plant
- FWSD #23
- Tidwell Timbers Wastewater Treatment Plant
- WCID # 76 Wastewater Treatment Plant
- International Airport Wastewater Treatment Plant
- Northbelt Wastewater Treatment Plant
- Imperial Valley Wastewater Treatment Plant
- Northgate Wastewater Treatment Plant
- Northborough Wastewater Treatment Plant
- MUD #203 Wastewater Treatment Plant
- Willowbrook Wastewater Treatment Plant

Hunting Bayou Watershed

- Homestead Wastewater Treatment Plant

Lake Houston Watershed

- Kingwood Central Wastewater Treatment Plant
- Forest Cove Wastewater Treatment Plant
- MUD #48 Wastewater Treatment Plant

Sims Bayou Watershed

- Sims Bayou Wastewater Treatment Plant
- Sims Bayou South Wastewater Treatment Plant
- WCID #47 Wastewater Treatment Plant
- Easthaven Wastewater Treatment Plant
- Chocolate Bayou Wastewater Treatment Plant
- Almeda Sims Wastewater Treatment Plant
- WCID #51
- Greensridge Wastewater Treatment Plant

White Oak Bayou Watershed

- Northwest Wastewater Treatment Plant
- Westway Wastewater Treatment Plant
- White Oak Wastewater Treatment Plant

Diversion Points (by Watershed):

Brays Bayou Watershed

- Southwest Wastewater Treatment Plant
- Macgregor Park

Buffalo Bayou Watershed

- 69th Street Wastewater Treatment Plant
- Memorial Park

Greens Bayou Watershed

- Northeast Wastewater Treatment Plant
- Brock Park

Hunting Bayou Watershed

- Homestead Wastewater Treatment Plant
- Herman Brown Park

Lake Houston Watershed

- Lake Houston Pump Station
- Northeast Water Purification Plant

Sims Bayou Watershed

- Sims Bayou Wastewater Treatment Plant
- Reveille Park

White Oak Bayou Watershed

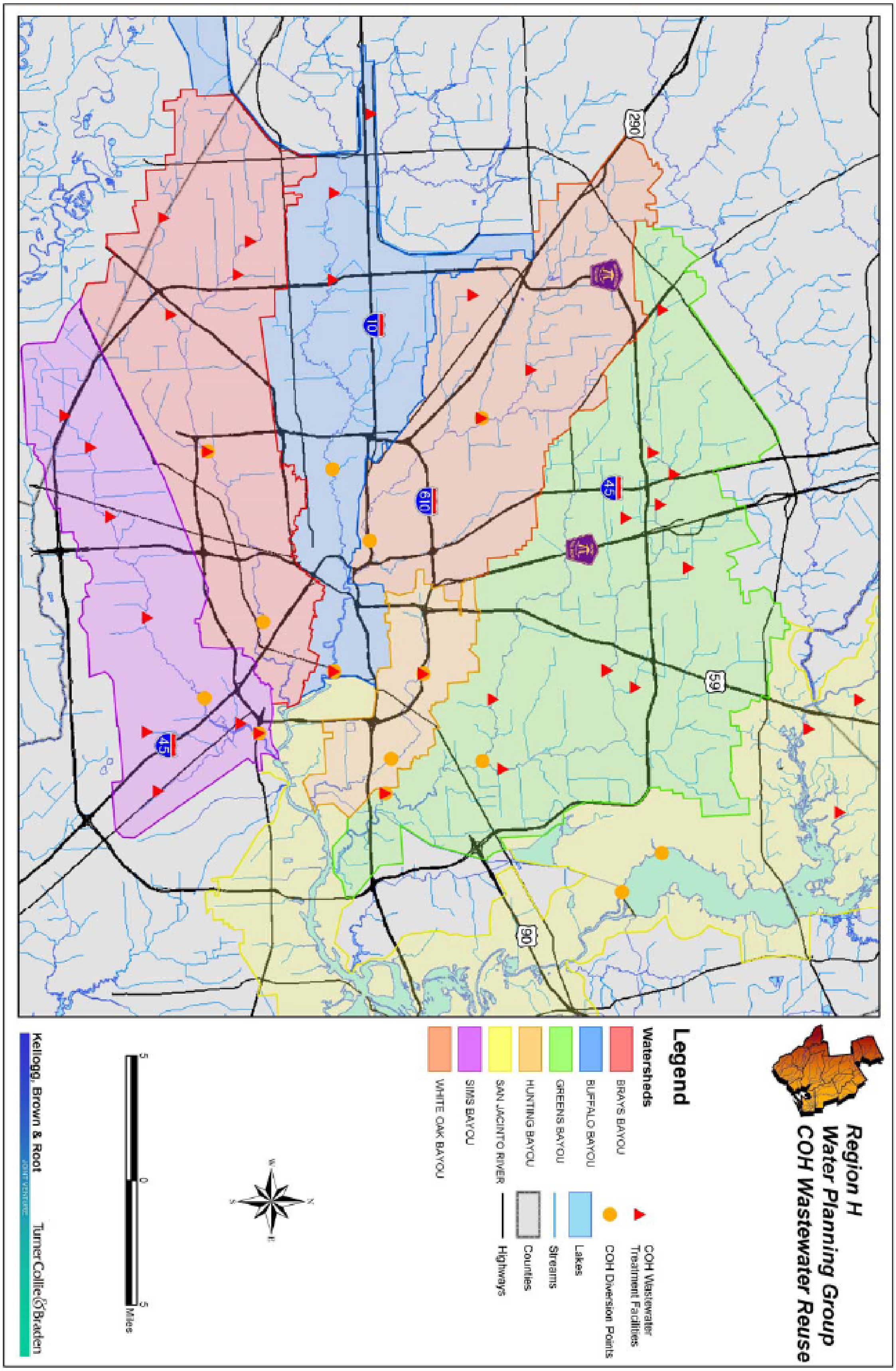
- Northwest Wastewater Treatment Plant
- Stude Park

WATER USER GROUP APPLICATION

This strategy would help to meet the growing municipal and industrial demands of the region in which the City of Houston serves. In particular, the reuse water would serve demands in the seven watersheds listed above. According to the permit application, all water not consumptively used will be returned to the San Jacinto or adjoining coastal basins at wastewater treatment plants in the City's system.

ISSUES AND CONSIDERATIONS

Environmental impacts, impacts to other water rights, and other issues or concerns will be addressed during the permitting process.


Region H
Water Planning Group
COH Wastewater Reuse
Legend
COH Wastewater Treatment Facilities
COH Diversion Points
Lakes
Streams
Counties
Highways
Watersheds
BRAYS BAYOU
BUFFALO BAYOU
GREENS BAYOU
HUNTING BAYOU
SAN JACINTO RIVER
SIMS BAYOU
WHITE OAK BAYOU
5
0
5
Miles
Kellogg, Brown & Root
Turner Collie & Braden
290
10
610
45
59
90

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Montgomery County MUDs 8 and 9 Reuse

DATE: July 22, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Establishment of a bed-and-banks permit and treatment facility to supply water to Montgomery County MUDs 8 and 9 via indirect reuse, reducing dependence on groundwater.

SUPPLY QUANTITY: Up to 1,120 acre-ft/year (1 MGD)

SUPPLY SOURCE: Groundwater-based WWTP discharges to Lake Conroe, up to 132,147 acre-ft/yr (118 MGD) assumed effluent available for diversion

IMPLEMENTATION DECADE: 2020 (2016)

TOTAL STRATEGY COST: $12,245,700 capital cost (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $878 per ac-ft (based on allocated volume)

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Lone Star Groundwater Conservation District (LSGCD) has mandated a county-wide reduction in groundwater, limiting groundwater to 70 percent of total county demands, to be met by 2015. Montgomery MUDs 8 and 9 have undertaken study of an indirect reuse methodology as an alternate means to surface water conversion for meeting the mandated groundwater reduction. The MUDs have applied to TCEQ for a permit to divert a volume equal to their WWTP discharge, less evaporative losses, from Lake Conroe. This water would be treated and used to meet water demands within the MUDs. Initial treatment plant capacity would be 0.5 MGD, scalable up to 1.0 MGD.

Analysis:

A preliminary study of this WMS has been carried out on behalf of Montgomery County MUDs 8 and 9. Results indicate that a treatment plant of 0.5 MGD capacity could reduce current groundwater usage by approximately 30 percent on an annual basis. The preliminary study is attached at the back of this memorandum.

Water User Group Application:

Diverted water would meet shortages for the Montgomery County MUD 8 and 9 WUGs.

Issues and Considerations:

This WMS is contingent on TCEQ granting a bed-and-banks permit for the groundwater-based WWTP discharge. The WMS would not be allowed to adversely impact senior water rights holders. Approval of the San Jacinto River Authority and the City of Houston would be required in order to secure or use the permit.

Water Credit Feasibility Study
Proof of Concept Report

Montgomery County
Municipal Utility District No. 8, Texas

And

Montgomery County
Municipal Utility District No. 9, Texas

STATE OF TEXAS
JOSEPH W NORRIS
49962
LICENSED
PROFESSIONAL ENGINEER

August 2009

NRS
engineering water solutions

NRS Consulting Engineers, Inc.
Texas Registered Engineering Firm
F-2705

Outline

Introduction

This Water Credit Feasibility Study (Study) was undertaken by the Montgomery County Municipal Utility Districts No. 8 and 9 (MUDs) to determine the feasibility of constructing a surface water treatment facility within their district boundaries to take advantage of wastewater return flow credits, and thereby reduce their dependency upon groundwater resources.

The Study is in response to a Lone Star Groundwater Conservation District (Lone Star GCD) county-wide groundwater reduction mandate of 30 percent by 2015. The San Jacinto River Authority (SJRA) is currently preparing a plan that identifies the options for groundwater users in Montgomery County to comply with the Lone Star GCD mandate by converting to a central surface water treatment and distribution system. The MUDs have agreed to participate in the SJRA plan to determine their potential costs, but the present Study would be an alternative means of satisfying their groundwater reduction requirements. It is recognized that the final reduction requirement may be greater than 30 percent.

Objective

The objective of this proof of concept report is to identify any permitting or engineering fatal flaws associated with the water credit project concept.

Scope

As scoped, the Study includes two tasks:

Task 1 Proof of Concept
Task 2 Conceptual Engineering Feasibility Assessment

Task 2 will only be undertaken if authorized by the MUDs after their review and consideration of the results from Task 1. The present report, therefore, only addresses Task 1 findings.

Subtask 1.1: Data Gathering

For Task 1[1], NRS worked with the MUDs' local engineers and system operator (Hays Utility North) to compile available data, including:

A. Maps with designated jurisdictional boundaries, including land ownership and ROW easements held by the MUDs.
B. Existing documents and data for water quantity and quality information and studies by Federal, State, local, and private entities.
C. Existing water resources planning and engineering documents and reports for the study area.
D. Regional water planning data for population and water demands.
E. Water supply and treatment capacities.
F. Water and wastewater treatment and distribution infrastructure.

[1] For Task 2, additional data and information that will be required will include, at a minimum:
A. Existing water treatment costs on a per 1,000 gallon basis.
B. Existing power service agreements, costs, and sources.
C. Water quality data provided by MUDs 8 and 9.

Subtask 1.2: Proof of Concept Determination

Based on a review of the data gathered, NRS made a determination of fundamental project viability (proof of concept) based on an assessment of fatal flaws. This determination resulted in a conceptual description of:

A. Facility treatment capacity.
B. Primary water treatment process.
C. Suitability of potential facility sites.

Subtask 2.2: Permitting Requirements

In addition to the specified activities in Task 1, NRS, at the request of the MUDs, also performed some of the activities outlined for Task 2; namely, assisting the legal and engineering team retained by the MUDs to explore permits and approvals required from the Texas Commission on Environmental Quality (TCEQ), San Jacinto River Authority (SJRA), and City of Houston for the proposed water credit project. The work conducted under Task 1 did not include a complete assessment of permitting requirements necessary for project design and implementation, which will be accomplished during Task 2, if authorized.

Results and Discussion

1.1 Data Gathering

For Task 1 of the present Study, the type and quality of available data was generally adequate. Key information obtained and evaluated included: planning objectives and constraints; daily operational data for water production and wastewater discharge for the previous year; projected district build-out estimates for connections and water demands for the MUDs; and mapping data for MUDs-owned infrastructure (water and wastewater) and property. One notable information deficiency was the available raw water quality data in Lake Conroe.

Water Usage Analysis

Based on a 2008 water usage analysis conducted by the MUDs' engineers, the combined number of water connections within the MUDs boundaries was 2,873. Full build-out of the districts is expected to include a total of 5,411 connections and be achieved by 2035 (Table 1 and Figure 1).

Table 1: Summary of MUDs water usage analysis through 2035.

	Total Number of Connections	Average Daily Flow Requirement (mgd)	Peak Daily Demand Requirement (mgd)	Peak Hourly Demand Requirement (mgd)
2008	2,873	1.437	3.448	6.321
2015*	3,531	1.766	4.237	7.768
2025	4,471	2.236	5.356	9.836
2035	5,411	2.706	6.493	11.904

* The Lone Star GCD required 30 percent groundwater reduction begins in 2015.

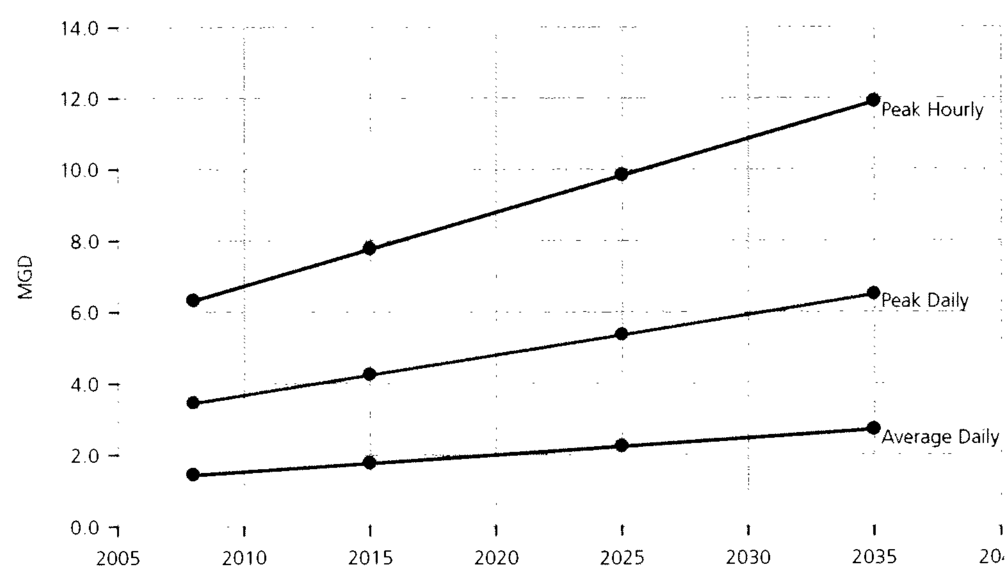


Figure 1: Projected water usage demands for both MUDs.

Daily Water Production

Daily production data for the four water treatment plants (WTP) and daily discharge for the one wastewater treatment plant (WWTP) over the past year were evaluated (Figure 2). The Walden plant is the newest WTP and has been operating only since January 2009. Each water plant includes a well, disinfection, and ground storage. The design capacity of each well is 1,200 gallons per minute (gpm) except for the Poe Street WTP, which is 1,000 gpm.

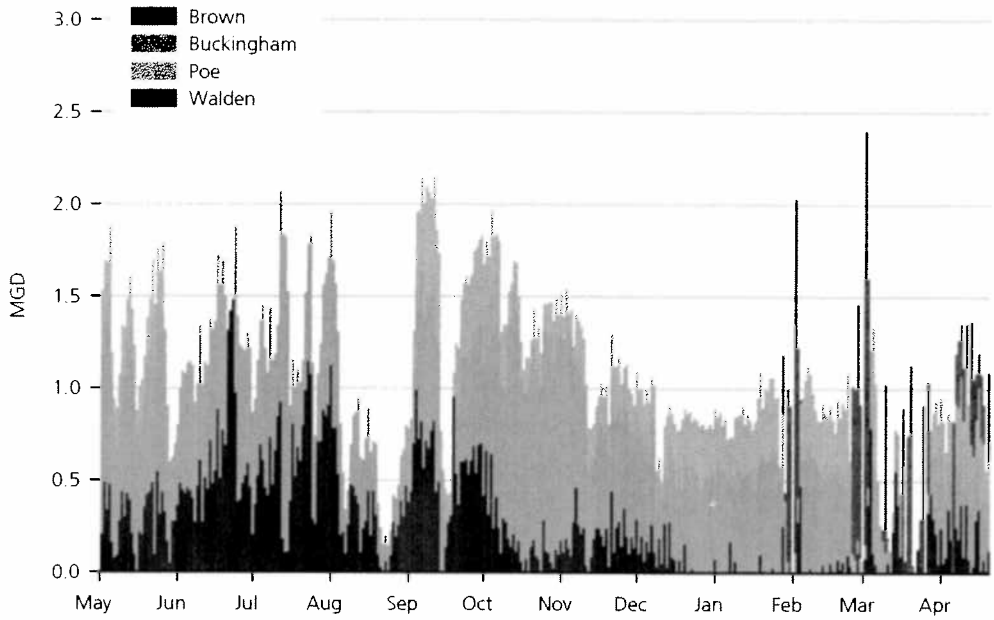


Figure 2: Daily WTP production data for May 1, 2008 to April 30, 2009.

For the period evaluated (May 1, 2008 to April 30, 2009)[2], the average daily production from all four water plants was 1.113 million gallons per day (mgd) (Table 2). The MUDs water distribution system is efficient, as between 91 and 97 percent of the total amount of water produced is billed to customers[3].

Table 2: Summary of daily water and wastewater production data for May 1, 2008 to April 30, 2009 (mgd).

	Water					Wastewater
	Brown	Buckingham	Poe	Walden	**Total**	**Total**
Annual Total*	98.395	204.971	68.988	24.895	**372.354**	**129.470**
Daily Average	0.270	0.563	0.190	0.251	**1.113**	**0.355**
Daily Minimum	0.0	0.0	0.0	0.0	**0.010**	**0.0**
Daily Maximum	1.481	1.714	0.736	2.247	**2.402**	**1.175**
Percent of Total (annual) Water Production	26.4%	55.1%	18.5%	6.7%	**100.0%**	**34.8%**
Percent of Average (daily) Water Production	24.3%	50.6%	17.0%	22.6%	**100.0%**	**31.9%**

* Data for 21 days during the year were missing.

2 Data were missing for a total of 21 days during this period.
3 Based on monthly data provided by the MUDs' engineers for the period of December 2007 to May 2009.

Daily Wastewater Discharge

The WWTP is presently permitted for a discharge capacity of up to 0.9 mgd, but the average daily wastewater discharge for the period evaluated was 0.355 mgd (see Table 2). Unlike with water production, which showed a strong seasonal signal (higher in the summer), the wastewater discharge is relatively constant (Figure 3). By volume, the WWTP discharges approximately 35 percent of the annual total WTP production and 32 percent of the daily average (Figure 4).

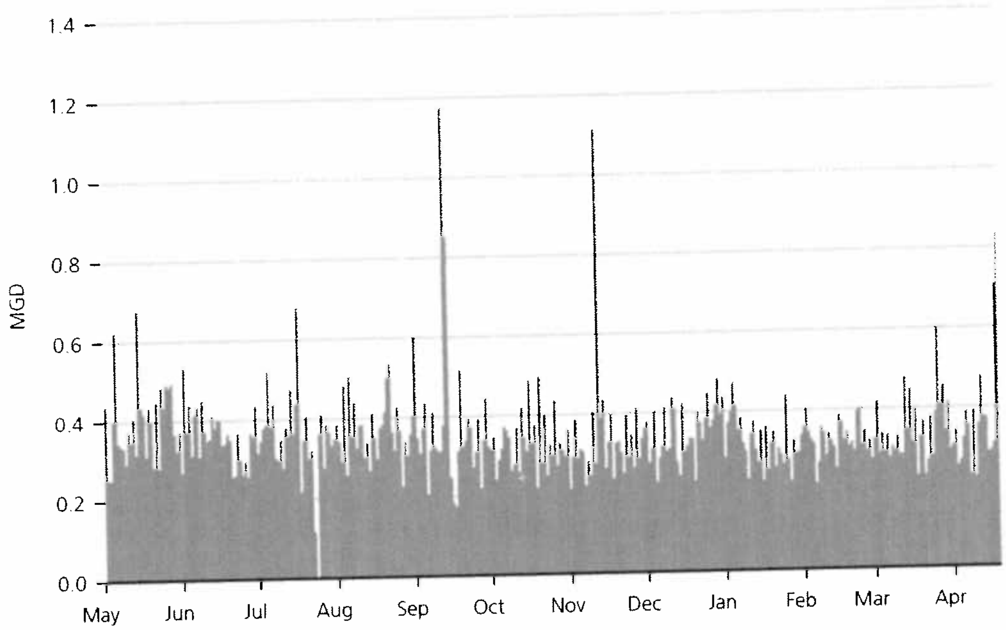


Figure 3: Daily WWTP discharge data for May 1, 2008 to April 30, 2009.

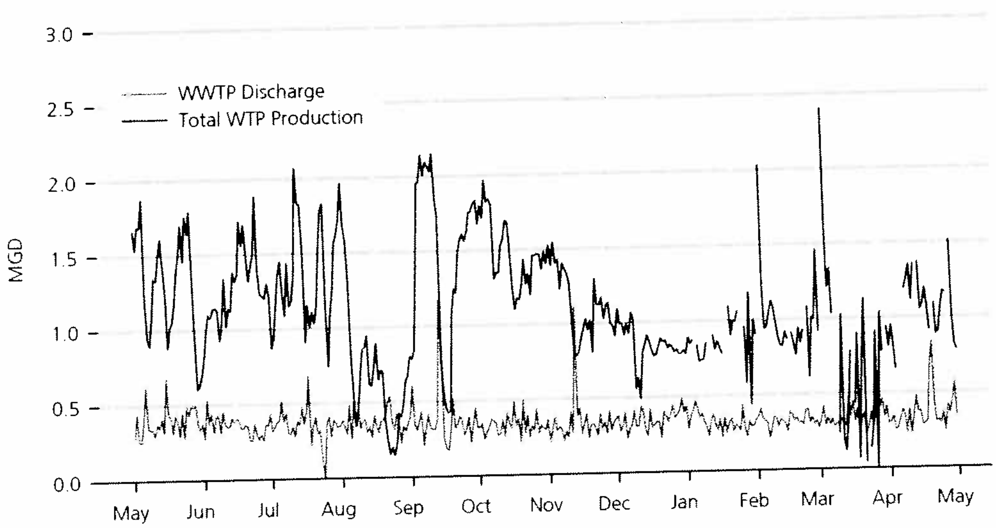


Figure 4: Comparison of total WTP production and WWTP discharge for May 1, 2008 to April 30, 2009.

Raw Water Quality

Raw water quality from Lake Conroe is very limited. The only data available included monthly and quarterly testing results for a limited period (October to December 2007) at the Intake Structure East Gate[4]. While insufficient for a firm treatment process design, this information provides some means of developing a conservative treatment process.

1.2 Proof of Concept Determination

Current Operations

Presently, the water and wastewater system for the MUDs operates as a single system, although individual facilities are owned by one or the other district. The four WTPs produce 100 percent of the potable water supply, all from groundwater (Figure 5). Of the total amount produced, 35 percent is returned to the WWTP, treated, and then discharged into Lake Conroe. The remaining 65 percent is lost to consumptive use by the customers.

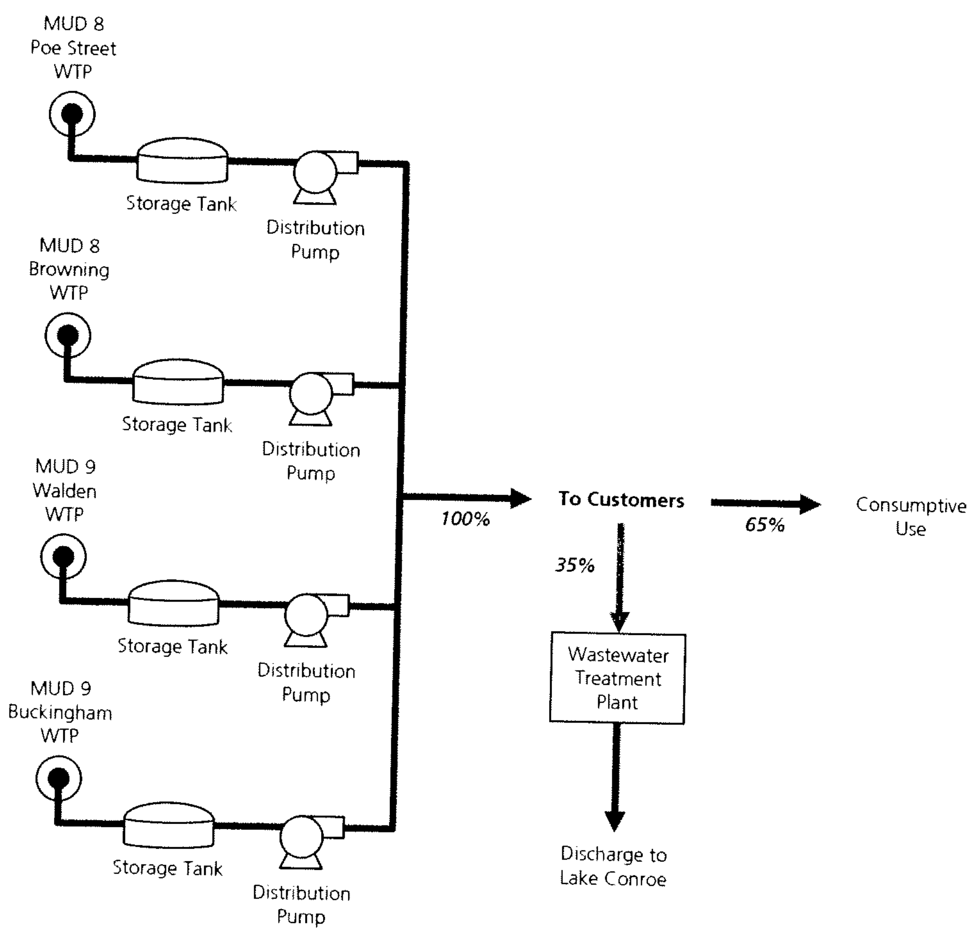


Figure 5: Diagram showing current system operation.

4 TCB/AECOM. 2008. Planning level study for Alternative surface water pipeline routing in Montgomery County for Lone Star Groundwater Conservation District and San Jacinto River Authority. May 2008.

Proposed Operations

Proposed Project Concept

The proposed project would involve developing a surface water treatment plant within the MUDs district boundaries. On a daily basis, the new WTP would divert and treat water from Lake Conroe in daily amounts equal to the discharge volume from the WWTP, less any evaporation losses (Figure 6). The raw water intake has not yet been sited, but would be located within the district boundaries at a distance from the wastewater treatment plant point of discharge that satisfies state regulatory requirements.

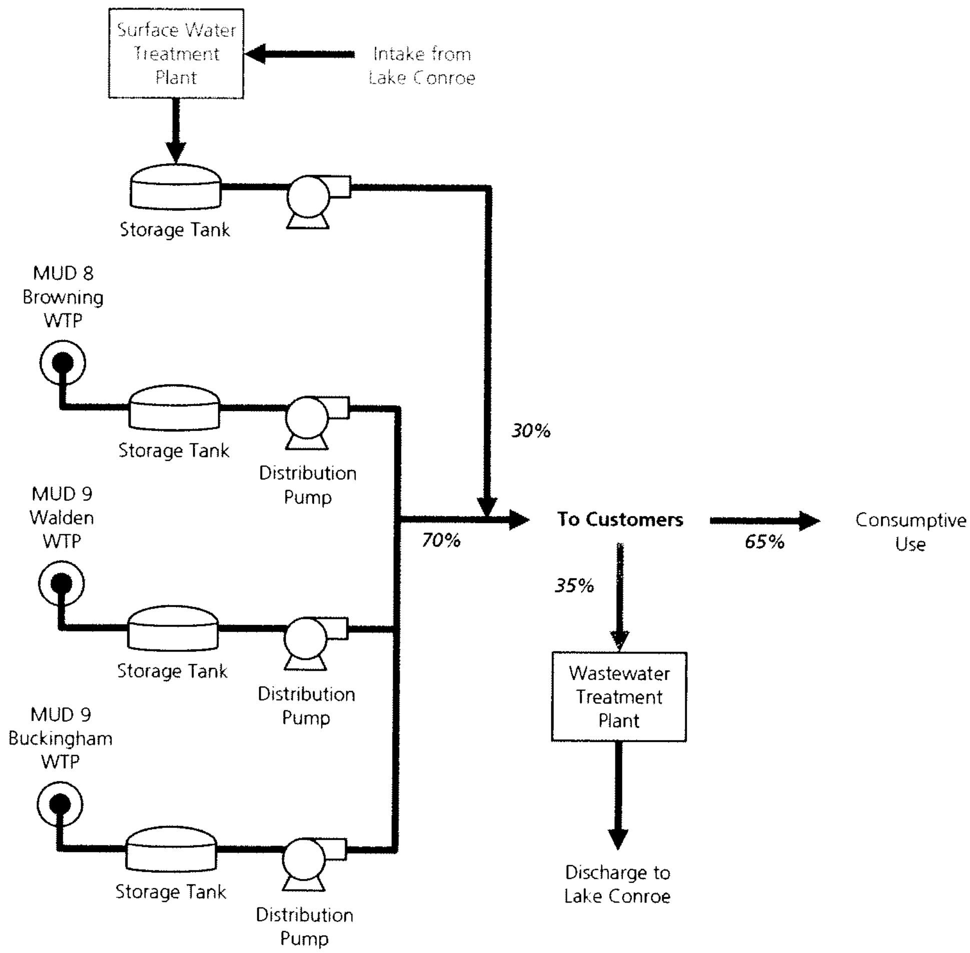


Figure 6: Diagram showing proposed system operation.

A basic spreadsheet model was constructed using daily data to quantify the effectiveness of this project concept. A MF treatment plant capacity of 0.5 mgd was selected as the initial project scale. On a daily basis, the amount of wastewater discharge available for diversion by the proposed MF treatment plant was determined. For this simulation, the daily actual total WTP production amount was used as the total daily water demand. On most days, this demand exceeded the WWTP discharge, so the full discharge amount could be diverted up to the design capacity of the MF treatment plant. However, on days when the demand was less than the WWTP discharge, or when the WWTP discharge exceeded the MF treatment plant capacity, some volume of WWTP discharge could not be diverted. The results of this simulation are summarized in Table 3.

Table 3: Summary of simulated water and wastewater system performance with a 0.50 mgd MF WTP using daily water and wastewater production data for May 1, 2008 to April 30, 2009 (mgd).

	WWTP Discharge Available for Diversion*	Simulated MF Plant Production	Simulated Groundwater Production	Simulated Total Production
Annual Total**	117.988	115.803	266.065	**381.868**
Daily Average	0.344	0.338	0.794	**1.110**
Daily Minimum	0.000	0.000	0.000	**0.000**
Daily Maximum	1.175	0.500	1.984	**2.402**
Percent of Total (annual) Water Production	31.69%	30.3%	69.7%	**100.0%**
Percent of Average (daily) Water Production	30.90%	29.8%	70.2%	**100.0%**

* Does not include any reduction for evaporation losses.

** Data for 21 days during the year were missing.

The proposed project concept would allow a portion of the total water production to be provided by surface discharge credits, resulting in a reduction by the same amount in groundwater pumping. The simulation shows that, if the proposed MF plant had been in operation for the past year, it could have accounted for 30.3 percent of the total (annual) and 29.8 percent of average (daily) of water production (Figure 7). Because water discharged into the lake from the WWTP would be diverted back from the lake within 24 hours, no net effect to water rights or reservoir storage capacity would occur.

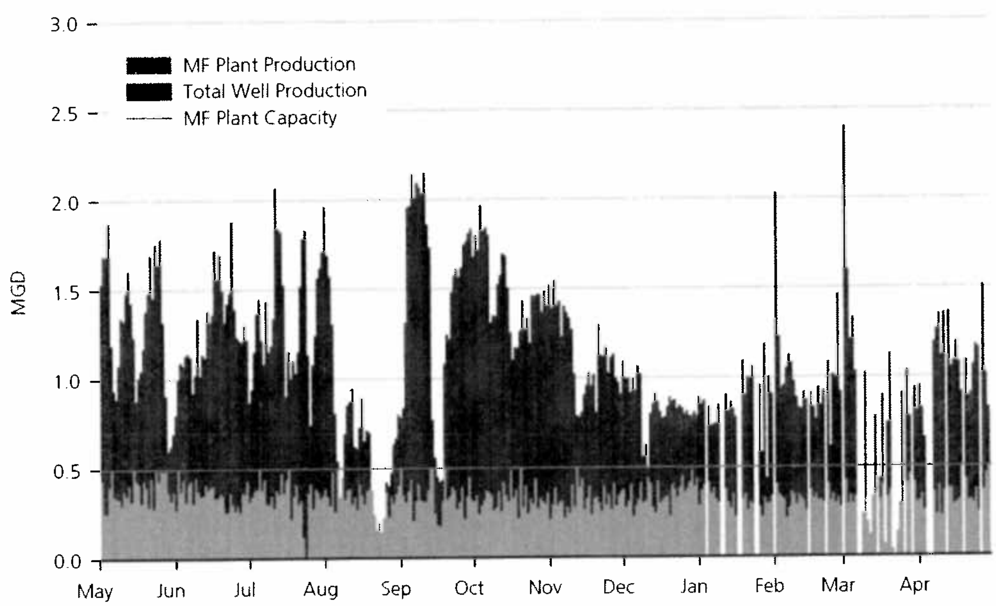


Figure 7: Simulated total water production for May 1, 2008 to April 30, 2009.

Treatment Process

Based on limted raw water quality data for Lake Conroe, the treatment method anticipated is rapid mix–flocculation–clarification–microfiltration (MF) (Figure 8). The initial MF treatment plant would be sized to produce 0.5 mgd, expandable to 1.0 mgd. The clarifier would be sized to accommodate 1.0 mgd at an overflow rate of 0.6 gallons per minute per square foot. The MF building would be large enough to contain 1.0 mgd, an electrical building, bathroom, lab, and perhaps a small office. In addition, two storage tanks would be constructed; one for the MF feed and one for the MF filtrate. The MF feed tank would allow storage due to the inconsistent feed flow rate due to scheduled membrane trains being off-line due to backwashing and other cleanings. The MF filtrate tank would be used to store treated water prior to pumping to the ground storage tank. Finally, a small lagoon would be included to contain the MF backwash. There is the potential that some of these facilities could be eliminated once more specific planning parameters and water quality data are known, but the present plan represents a conservative design approach.

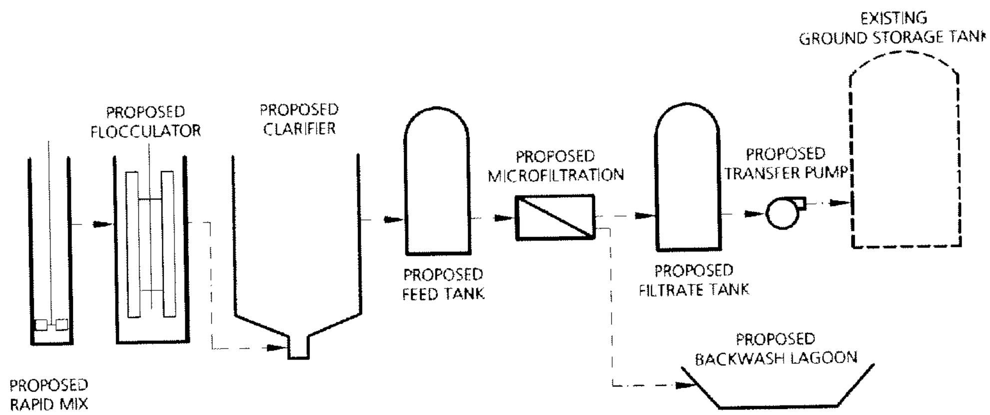


Figure 8: Conceptual process flow chart for the proposed MF plant.

As presently envisioned, the new WTP would be located at the Poe Street WTP where the MUDs own several adjacent parcels. A conceptual layout using the fewest parcels is provided in Figure 9.

2.2 Permitting Requirements

Implementing the proposed water credit project would require the MUDs obtain a bed and banks permit from the Texas Commission on Environmental Quality (TCEQ). As the applicant, the MUDs would seek authorization to divert and use its groundwater-based effluent return flow and any future groundwater based effluent return flow from the WWTP for municipal and industrial purposes within its service area, and to use Lake Conroe to convey return water to its diversion point.

As part of the bed and banks application, the applicants are required to demonstrate that the proposed project would not adversely affect water rights holders of water in Lake Conroe or their storage operations. This is demonstrated through a detailed accounting plan, which basically protects other water users and the owners of the water rights by ensuring that the appropriate amount of water is used, impounded, and released.

At the request of the MUDs, NRS prepared a draft Accounting Plan (Annex A) based on input from the MUDs' legal and engineering team. Any other permitting requirement for the proposed water credit project (such as TCEQ piloting and approval requirements for membrane-based water treatment facilities, or construction permits for intake installation) will be addressed as part of Task 2.

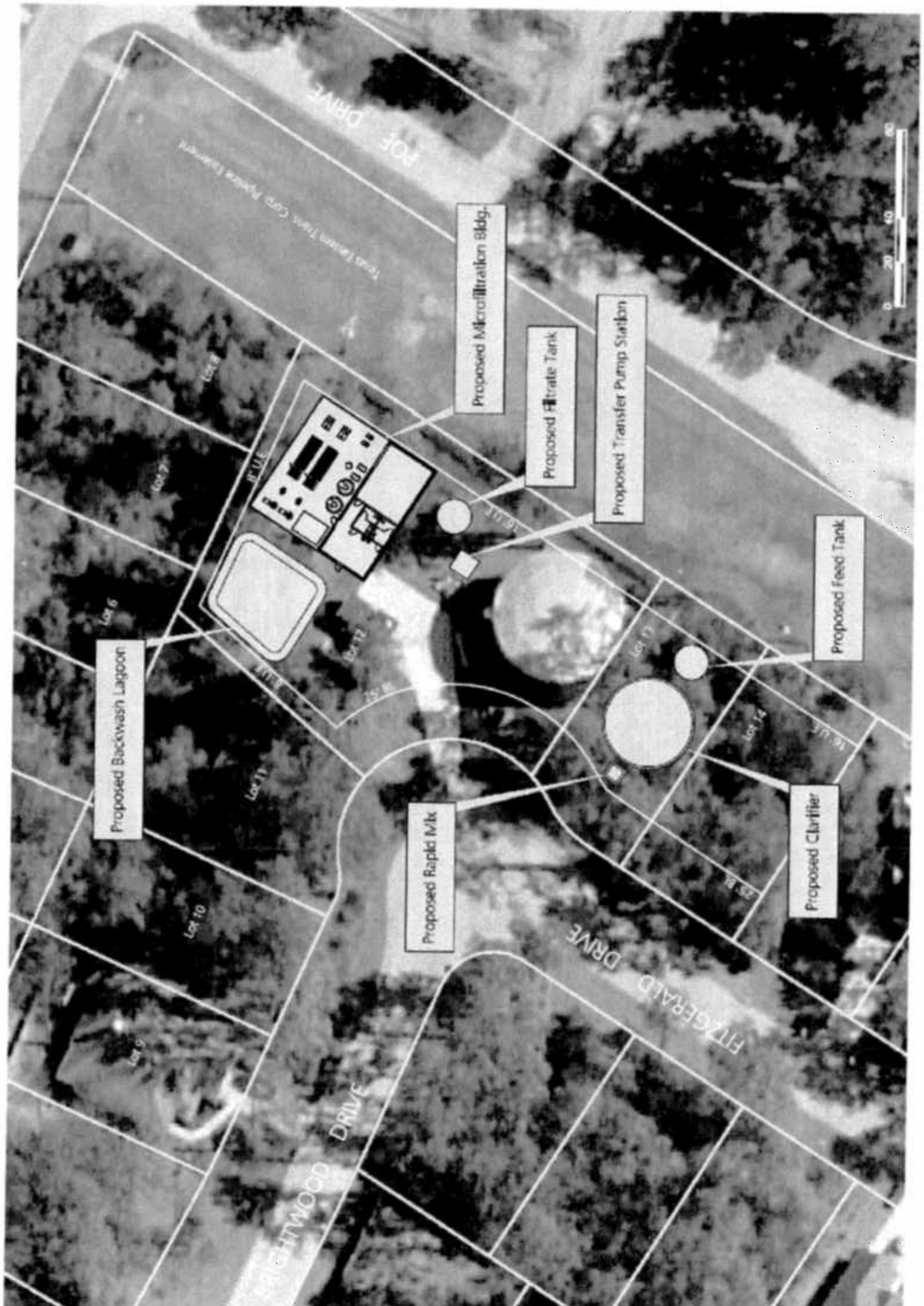


Figure 9: Conceptual layout of the proposed MF treatment plant.

Findings

Based on the engineering and permitting evaluation conducted in this Task 1 analysis, **no fatal flaws were identified for the proposed water credit project**. This conclusion is based on the following findings:

1. The proposed treatment system (microfiltration membrane process) would be adequate for the known water quality conditions in Lake Conroe.

2. There appears to be sufficient land presently controlled by the MUDs to accommodate a MF treatment plant with an initial capacity of 0.5 mgd, expandable to 1.0 mgd.

3. No permitting impediments exist to obtain state approval for the treatment process, although a raw water quality monitoring program and pilot-scale test may be required by TCEQ prior to approval.

4. An MF treatment plant with a capacity of 0.5 mgd could reduce the current amount of groundwater pumping by approximately 30 percent.

While no fatal flaws were identified, it should be noted that **the proposed water credit project may have one or more of the following potential limitations**:

1. Extended implementation schedule – if determined necessary by TCEQ, the permitting approval process for the proposed MF treatment plant may include a 12-month raw water quality monitoring program and a minimum 90-day pilot test. Together, including agency review and approval, these requirements could add 24 to 30 months of time prior to initiation of facility construction.

2. Does not address future increases in water demand – the proposed water credit project appears capable of satisfying the Lone Star GCD 30 percent reduction by 2015. However, as demands increase due to build-out activity, a new water supply will likely be required. The need for new water could be off-set by reductions in consumptive use (water conservation) or by introducing a new supply.

   If there was an opportunity to contract for additional surface water from Lake Conroe by contract, then the planning and design work for the MF treatment plant should anticipate this future expansion. There may be some advantage in negotiating a future water contract while seeking permission to implement the water credit project. From a bigger perspective, the regional plan under development by SJRA intends to meet the future demands of the MUDs with water from Lake Conroe, but through a large, regional treatment and distribution system. By allowing the MUDs to develop their own on-site treatment system for the same source water, some of the distribution costs of the regional project could be eliminated.

3. Project concept encompasses some risk while uncertainty remains in the final Lone Star GCD reduction requirement – while no fatal flaws were identified with the proposed water credit project as presently envisioned, a change in the reduction requirements or its application could impose conditions under which the project would not be feasible.

Annex A: Proposed Accounting Plan

Introduction

This proposed Accounting Plan accompanies a Bed and Banks water rights application by Montgomery County Municipal Utility District No. 8 and Montgomery County Utility District No. 9, together referred to as "MUDs". The water system serving the MUDs is supplied by four groundwater wells located within MUDs' boundaries. This Plan describes the method by which the MUDs will account for discharges into and diversions from Lake Conroe, Texas.

In summary, the MUDs will:

1. Meter discharge into Lake Conroe from an existing Wastewater Treatment Plant WWTP) over a 24-hour period;

2. From the amount discharged, subtract a calculated evaporation value for that period to determine a daily diversion target;

3. Meter diversion from Lake Conroe to a new surface water treatment plant WTP) over the subsequent 24 hour period; and

4. Calculate the difference between the diversion target and actual diversion for that day, and adjust the next day's diversion target accordingly.

All measurements and calculations would be rounded to the nearest gallon. The result of this operation is that water discharged into the lake from the WWTP would be diverted back from the lake within 24 hours, and any differences between the target and actual diversions would be reconciled daily. There would be no net effect to water rights or reservoir storage capacity over a 24-hour period.

Explanation of Fields

The Accounting Plan would use six major fields (Table 4). All metered and calculated values would be integrated into the MUDs existing Supervisory Control and Data Acquisition (SCADA) system. The WTP would be designed with a set production capacity. Therefore, the total daily diversion target would be met by determining how long the facility would operate within the 24-hour period. Assigning this operating duration for each day could also be automated within the SCADA system or could be performed by an on-site operator.

Table 4: Summary of fields in the proposed Accounting Plan.

Field Name	A Date	B Discharge	C Carriage Losses	D Diversion Target	E Diversion	F Difference
Units	daily	gallons	gallons	gallons	gallons	gallons
Source	assigned	metered	calculated	calculated	metered	calculated
Details	12:00am to 12:00am	-	**C = (X*Y*0.004329)*(B/Z)** where X represents the assigned daily evaporation rate in inches, Y represents the surface area of Lake Conroe at conservation pool elevation (126,192,971,520 square inches)[5], 0.004239 equals the factor to convert cubic inches to gallons; and Z represents the volume of Lake Conroe at conservation pool elevation (135,628,490,360 gallons)[6].	**$D = B–C+F_1$** where 1 indicates the previous day's value	-	**$F_2 = D–E$** where 2 indicates the current day's value

Date

Data would be reported daily on a 24-hour basis from midnight to midnight.

Discharge

WWTP discharge data would be metered.

Carriage Losses

Carriage losses between the point of discharge and the point of diversion would only include evaporation. The proposed Accounting Plan would estimate daily evaporation based on the proportional share that the discharge volume comprises of the reservoir storage capacity of Lake Conroe at conservation pool.

The Texas Water Development Board[7] has calculated monthly lake surface evaporation for Texas over a 53-year period from 1954 to 2007. Data used included monthly pan evaporation and precipitation data obtain from 1) TWDB and NWS evaporation stations; 2) Hydrosphere NCDC (National Climatic Data Center), Summary of the Day Compact Disc; 3) NCDC Climatological data (monthly or annual) for surrounding states (Louisiana, Arkansas, Oklahoma, and New Mexico); and 4) other internet data sources. For use in this Accounting Plan, the monthly average evaporation value for Lake Conroe (Quad 712) was divided by the average number of days in that month to obtain a daily evaporation rate (Table 5).

[5] Texas Water Development Board. 2003. Volumetric Survey of Lake Conroe. Prepared for San Jacinto River Authority; March 10, 2003. Texas Water Development Board, Austin, Texas.

[6] *Ibid.*

[7] Texas Water Development Board. 2009. Evaporation and Precipitation Data for Texas. Acquired online at http://midgewater.twdb.state.tx.us/cgi-in/Evaporation/parseevap.cgi?quad=712&options=ET&submit=SUBMIT.

Table 5: Monthly evaporation rates for Lake Conroe, Texas.

Quad	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
712	1954	1.87	3.45	4.00	4.21	4.80	6.80	6.56	6.56	6.39	5.13	3.34	2.82	**55.94**
712	1955	2.44	2.14	3.93	4.92	5.31	5.89	5.85	5.08	4.64	5.60	3.92	2.70	**52.42**
712	1956	2.58	2.98	3.84	4.63	5.70	5.96	8.28	7.41	6.27	4.83	3.05	2.71	**58.23**
712	1957	1.52	1.96	3.52	3.66	4.72	4.96	6.45	5.96	4.16	3.31	2.59	2.07	**44.87**
712	1958	1.76	2.13	2.98	3.70	4.27	6.01	5.45	6.03	3.07	2.73	2.06	1.46	**41.64**
712	1959	1.41	1.51	3.66	3.54	4.62	5.62	5.25	4.20	3.99	3.50	2.28	1.69	**41.26**
712	1960	1.67	1.93	2.68	3.98	5.22	6.30	5.43	3.42	4.14	2.76	2.04	1.37	**40.94**
712	1961	1.56	2.14	3.23	4.35	5.09	4.94	4.72	5.06	4.20	4.01	2.29	1.84	**43.41**
712	1962	1.77	2.62	3.49	4.06	5.12	4.57	6.03	6.53	4.11	4.34	2.81	1.90	**47.34**
712	1963	1.35	2.23	3.74	4.80	5.37	5.74	5.75	6.07	4.43	4.03	2.71	1.77	**48.00**
712	1964	1.79	2.36	3.20	3.93	4.60	5.86	5.82	5.55	4.25	4.38	2.69	1.96	**46.38**
712	1965	2.35	2.13	3.28	3.92	3.95	5.39	6.16	5.17	4.81	3.51	2.20	1.36	**44.23**
712	1966	1.37	2.01	3.69	3.93	3.75	6.20	6.59	5.05	4.52	3.77	3.10	1.96	**45.95**
712	1967	1.99	2.52	4.28	3.99	4.67	6.14	6.11	6.14	4.39	4.51	2.68	1.77	**49.19**
712	1968	1.74	2.06	2.94	3.31	4.49	4.23	5.38	6.03	4.26	3.75	2.75	2.01	**42.96**
712	1969	1.70	1.22	3.17	4.31	3.88	5.21	6.73	6.01	4.79	4.46	2.73	1.87	**46.07**
712	1970	1.32	2.39	2.95	3.87	4.74	5.98	6.41	6.73	4.14	3.50	2.95	2.64	**47.61**
712	1971	2.06	2.86	3.82	5.35	4.57	6.39	7.92	5.20	4.03	3.88	2.84	1.42	**50.36**
712	1972	2.00	2.37	3.81	4.52	4.59	5.63	5.35	4.93	4.03	3.55	2.14	1.32	**44.24**
712	1973	1.49	1.61	3.11	3.07	4.81	4.49	6.14	4.80	3.88	3.16	3.11	2.40	**42.07**
712	1974	1.59	2.76	3.50	4.64	4.82	5.32	6.64	5.09	3.47	3.56	2.26	2.01	**45.67**
712	1975	2.18	2.01	3.11	3.61	3.89	4.93	4.99	4.61	4.27	4.21	3.11	2.06	**42.99**
712	1976	2.36	2.99	3.38	3.93	4.54	5.43	4.37	5.85	4.33	3.51	2.11	1.95	**44.75**
712	1977	1.87	2.78	3.42	4.47	5.31	5.88	6.39	5.21	4.94	4.06	2.99	2.51	**49.82**
712	1978	1.58	1.81	3.63	4.41	5.12	5.62	5.91	6.24	4.11	4.75	2.62	2.00	**47.79**
712	1979	2.27	1.81	3.85	3.92	4.64	5.44	5.25	5.14	4.75	4.44	3.02	2.17	**46.71**
712	1980	1.69	2.43	3.46	4.80	4.91	6.85	8.02	6.95	5.29	4.38	2.71	2.04	**53.52**
712	1981	2.51	2.26	3.66	4.07	4.96	5.64	5.71	6.46	5.25	3.50	3.19	2.37	**49.59**
712	1982	1.92	2.14	3.25	3.91	4.58	6.17	6.89	6.74	5.69	4.31	3.31	2.60	**51.52**
712	1983	2.56	2.45	3.95	4.70	5.32	5.46	6.25	5.46	4.78	3.98	3.25	2.44	**50.62**
712	1984	1.98	2.97	3.99	5.28	5.86	5.93	6.44	6.10	5.03	4.86	3.63	2.91	**54.97**
712	1985	2.34	2.86	4.25	4.54	5.45	6.62	5.87	6.87	5.35	4.12	2.61	1.91	**52.77**
712	1986	2.63	2.97	4.40	4.62	5.46	5.24	6.98	6.05	4.31	3.62	1.96	1.54	**49.76**
712	1987	2.73	2.00	4.06	5.45	4.17	5.60	5.86	6.77	4.74	4.25	3.08	1.57	**50.27**
712	1988	1.97	2.22	3.55	4.62	5.73	5.86	6.30	6.26	5.38	4.48	2.88	1.94	**51.19**
712	1989	1.93	2.10	3.39	4.19	4.82	5.06	5.63	5.37	5.20	4.38	3.09	2.36	**49.10**
712	1990	2.02	2.30	3.10	3.73	4.83	6.99	6.08	6.81	4.76	4.14	2.59	1.63	**50.65**
712	1991	2.57	2.31	3.65	4.06	4.31	6.16	6.43	6.49	6.04	5.31	4.14	5.12	**56.60**
712	1992	3.55	2.93	3.35	4.10	3.85	5.04	5.30	5.00	4.53	3.68	3.11	1.71	**46.16**
712	1993	2.65	2.15	2.65	3.61	5.37	6.92	6.66	7.10	5.53	4.19	2.45	3.23	**52.49**
712	1994	2.87	3.04	3.37	3.80	5.07	6.11	7.24	5.77	6.11	6.37	3.00	4.83	**57.57**
712	1995	2.56	1.97	3.60	4.32	4.95	6.55	6.41	5.53	4.75	4.34	2.73	2.17	**49.90**
712	1996	2.17	2.75	3.60	5.09	5.63	5.72	6.70	5.62	4.79	4.29	2.55	3.01	**51.93**
712	1997	2.85	2.05	2.97	5.22	4.75	6.03	7.25	6.79	5.20	4.52	3.30	2.28	**53.22**
712	1998	1.95	2.60	4.22	5.54	5.03	7.28	7.97	6.68	4.97	3.93	2.30	2.05	**54.52**
712	1999	3.69	2.61	3.52	4.91	6.42	6.49	6.31	7.41	6.14	4.16	3.01	2.57	**57.25**
712	2000	2.99	2.36	3.61	4.91	6.36	5.85	7.60	7.10	6.58	3.48	4.80	3.86	**59.50**
712	2001	1.04	1.57	3.14	3.61	4.66	4.15	5.07	5.25	4.53	3.64	3.09	2.25	**42.00**
712	2002	1.92	2.30	3.24	5.14	5.62	5.76	5.10	5.17	5.23	3.07	2.44	2.23	**47.25**
712	2003	2.13	2.07	3.20	4.09	4.88	6.56	5.89	5.83	4.44	4.34	3.67	3.07	**50.17**
712	2004	3.14	2.68	3.73	4.19	5.01	5.20	6.02	6.93	5.43	4.14	3.38	3.26	**53.13**
712	2005	2.44	3.26	3.59	5.14	5.56	6.55	7.00	5.99	5.51	5.12	4.07	2.63	**56.87**
712	2006	3.42	3.05	3.94	5.25	5.85	6.75	5.62	6.89	5.30	4.37	3.50	2.65	**56.60**
712	2007	3.11	2.33	4.00	3.98	5.61	5.24	5.52	5.92	4.98	4.93	4.10	2.57	**52.29**
Average Monthly		**2.17**	**2.36**	**3.53**	**4.33**	**4.96**	**5.79**	**6.19**	**5.91**	**4.82**	**4.13**	**2.93**	**2.31**	**49.49**
Minimum		1.04	1.22	2.65	3.07	3.75	4.15	4.37	3.42	3.07	2.73	1.96	1.32	**40.94**
Maximum		3.69	3.45	4.40	5.54	6.42	7.28	8.28	7.41	6.58	6.37	4.80	5.12	**59.50**
Ave. Days in Month		31	28.25	31	30	31	30	31	31	30	31	30	31	**365.25**
Calculated Daily		**0.0698**	**0.0836**	**0.1139**	**0.1444**	**0.1599**	**0.1930**	**0.1996**	**0.1908**	**0.1606**	**0.1333**	**0.0977**	**0.0744**	

Source: Texas Water Development Board 2009.

A simulation of carriage losses was conducted using the calculated monthly evaporation values applied to the daily data for the past year. Based on this assessment, the MUDs' portion of daily evaporation losses would account for an average of 0.05 percent of the average daily WWTP discharge, or about 195 gallons per day (Table 6).

Table 6: Summary of simulated daily carriage losses due to evaporation by month using daily wastewater production data for May 1, 2008 to April 30, 2009.

		Calculated Evaporation			
	Average Daily Discharge (gallons)	Total Daily Evaporation on Lake Conroe (gallons)	MUDs' Share of Daily Evaporation	Daily Carriage Loss (gallons)	Percent of Average Daily Discharge
Jan	322,600	38,130,998	0.000238%	**91**	0.03%
Feb	327,400	45,669,792	0.000241%	**110**	0.03%
Mar	347,900	62,222,360	0.000257%	**160**	0.05%
Apr	374,800	78,884,186	0.000276%	**218**	0.06%
May	391,300	87,351,671	0.000289%	**252**	0.06%
Jun	358,600	105,433,849	0.000264%	**279**	0.08%
Jul	351,100	109,039,359	0.000259%	**282**	0.08%
Aug	369,000	104,232,013	0.000272%	**284**	0.08%
Sep	384,200	87,734,073	0.000283%	**249**	0.06%
Oct	331,900	72,820,374	0.000245%	**178**	0.05%
Nov	343,400	53,372,472	0.000253%	**135**	0.04%
Dec	353,000	40,643,929	0.000260%	**106**	0.03%
Average	354,600	73,794,590	0.000261%	**195**	0.05%

Diversion Target

The daily targeted diversion volume from the MF treatment plant would be calculated by adding the previous day's discharge volume less the carriage loss. To this amount would be added any difference in actual and targeted diversion from the previous day.

Diversion

MF treatment plant diversion data would be metered.

Difference

On a daily basis, the difference in actual diversion and targeted diversion would be calculated.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: NHCRWA Wastewater Reclamation for Industrial Use and Municipal and Commercial Irrigation Use

DATE: July 22, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Wastewater reclamation for industrial reuse and municipal and commercial irrigation reuse from up to 163 municipal utility districts or similar entities within the North Harris County Regional Water Authority (NHCRWA) service area. Under this strategy, entities within the NHCRWA service area which own wastewater may elect individually, collectively or in combination with the NHCRWA (under an agreement authorizing the NHCRWA's participation) to submit a water right permit application for those respective wastewater flows.

SUPPLY QUANTITY: Up to 61,000-, 87,000-, 103,000-, 115,000-, 121,000-, 124,000-, and 126,000-acre-feet per year for Years 2000, 2010, 2020, 2030, 2040, 2050, and 2060, respectively. The NHCRWA, and/or other districts in the Authority service area, may also request permits for any future flows from WWTP facility expansions or additions.

SUPPLY SOURCE: Effluent from up to 163 municipal utility districts or similar entities which own and operate WWTPs. Total effluent volume is unknown, however, only a percentage of total effluent volume will be available for reclamation, based on permits.

TOTAL STRATEGY COST:	\$66,778,700 for allocated 16,300 acre-feet (Costs rounded to nearest \$100)
UNIT WATER COST:	\$702 per ac-ft allocated

<u>WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION</u>

INTRODUCTION

The purpose of this analysis is to address the potential use of reclaimed wastewater to meet projected water shortages in Region H. This study investigates using reclaimed wastewater effluent to supplement existing and future water supplies that serve industrial demands as well as municipal and commercial irrigation demands within NHCRWA's service area.

ANALYSIS

The NHCRWA, and/or other districts within the Authority service area, could submit water right permit applications for return flows from approximately 163 WWTPs from within the NHCRWA service area. These WWTPs discharge to tributaries of the San Jacinto River and Lake Houston. The applicant(s) can use bed and banks permits to transmit the water to future diversion locations yet to be identified. Figure 1 provides a graphical representation of the NHCRWA service area, WWTP discharge points, and waterways which could potentially be used for the transport of the return flows to diversion locations.

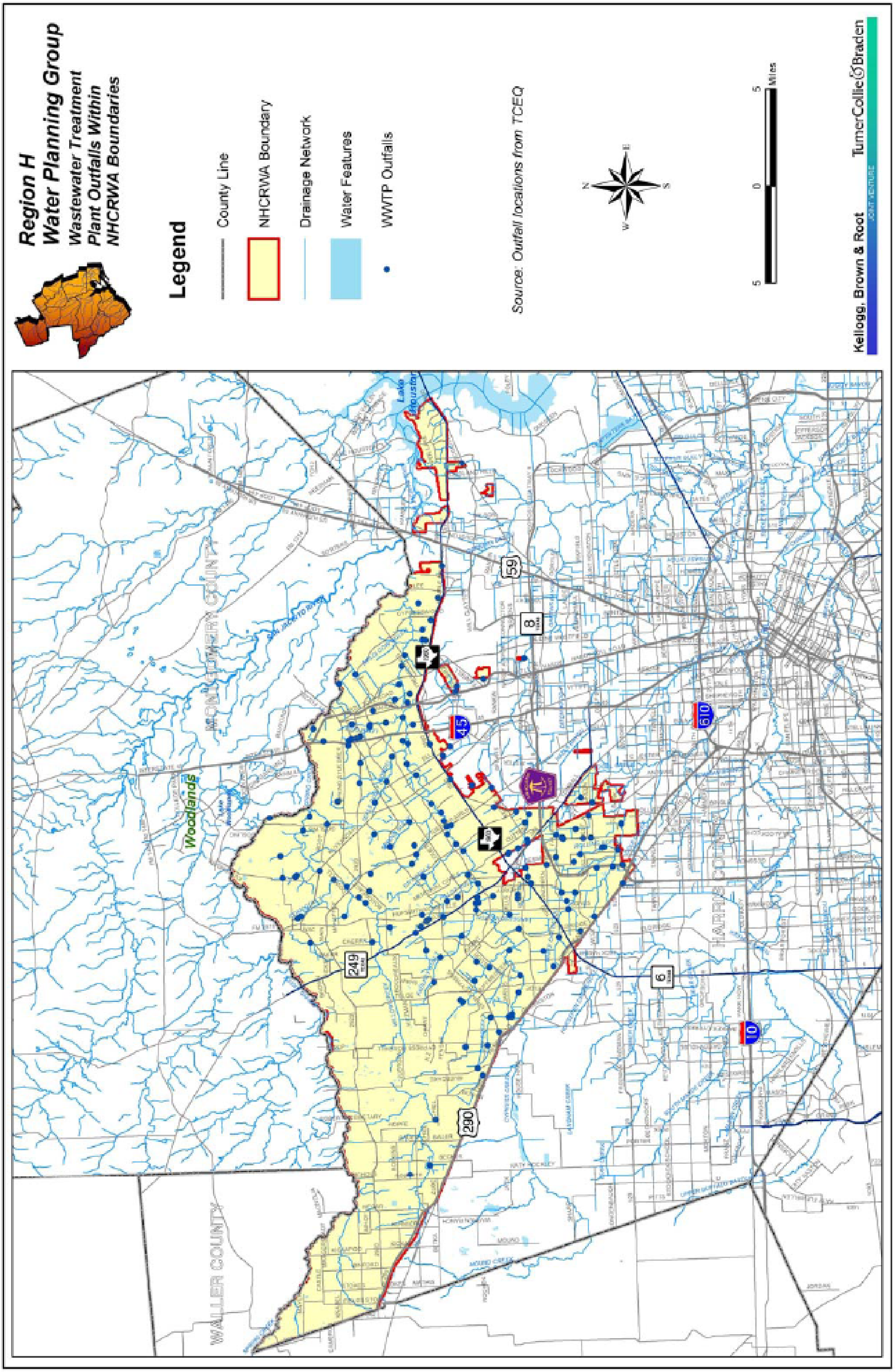
The amount of estimated future flows from the approximately 163 WWTPs is estimated at 61,000-, 87,000-, 103,000-, 115,000-, 121,000-, 124,000-, and 126,000-acre-feet per year for Years 2000, 2010, 2020, 2030, 2040, 2050, and 2060, respectively. These values were estimated using the 2011 Regional Water Plan projected water demands and applying a 75 percent factor (referenced in the *2003 Groundwater Reduction Plan* (GRP) prepared by NHCRWA consultants) to determine the quantity of water that could be expected as return flows through the WWTPs for the 60 year planning period. Future plant expansions and/or additions could increase the amount of water available for reuse downstream.

WATER USER GROUP APPLICATION

This strategy would help to meet the growing industrial demands as well as municipal and commercial irrigation demands of the region in which the NHCRWA serves.

ISSUES AND CONSIDERATIONS

Environmental impacts, impacts to other water rights, and other issues or concerns will be addressed during the TCEQ permitting process.


Region H
Water Planning Group
Wastewater Treatment
Plant Outfalls Within
NHCRWA Boundaries
Legend
County Line
NHCRWA Boundary
Drainage Network
Water Features
WWTP Outfalls
Source: Outfall locations from TCEQ
5
0
5
Miles
Kellogg, Brown & Root
TurnerCollie&Braden
WALLER COUNTY
MONTGOMERY COUNTY
HARRIS COUNTY
Woodlands
Lake Houston
249
290
45
59
8
610
6
10

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Wastewater Reclamation for Manufacturing Use

DATE: July 22, 2010

SUMMARY

STRATEGY DESCRIPTION: Wastewater reclamation for industrial process water along the Houston Ship Channel using reclaimed wastewater as a source from three City of Houston wastewater treatment plants.

SUPPLY QUANTITY: 67,200 ac-ft per year (60 mgd)

SUPPLY SOURCE: Up to 92,960 ac-ft per year (83 MGD) of effluent from three Houston wastewater treatment plants – 69th Street, Sims North, and Sims South.

TOTAL STRATEGY COST: $332,051,800 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $893 per acre-foot

Water Management Strategy Analysis Description

Introduction

The purpose of this analysis is to determine the potential use of reclaimed wastewater to address projected water shortages in Region H. This study investigates using reclaimed wastewater effluent to replace existing surface water supplies that serve industrial demands for process and boiler feed waters. Under this strategy, 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 strategy is applied within the industrial corridor of State Highway 225 and the Houston Ship Channel (San Jacinto Basin). The raw water saved would then be available to meet other demands in Harris County.

Effluent from three of the City's wastewater treatment plants—Sims North, Sims South and 69th Street—will be used. Secondary effluent will be pumped to an Integrated Membrane Treatment Facility (IMTF). After treatment, the reclaimed water will be piped to the industrial users along the south side of the Houston Ship Channel corridor (see Figures 1 and 2).

Figure 1: Reuse Process

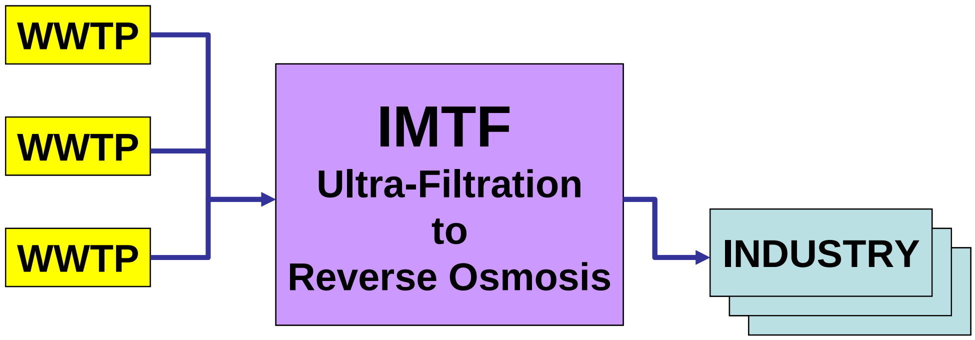
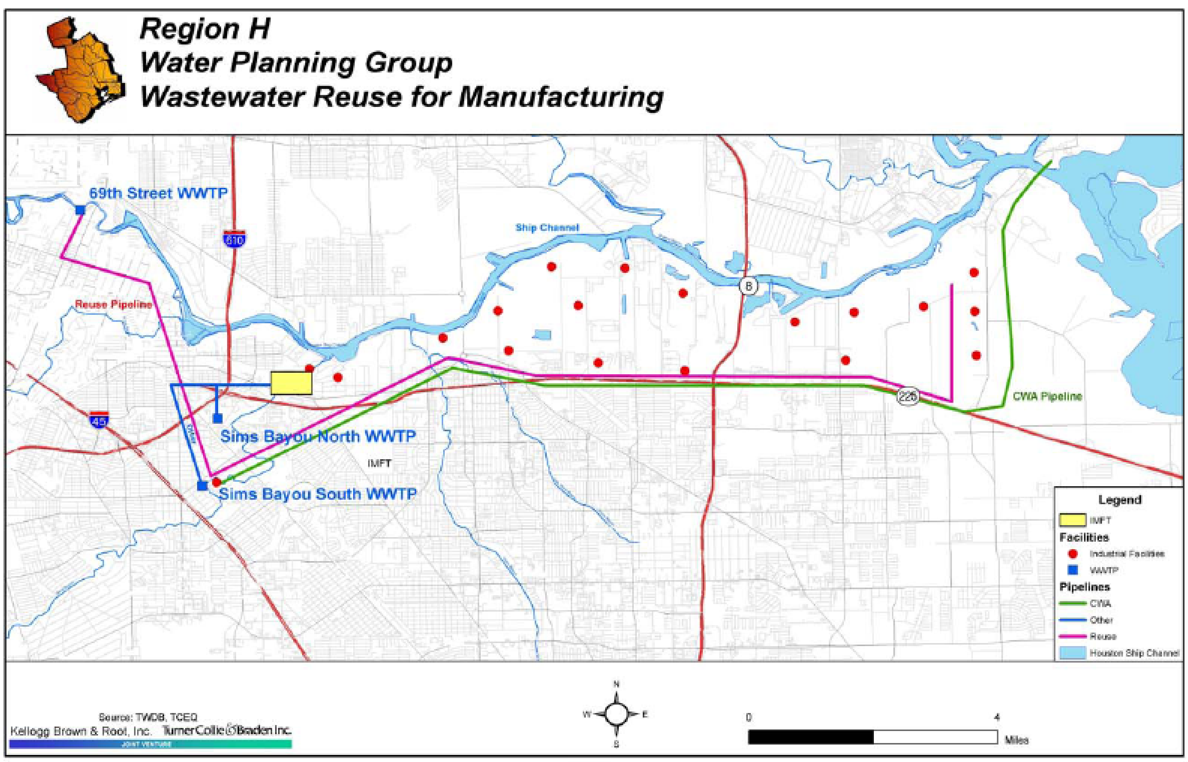


Figure 2: Reuse Location and Industrial Facilities



Water User Group Application

This strategy will address projected municipal and manufacturing shortages within Harris County. This shortage begins in year 2010 and ranges to approximately 403,000 acre-feet by year 2060.

This strategy has an interesting cost dynamic. The industries will participate in this strategy 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 strategy can only be determined through negotiation of firm supply contracts with the industry customers.

Environmental Impact

Environmental Impacts – 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. However, less effluent will be discharged into the receiving stream. 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.

Impacts to Water Resources of the State – 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 strategy. This strategy 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.

Impacts to Agriculture and Other Natural Resources of the State – Proposed reclamation would not impact agriculture since there are no agriculture surface water users downstream of the proposed facility.

Issues and Considerations

Impacts to Manufacturing—Substitution of reclaimed wastewater will increase the industries' cost of water. However, the reclaimed water will 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. It appears that the use of reclaimed municipal wastewater may be an economical alternative to current supplies.

Cost estimate—Project costs of this strategy, both capital and O&M, have been taken from the cost estimates developed for the ongoing Wastewater Reclamation and Reuse Feasibility Study funded by the City of Houston, the Gulf Coast Waste Disposal Authority and the Texas Water Development Board. The WWRRFS work used recent comparable contract unit prices to estimate construction costs for all facilities except the wastewater reclamation plant. Construction and O&M costs for the 2006 plant were developed using the WTCost software package provided by the US Bureau of Reclamation. Costs are updated to September 2008 for the 2011 RWP.

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 215,532,966	$ 215,532,966
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES (30% OF ENGINEERING COST)	1	LS	$ 73,221,996	$ 73,221,996
3	LAND & EASEMENTS	1	LS	$ 6,746,500	$ 6,746,500
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 524,000	$ 524,000
5	INTEREST DURING CONSTRUCTION	1	LS	$36,026,299	$ 36,026,299
	PROJECT COST				**$ 332,051,761**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ -	$ -	$ -	$ -	$ -	$28,949,786
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ -	$ -	$ -	$ 24,570,941
3	PUMPING ENERGY COSTS	$ -	$ -	$ -	$ -	$ -	$ 1,671,887
4	REBATE OF CWA DEBT SERVICE COSTS	$ -	$ -	$ -	$ -	$ -	$ 4,818,000
	TOTAL ANNUAL COST	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 60,010,614**

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$ 19,133,975	$ 19,133,975
2a	PIPELINES	1	LS	$ 28,721,488	$ 28,721,488
2b	PIPELINE CROSSINGS	1	LS	$ 15,569,350	$ 15,569,350
3	WATER TREATMENT PLANTS	1	LS		$ -
4	WATER STORAGE TANKS	1	LS		$ -
5	OFF-CHANNEL RESERVOIRS	1	LS		$ -
6	WELL FIELDS	1	LS		$ -
7	DAMS & RESERVOIRS	1	LS		$ -
8	RELOCATIONS	1	LS		$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	1	LS		$ -
10	STILLING BASINS	1	LS		$ -
11	WASTEWATER RECLAMATION PLANTS	1	LS	$ 152,108,153	$ 152,108,153
12	OTHER ITEMS	1	LS		$ -
	PROJECT COST				**$ 215,532,966**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

ALL FACILITIES
OPERATIONS & MAINTENANCE (O&M) COSTS

Formula Basis for Estimating
WWRRFS Estimate & WT Cost (Bureau of Reclamation Softw are)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	0.025	%	$ 19,133,975	$ 478,349
2a	PIPELINES	0.010	%	$ 28,721,488	$ 287,215
2b	PIPELINE CROSSINGS	0.010	%	$ 15,569,350	$ 155,694
3	WATER TREATMENT PLANTS (see page before previous)	1	LS		$ -
4	WATER STORAGE TANKS	0.010	%		$ -
5	OFF-CHANNEL RESERVOIRS	0.010	%		$ -
6	WELL FIELDS	0.010	%		$ -
7	DAMS & RESERVOIRS	0.015	%		$ -
8	RELOCATIONS	0.010	%		$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0.010	%		$ -
10	STILLING BASINS	0.010	%		$ -
11	WASTEWATER RECLAMATION PLANTS (see previous page)	1	LS	$ 23,649,683	$ 23,649,683
12	OTHER ITEMS	0.010	%		$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 24,570,941**

PUMP STATIONS
CONSTRUCTION COSTS

Formula Basis for Estimating (same formula as Table uses)
WWRRFS Estimate

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Stations	1	LS	$ 19,133,975	$ 19,133,975
2	Pump Station #1 added Intake Structure				$ -
3	Pump Station #1 added Standby Pow er				$ -
	PUMP STATIONS TOTAL COST				**$ 19,133,975**

PIPELINES
CONSTRUCTION COSTS

Table Basis for Estimating
WWRRFS Cost Estimate

ITEM	DESCRIPTION	DIAMETER	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(IN)	(LF)			
1	Urban Pipeline	Various	1	LS	$ 28,721,488	$ 28,721,488
2	Rural Pipeline					$ -
	PIPELINES TOTAL COST					**$ 28,721,488**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

PIPELINE CROSSINGS
CONSTRUCTION COSTS

Table Basis for Estimating

Formula Basis for Estimating (not used)
WWRRFS Cost Estimate

ITEM	DESCRIPTION	DIAMETER	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(IN)	(LF)			
PIPELINE CROSSING COST SUMMARY						
1	Pipeline Crossing	Various	1	LS	$ 15,569,350	$ 15,569,350
	PIPELINE CROSSINGS TOTAL COST					**$ 15,569,350**

WATER TREATMENT PLANTS
CONSTRUCTION COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WATER TREATMENT PLANT COST SUMMARY					
1	Groundwater Chlorination Treatment Plant	100	MGD	$ 19,834,000	$ 19,834,000
2	Direct Filtration Treatment Plant	100	MGD	$ 147,334,000	$ 147,334,000
3	Conventional Filtration Treatment Plant	100	MGD	$ 184,168,000	$ 184,168,000
	WATER TREATMENTS PLANT TOTAL COST				**$ 351,336,000**

WATER STORAGE TANKS
CONSTRUCTION COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WATER TREATMENT PLANT COST SUMMARY					
1	Water Storage Tank	10	MG	$ 4,555,000	$ 4,555,000
	WATER STORAGE TANKS TOTAL COST				**$ 4,555,000**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

OFF-CHANNEL STORAGE RESERVOIRS
CONSTRUCTION COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OFF-CHANNEL STORAGE RESERVOIR COST SUMMARY					
1	Off-Channel Storage Reservoir	10,000	AC-FT	$ 9,540,000	$ 9,540,000
	OFF-CHANNEL STORAGE RESERVOIRS TOTAL COST				**$ 9,540,000**

WELL FIELDS
CONSTRUCTION COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	WELL DEPTH	QUANTITY	UNIT	UNIT PRICE	TOTAL
		(FT)	(GPM)			
WELL COST SUMMARY						
1	Public - static W.S. 0-200 ft below land	1,000	700	GPM	$ 504,400	$ 504,400
2	Public - static W.S. 200-300 ft below land	1,000	400	GPM	$ 478,200	$ 478,200
3	Public - static W.S. 300-400 ft below land	1,000	700	GPM	$ 524,000	$ 524,000
4	Public - static W.S. 400-500 ft below land	1,000	1,000	GPM	$ 845,000	$ 845,000
5	Agricultural - static W.S. 0-200 ft below lan	1,000	700	GPM	$ 277,420	$ 277,420
6	Agricultural - static W.S. 200-300 ft below l	1,000	400	GPM	$ 263,010	$ 263,010
7	Agricultural - static W.S. 300-400 ft below l	1,000	700	GPM	$ 288,200	$ 288,200
8	Agricultural - static W.S. 400-500 ft below l	1,000	1,000	GPM	$ 464,750	$ 464,750
	WELLS TOTAL COST					**$ 3,644,980**

STILLING BASINS
CONSTRUCTION COSTS

Formula Basis for Estimating
Cost = 2,800 *1.31* (Discharge in CFS)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
STILLING BASIN COST SUMMARY					
1	Stilling Basin	20	CFS	$ 3,668	$ 73,360
	STILLING BASIN TOTAL COST				**$ 73,360**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

WASTEWATER RECLAMATION PLANTS
CONSTRUCTION COSTS

Table Basis for Estimating
WT Cost (BuRec Software)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WASTEWATER RECLAMATION PLANT COST SUMMARY					
1	Wastewater Reclamation Plant	1	LS	$ 152,108,153	$ 152,108,153
	WASTEWATER RECLAMATION PLANT TOTAL COST				**$ 152,108,153**

WATER TREATMENT PLANTS
OPERATIONS & MAINTENANCE (O&M) COSTS

Table Basis for Estimating

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WATER TREATMENT PLANT ANNUAL O&M SUMMARY					
1	Groundwater Chlorination Treatment Plant	100	MGD	$ 2,380,000	$ 2,380,000
2	Direct Filtration Treatment Plant	100	MGD	$ 17,680,000	$ 17,680,000
3	Conventional Filtration Treatment Plant	100	MGD	$ 22,100,000	$ 22,100,000
	WATER TREATMENT PLANT ANNUAL O&M TOTAL COST				**$ 42,160,000**

WASTEWATER RECLAMATION PLANTS
OPERATIONS & MAINTENANCE (O&M) COSTS

Table Basis for Estimating
WT Cost (BuRec Software)

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
WASTEWATER RECLAMATION PLANT ANNUAL O&M SUMMARY					
1	Wastewater Reclamation Plant	1	LS	$ 23,649,683	$ 23,649,683
	WASTEWATER RECLAMATION PLANT ANNUAL O&M TOTAL COST				**$ 23,649,683**

Municipal Wastewater Reclamation for Manufacturing Use
Cost Estimate

PUMP STATIONS
PUMPING ENERGY COSTS

Formula Basis for Estimating
Cost = $0.09 per kW-hr* 0.7457*24*365
Quantity is from WWRRFS Cost Estimate

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PUMP STATION ANNUAL PUMPING ENERGY COST SUMMARY					
1	Pumping and Treatment Energy Costs	18,576,524	kW-hr	$ 0.09	$ 1,671,887
	PUMP STATION ANNUAL PUMPING ENERGY TOTAL COST				**$ 1,671,887**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: **WASTEWATER RECLAMATION FOR MUNICIPAL IRRIGATION**[1]

Date: July 22, 2010

SUMMARY:

Strategy Description: The use of reclaimed wastewater for municipal irrigation of green spaces and golf courses.

Supply Quantity:

Brazoria County –	465 ac-ft/yr in 2060
Fort Bend County –	12,277 ac-ft/yr in 2060
Harris County –	13,431 ac-ft/yr in 2060
Montgomery County –	10,215 ac-ft/yr in 2060

Supply Source: Wastewater Treatment Plant Discharges. Total effluent volume is unknown, however, only a percentage of total effluent volume will be available for reclamation, based on permits.

Total Strategy Cost: Based on relative location of reuse water source and need

Unit Water Cost: $564 per ac-ft of plant capacity capital construction cost, based on previous studies. Average annual unit water cost of $539 per acre-foot

WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION

Introduction

This strategy consists of using reclaimed wastewater to supplement existing and future water supplies that currently serve nonpotable municipal demands within Region H. Wastewater reuse for municipal irrigation of golf courses and maintenance of green spaces in new and some existing communities is a potentially feasible water management strategy. Some existing communities can potentially retrofit existing irrigation systems to use reclaimed wastewater. With growth expected to nearly double 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.

Previous Reuse Studies

Feasibility studies have been previously conducted to analyze the potential for meeting nonpotable water demands with reclaimed wastewater for a number of communities within Region H. The majority of these studies focused on individual master-planned communities (MPCs) or on multiple communities and wastewater treatment plants (WWTPs) organized within a regional authority, including:

- Cinco Ranch
- Cinco Ranch Southwest

[1] This memorandum was prepared using information in the report titled *Wastewater Reclamation for Municipal Irrigation*, prepared by TCB for TWDB.

- Copperfield
- Fairfield Village

These studies examined a number of potential uses for wastewater and determined that the most feasible uses for reclaimed water were for:

- Golf course irrigation
- Green space irrigation, including parks and esplanades
- Maintaining water levels in amenity ponds

The overall cost for these projects was approximately $431 per acre-foot for the 2006 RWP. Scaled to the September 2008 reference date for the 2011 RWP, this is equivalent to $565. However, costs varied depending upon whether the proposed system was included in a newly constructed development or retrofitted into an existing community, the proximity of wastewater demands to WWTPs, and the volume of water delivered.

Wastewater Reuse Demand Analysis

The potential demands for wastewater reuse and wastewater supplies in Brazoria, Fort Bend, Harris, and Montgomery Counties were examined in detail for this study, and the methodology is suitable for projecting potential wastewater reuse for the entire region. Population growth in future MPCs was identified as the most likely candidate for using this strategy. Future MPCs are assumed to represent a portion of the growth within County-Other water user groups (WUGs) in the region. Additionally, in Harris County growth in the NHCRWA, WHCRWA, CHCRWA, and NFBWA WUGs were also considered to have the potential for using this strategy. Therefore, NHCRWA's proposed population growth was added to County-Other for Harris County for purposes of analysis of this strategy.

Data from the Fort Bend Economic Development Council was used to determine that approximately 25 percent of the recent county population growth has occurred in MPCs within Fort Bend County. 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 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. This ratio was then 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 2060.

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 2060.

Irrigation demands for the expected green space acreage were determined from evapotranspiration and precipitation data obtained from 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 determine 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 determine 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
Brazoria	Golf Courses	39	75	115	156
	Green Spaces	60	118	177	240
	Amenity Lakes	17	34	52	69
	Total	**116**	**227**	**344**	**465**
Fort Bend[1]	Golf Courses	1,360	3,018	5,347	7,810
	Green Spaces	982	2,182	3,868	5,647
	Amenity Lakes	284	635	1,124	1,641
	Total	**2,626**	**5,835**	**10,339**	**15,098**
Harris[1]	Golf Courses	994	2,011	3,048	4,082
	Green Spaces	1,762	3,569	5,408	7,245
	Amenity Lakes	512	1,036	1,571	2,104
	Total	**3,268**	**6,616**	**10,027**	**13,431**
Montgomery	Golf Courses	1,653	3,622	6,406	9,640
	Green Spaces	806	1,766	3,123	4,700
	Amenity Lakes	234	513	907	1,365
	Total	**2,693**	**5,901**	**10,436**	**15,705**
Total Potential Reuse Demands		**8,703**	**18,579**	**31,146**	**44,699**

[1] Includes supplies for the Authority WUGs.

Wastewater Reuse Supply Analysis

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 WWTPs typically experience their lowest discharge flows during the summer when irrigation demands are at their highest. The Greatwood community was used as a model for determining the average minimum per capita flow for WWTPs in low-flow conditions. Daily discharge reports from the summer of 2004 were used to generate a report of 5 weeks in this period with no rainfall. The 7-day flow for each of these weeks was averaged to determine the minimum amount of wastewater that could be provided at any time with minimal need for storage. The estimated number of wastewater connections during this time was used to find the per capita low-flow wastewater discharge, assuming a population of 3.2 persons per connection.

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
Brazoria	134	255	385	521
Fort Bend[1]	2,136	4,744	8,403	12,277
Harris[1]	3,833	7,754	11,756	15,745
Montgomery	1,752	3,838	6,787	10,215
Total Potential Reuse Supplies	**7,855**	**16,591**	**27,331**	**38,758**

[1] Includes supplies for the Authority WUGs.

Costs of Implementing a Reuse Strategy

The previous studies examined above were used to determine a unit cost of water for municipal wastewater reuse. These costs varied considerably depending on the following:

- Layout of the community
- New or existing construction
- Amount of water delivered

The average cost of supplying treated wastewater under these proposed scenarios was approximately $564 per acre-foot for construction cost. Standard Region H cost estimation criteria (see Appendix 4C) were used for estimation of other project capital costs. This cost was applied to the lesser of the demand or supply determined for each county to produce the costs shown in *Table 3*.

Table 3
Potential Wastewater Reuse and Associated Costs

County	Potential Demand Reduction from Reuse (ac-ft/yr) / Implementation Cost ($1,000s)			
	2030	2040	2050	2060
Brazoria	116	227	344	465
	$153	$146	$154	$159
Fort Bend[1]	2,136	4,744	8,403	12,277
	$2,825	$3,437	$4,822	$5,105
Harris[1]	3,268	6,616	10,027	13,431
	$4,306	$4,505	$4,501	$4,479
Montgomery	1,752	3,838	6,787	10,215
	$2,309	$2,749	$3,886	$4,517
Total	**7,272**	**15,425**	**25,561**	**36,388**
	$9,583	**$10,837**	**$13,363**	**$14,261**

1 Includes supplies for the Authority WUGs.

Considerations for Wastewater Treatment Standards and Proper Handling of Wastewater

The Texas Commission on Environmental Quality (TCEQ) classifies wastewater reclaimed for irrigation in two categories: Type I effluent with higher quality standards and Type II effluent that has slightly lower treatment standards. Type II effluent can generally be used in areas with controlled access and minimal potential for human contact. In areas such as parks and esplanades with pedestrian access, reclaimed wastewater must meet higher Type I standards in order to be used for irrigation purposes. The standards for Type I effluent are based on a 30-day average and have the following limits:

- BOD5 or CBOD5 not to exceed 5 mg/l
- Turbidity no greater than 3 NTU
- Average fecal coliform not to exceed 20 CFU/100 ml with a peak no greater than 75 CFU/100 ml

Typical WWTPs in these areas where MPCs are being developed are permitted to 10/15/3 mg/l (CBOD, TSS, N-NH_3) standards. This level of treatment is sufficient for Type II effluent applications, but additional filtration is necessary to improve the effluent quality to Type I standards. The capital cost for this improvement to Type I standards is approximately $1,965,000 for a plant with an average daily flow of 1 mgd.

Likely Communities to Benefit from a Reuse Program

This strategy is focused on the application of reclaimed wastewater for irrigation in municipal settings. In particular, these strategies are recommended for MPCs, especially those that are to be developed in the future. These communities provide a centralized population and wastewater source and a number of water-consumptive amenities such as lakes, golf courses, and green spaces within a close proximity.

New developments may also benefit from reduced costs for implementing a reuse system, since they can be planned using this strategy during the design phase. Major water demands such as for golf courses can be initially located near WWTPs to limit the expense associated with transporting water to the demand. Construction of the effluent distribution system early in the development will also reduce costs associated with laying pipelines around existing utilities and in landscaped areas.

Many of the MPCs that would be the best candidates for wastewater reuse in the Region H area are located within subsidence districts. By implementing a reuse strategy early, before subsidence regulations go into effect, communities can sometimes apply for groundwater credits that will promote better use of the limited groundwater that is available.

Other Potential Wastewater Reuse Options

Other potential participants in a reuse program were examined for this study. Agricultural irrigation for rice represents a sizable potential demand for reclaimed wastewater. The application rate for rice is much higher than for municipal irrigation, and rice farms represent prime users of large volumes of water. Unfortunately, much of the agricultural land where municipal wastewater could most easily be used is now being developed or, in the near future, will be developed into residential communities. Therefore, these agricultural needs do not require a long-term strategy. Other irrigated agricultural operations such as commercial nurseries or turf farms represent potential demand centers that are likely to be in operation for a longer period of time. However, the locations of these operations and their availability as a point of demand are highly variable and therefore, they have not been included in this strategy at this time. Also, the total demand for this source is expected to be relatively small compared to municipal irrigation demand.

Another area of potential demand for reclaimed wastewater is for industrial cooling and process water, particularly in Harris County, but also in all the heavily urbanized areas of Region H. One major strategy for reclaimed wastewater is already included in this plan for the Houston Ship Channel industries. Other smaller opportunities for this application may be present in scattered areas throughout Harris, Galveston, and Brazoria Counties, but these are difficult to quantify and are not included at this time.

ISSUES AND CONSIDERATIONS

Environmental impacts, impacts to other water rights, and other issues or concerns would be addressed during the permitting process for this strategy. However, it should be expected that as reuse increases, instream flows potentially could decrease due to the reduction or elimination of wastewater return flows. However, not all water users will reuse their wastewater, and the increased use of water due to overall growth will most likely offset the impact of reuse as a municipal irrigation water supply strategy. Therefore, the overall reduction in instream flows is not expected to be significant.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Brazos River Authority System Operations Permit[1]

DATE: November 16, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Use of additional appropriation of water that could be made available through system operations of the BRA's existing water rights and reservoirs.

SUPPLY QUANTITY: 25,350 acre-feet

SUPPLY SOURCE: Brazos River Authority System Supply

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: TBD – based on system rate of $61 per acre-foot

UNIT WATER COST: TBD – based on system rate of $61 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Brazos River Authority 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.

Analysis:

The Region G Water Planning Group 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. During the model simulations, BRA contracts are met first from the BRA System, followed by the remaining amount that could be met at the lowest diversion point. This gave the maximum amount that could be realized by the BRA under the agency's current contractual commitments.

The 2006 Region H Plan included a supply from the BRA Systems Operations Permit of approximately 248,650 acre-feet per year. This value included Allens Creek supplies, which are not included in the current estimate. The supply projected to be available in the 2011 plan is 25,350 acre-feet per year.

The reduction in supply is attributed to two major factors:

1. Increased upstream demands supplied by the BRA system.
2. Lower projected return flows from the upper basin.

[1] [1] This memorandum was prepared using information in the 2011 Region G Regional Water Plan.

Upstream Demands

Increases in upstream demands resulting in additional supplies contracted from the BRA System result in a reduction in the supply of water available for downstream appropriation. Additional diversions in the upper basin reduce the efficiency of the BRA system and limit the number of reservoirs that can contribute releases and the ability of the system to utilize unappropriated flows in the basin downstream of the BRA reservoirs. Since the 2006 Plan, current BRA contractual commitments have increased from 600,946 to 670,859 acre-feet per year, an increase of approximately 70,000 acre-feet per year. The System Operations supply that is projected to be supplied to water users in Region G has also increased from 65,482 to 90,197 acre-feet per year, n increase of approximately 25,000 acre-feet per year. The total supply increase in the upper Brazos Basin is approximately 95,000 acre-feet per year.

Projected Return Flows

Changes in the projected return flows can have either adverse or beneficial effects on the supply of water available for appropriation in the lower basin. Increased demands in the upper basin could lead to an increase in projected reuse projects, which potentially reduce the level of projected return flows. Lower than projected growth of WUGs supplied primarily from groundwater sources could also result in lower levels of groundwater based effluent discharged into the Brazos River, reducing projected return flows. Alternatively, increased demands from these WUGs could potentially result in an increase in groundwater based effluent being returned to the stream increasing the level of return flows. The amount of return flows projected to be available in 2060 has declined from 144,000 acre-feet per year estimated in the 2006 Plan to 128,500 acre-feet per year in the 2011 Plan update.

Interruptible Supplies in Region H

An additional analysis was performed to quantify the availability of interruptible supplies available in the lower basin before and after the implementation of the BRA Systems Operations Strategy. By definition, at least 75 percent of an interruptible supply is available at least 75 percent of the time. Interruptible supply was evaluated at the Richmond gage to determine the availability of interruptible supplies in the lower Brazos Basin. Four scenarios were used to evaluate the availability of unappropriated water before and after implementation of the BRA Systems Operations Strategy. The first two models, Brazos G 2010 WAM and the Brazos G 2060 WAM, were used to evaluate the availability of unappropriated flows before the impact of the BRA Systems Operations Permit. The models were obtained from the Region G consultant to evaluate the availability of lower basin supplies under 2010 and 2060 return flow assumptions. The final two models, Brazos G Sys Ops WAM and Brazos G Sys Ops WAM w/ Major WMSs, were used to evaluate the availability of unappropriated flows after inclusion of the BRA System Operations and other major water management strategies in the Brazos Basin. The Brazos G Sys Ops WAM was obtained from the Region G consultant and assumes that the permit is used to create firm supply in the lower basin. The model does not assume that a portion of the BRA firm supply is used to create an interruptible supply. The final model was prepared by updating the Brazos G Sys Ops WAM with other major water management strategies from the 2006 Plan. A summary of the assumptions used in each model are shown in *Table 1*.

Table 1
Scenario Assumptions

Scenario	Return Flows	Sedimentation Conditions
Brazos G 2010 WAM	65,257	2010
Brazos G 2060 WAM	136,123	2060
Brazos G Sys Ops WAM	128,502	2060
Brazos G Sys Ops WAM w/ Major WMSs	128,502	2060

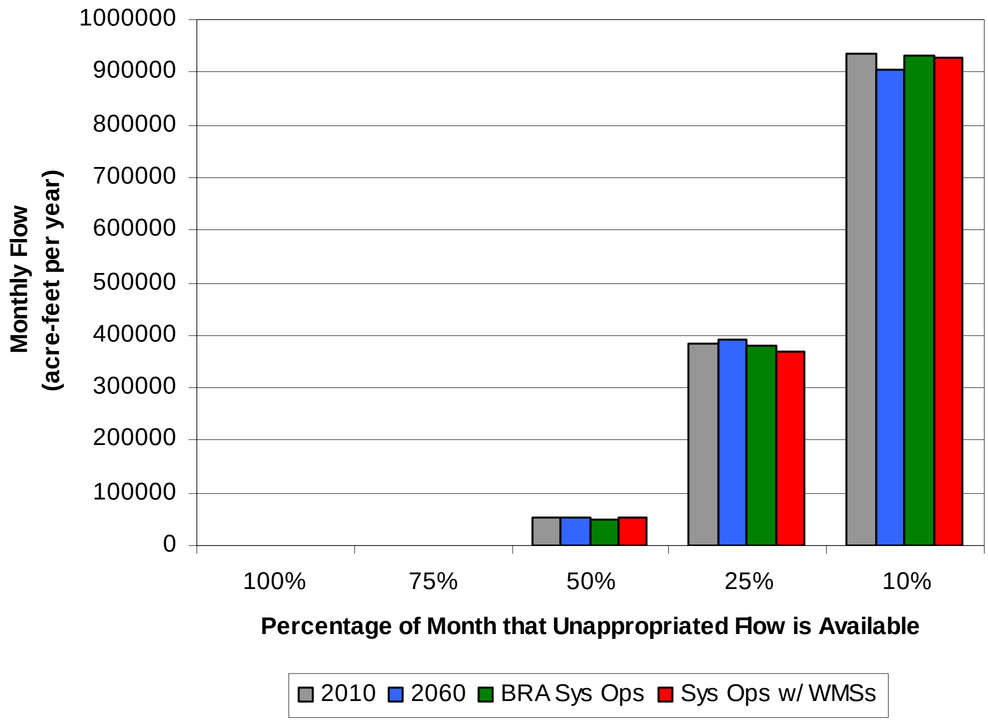
A dummy water right with a junior priority date was added to the models above to test the availability of interruptible supplies using several diversion targets. The dummy water right assumed a diversion pattern similar to other irrigation water rights in the lower Brazos Basin. As shown in *Table 2* there is limited potential for developing interruptible supplies from unappropriated water at the Richmond Gage before and after implementation of the BRA System Operation Permit. The level of unappropriated flow available at the Richmond gage increases slightly from 2010 to 2060 due to an increase in return flows from the upper basin. However, the affect on the annual availability is limited. As shown in *Table 2* below, 75% of the annual diversion target of 1,000 acre-feet per year is available in only 39.7% of the year modeled assuming 2010 projected return flows. Increased return flows in the 2060 condition results in an increased availability of 41.4%. After the implementation of the BRA System Operations Permit, the unappropriated flow available at the Richmond gage is projected to decrease slightly, resulting in reduced availability for potential interruptible supplies. The implementation of the BRA System Operation Permit results in decreased unappropriated flows available to Region H at the Richmond Gage, but does not negatively impact the reliability of existing water rights. This in due to the fact that diversions under the systems operation permit are made at a priority date junior to supplies permitted before October 15, 2004. As a result the permit allows unappropriated return flows to pass downstream to senior water rights in the lower basin before being appropriated by the system Operations Permit.

Table 2
Availability of Interruptible Supplies
(Percentage of Years that 75% of the Annual Diversion Target is Available)

Diversion Target (ac-ft/yr)	Before BRA System Operations		After BRA System Operations	
	2010	2060	BRA Sys Ops	Sys Ops w/ WMSs
20,000	37.9%	39.7%	32.8%	34.5%
10,000	37.9%	39.7%	34.5%	34.5%
1,000	39.7%	41.4%	34.5%	34.5%

Figure 1 illustrates the amount available on a monthly basis at the Richmond gage. On a monthly basis, no supply amount is available in 75% on the months modeled, also indicating limited availability for unappropriated flows that may satisfy the TCEQ 75 – 75 definition of interruptible supply. As a result, unappropriated flows available at the Richmond gage would require off-channel storage to increase the reliability of the supply before and after the implementation of the BRA System Operations Permit.

Figure 1
Unappropriated Flows at the Richmond Gage



Water User Group Application:

The water from the BRA System Operations would serve demands in the Brazos and San Jacinto Brazos basins. Delivery of water would be via the Brazos main stem and the GCWA canal systems.

Environmental Impact:

System Operations permit diverts from stream flows when above median flow, thus reducing peaks. Releases from storage when below median flows, this increasing the flows above diversion points. Permit reduces peak flushing effects due to diversions above median flows. Flows below median are minimally affected.

Issues and Considerations:
No location-specific issues have been identified at this time. It is possible that interruptible supplies could be affected by System Operations. The availability of interruptible supply has not been evaluated in this round of planning.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Houston Bayous Permit
DATE: December 22, 2009

SUMMARY

STRATEGY DESCRIPTION: The City of Houston and the San Jacinto River Authority have applied to the TCEQ for supplies identified in the San Jacinto Basin.

SUPPLY QUANTITY: 160,000 ac-ft/yr in Brays, Buffalo, Sims and White Oak Bayous (not 100% reliable)

SUPPLY SOURCE: Brays, Buffalo, Sims and White Oak Bayous

TOTAL STRATEGY COST: $ 20,956,000 (Costs rounded to nearest $100)

UNIT WATER COST: $ 15.77 to $20.55 per acre-foot at the bayou diversion points

WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION

INTRODUCTION

The City of Houston has submitted a water right permit application for 160,000 acre-feet per year of interruptible supply from four bayous in the lower San Jacinto Basin. This is requested to allow the use of in-basin supply, when it is available, rather than City-owned supply in Lake Conroe in the upper San Jacinto basin or Lake Livingston which must be transferred from the Trinity River Basin. The proposed diversion locations for both applications are shown in Figure 1.

Water rights are considered reliable when the full permit amount may be diverted during drought of record conditions. For all but senior water rights, some storage capacity is usually required to make a water right fully reliable. The TCEQ tests new water rights using the Water Availability Model to determine reliability and the impact on other permits in the basin. It is their practice to only issue water rights for municipal and manufacturing use when the permit will be 100% reliable. Irrigation water rights are issued at a lesser standard of 75% reliable (by volume), 75% of the time. In the case of this applications, only the additional yield in Lake Houston is considered fully reliable. The other permits are for supplies which are available less than 70% of the time. To use these supplies for municipal and manufacturing use, as requested, will require conjunctive use with other, fully reliable supply sources.

WATER USER GROUP APPLICATION

Diversions from the Harris County bayous will capture flows that are occurring in the stream system due to wastewater return flows upstream. Use of this water will offset the need to convey additional water from the Trinity River Basin during wet years.

ISSUES AND CONSIDERATIONS

The City of Houston bayous permit application proposes four new diversion points, located within the city limits, listed in *Table 1* (below). These locations have a greater potential for adverse environmental impact than the Lake Houston diversions. The requested diversions account for 20%

to 40% of the average flow in three bayous, and 40% to 70% in White Oak Bayou (see *Table 1*). Minimum stream-stage or flow-rate must be determined for each proposed diversion site. Without diversion triggers, the permits would allow most flows to be diverted from the bayous during below average conditions, which would impact aquatic habitats. Next, the diversion facilities must be located and any wetland mitigation conducted. Finally, the conveyance system from the points of diversion to the points of use must be constructed, and any mitigation involved with that constructed.

Table 1
Target Diversions and Historic Streamflows

Stream	Target Diversion (average)	Historic Average* (min/max month)	Percentage of Historic Average
Sims Bayou at Reveille Park	20,000 ac-ft/yr 28 cfs	70.4 cfs (min) 151.0 cfs (max)	40% 19%
Brays Bayou at McGregor Park	40,000 ac-ft/yr 55 cfs	139.0 cfs (min) 219.0 cfs (max)	40% 25%
White Oak Bayou at Stude Park	40,000 ac-ft/yr 55 cfs	79.2 cfs (min) 133.0 cfs (max)	69% 41%
Buffalo Bayou at Memorial Park	60,000 ac-ft/yr 83 cfs	202.0 cfs (min) 399.0 cfs (max)	41% 21%

* USGS Gage Data, period of record ending September 2003

For the purposes of this analysis, only the costs of the four diversion pump stations were estimated (*Table 2*, below). Once the City determines how and where to use this water, additional infrastructure conveyance and treatment facilities will need to be estimated and included in the water cost. Included on Figure 1 are the locations of the City of Houston East and Southeast Water Purification Plants. The four proposed diversion points range from seven to twelve miles from the East WPP, which is the closest of the three existing plants. Alternately, the City may elect to treat the water at the respective diversion points and feed the water into the treated water distribution system.

Table 2
Potential Bayou Diversion Costs

Location	Diversion Average Rate	Facility Size* and Cost	Cost per Acre-Foot**
Sims Bayou at Reveille Park	28 cfs 18 mgd	100 hp $3,139,000	$ 20.55
Brays Bayou at McGregor Park	55 cfs 36 mgd	200 hp $ 5,451,000	$ 18.23
White Oak Bayou at Stude Park	55 cfs 36 mgd	200 hp $ 5,451,000	$ 18.23
Buffalo Bayou at Memorial Park	83 cfs 54 mgd	300 hp $ 6,915,000	$ 15.77

* Assumed 25-ft lift from bayou to plant, 80% system efficiency
** Unit cost reflects 6% interest over 20-years, 2.5% annual O&M and power at $0.09/kWh

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Brazoria County Interruptible Supply for Irrigation

DATE: December 28, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Use of interruptible portions of the GCWA "Chocolate Bayou" water right to meet irrigation shortages in Brazoria County.

SUPPLY QUANTITY: Up to 124,000 acre-feet per year available (64,000 acre-feet per year once GCWA Off-Channel Reservoir is constructed)

SUPPLY SOURCE: Brazos River via GCWA Canal System

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST: $0

UNIT WATER COST: GCWA contract rate

<u>Water Management Strategy Analysis Description</u>

Introduction:

For the 2011 RWP, significant shortages are calculated for irrigation WUGs in Brazoria County. Subsequent to application of demand reduction through the Irrigation Conservation WMS, Brazoria County irrigation shortages remain as high as 63,000 acre-feet per year. See Table 1-8 in *Chapter 1* for a list of major irrigation demand centers in Region H. Commentary from the Region H Planning Group as well as local experience indicates that demands for irrigation, which are based on demands during a higher-production period in the 1990s, are no longer at the levels indicated by the RWP. However, as revision of these demands is outside of the scope of the current RWP. As such, these projected shortages must be met.

Two factors prevent these shortages from being met by firm supplies from a major water management strategy. The first is timing, with irrigation shortages in Brazoria County projected for 2010 through 2060. The second factor is cost, with irrigators having limited ability to fund capital projects. The only viable solution to meet irrigation shortages in Brazoria County is use of the interruptible portion of an existing GCWA water right.

Analysis:

The GCWA water rights in the Brazos and San Jacinto-Brazos basins were analyzed as a potential source of interruptible supply due to their proximity to existing irrigation demands. The GCWA System was analyzed as two separate systems described below.

1.1 GCWA A&B System

The Gulf Coast Water Authority "A&B" System is comprised of two water rights C5168 and C5171, both of which divert water from the Brazos River. Water right C5168 has a permitted diversion of 125,000 acre-feet per year and pumps water directly into the GCWA "A" Canal. Water right C5171 has a permitted diversion of 99,932 acre-feet per year delivering water to the GCWA "B" Canal. The GCWA A&B Canals run in a southeast direction beginning from diversion locations on the Brazos River. The Canal System provides raw water to GCWA customers primarily to municipal and industrial water users in Fort Bend and Galveston Counties. The Canals can also provide surface water to irrigation demands in Fort bend and Galveston Counties.

1.2 GCWA JC System

The Gulf Coast Water Authority "JC" System consists of the two former CBWC water rights C5322 and C5357. Historically, the two water rights have been operated separately. Water right C5322 has been used primarily to supply irrigation demands with Brazos River water from the "C" Canal and water right C5357 has been used to meet industrial and irrigation demands with water from bayous in the San Jacinto – Brazos coastal basin ("J" System). The presence of existing conveyance infrastructure in close proximity to irrigation demands is an important factor for developing interruptible supplies. Interruptible water supplies available from the existing GCWA "JC" System would be a likely candidate for meeting irrigation shortages in Brazoria County.

2. Interruptible Supplies

In order to quantify the amount of interruptible water available in each GCWA System, diversions for municipal and industrial contracts were assumed to be made prior to irrigation diversions. The assumption allowed only the water remaining after municipal and industrial diversions were made to be analyzed by applying the TCEQ 75-75 rule.
The analysis of the interruptible portion available in each system was performed using an annual test to determine the percentage of time that 75 percent of the annual diversion target is met when distributed on a monthly basis.

This is recognized in TCEQ rules for surface water rights permitting, which allow issuance of water rights permits for irrigation use that are less than 100 percent reliable during critical drought periods. Specifically, in consideration of applications for new irrigation use permits, TCEQ applies a "75/75" rule where:

"Approximately 75 percent of the water requested must be available approximately 75 percent of the time when distributed on a monthly basis and based on the available historic stream flow record (30 TAC, Chapter 297 – Section 297.42 (c))."

2.1 GCWA System

The GCWA System was modeled to reflect the "AB" Canal and the "JC" Canal System separately. As described previously, the GCWA "AB" System is comprised of two water rights (C5168 and C5171). In addition to the run-of-river rights, the GCWA also has three contracts for surface water from the BRA which can be diverted at either water right location. Diversions made at these locations were adjusted with a return flow factor added into the model to reflect conveyance losses. The return flows were returned to a dummy control point "GCWAAB". Table 1 below, lists the water rights, contracts used to model the GCWA "AB" Canal System.

Table 1 – GCWA "AB" Canal System

Water Right	Annual Diversion (ac-ft/yr)	Return Flow Factor	Dummy Control Point
C5168	125,000	0.85	GCWAAB
C5171	99,932	0.85	GCWAAB
BRA AB	28,333	0.9	GCWAAB
BRA AB	9,335	0.9	GCWAAB
BRA AB	3,100	0.9	GCWAAB

The GCWA "JC" Canal System consists of water rights C5322 and C5357. In addition to the two water rights, the GCWA also has a contract with the BRA for an additional 5,625 acre-ft per year. Diversions made from these locations were adjusted with a return flow factor and to represent conveyance losses and were returned to a dummy control point "GCWAJC" as shown in *Table 2*.

Table 2 – GCWA "JC" Canal System

Water Right	Annual Diversion (ac-ft/yr)	Return Flow Factor	Dummy Control Point
C5322	155,000	0.85	GCWAJC
C5357	57,500	0.85	GCWAJC
BRAJ	5,625	0.9	GCWAJC

2.2 GCWA System Diversions

Dummy water rights were added to GCWA System dummy control points to represent municipal and industrial demands that are satisfied prior to irrigation contracts. The water rights were modeled with a constant diversion pattern to simulate the municipal and industrial contracts. Dummy water rights CGWA_1 and GCWA_2 were added to dummy control points GCWAAB and GCWAJC respectively. The diversion targets associated with each water right are shown in *Table 3*.

Table 3 – GCWA Municipal and Industrial Diversions

Dummy Water Rights	Dummy Control Point	GCWA Canal System	M & I Demands (ac-ft/yr)
GCWA_1	GCWAAB	AB	219,350
GCWA_2	GCWAJC	JC	24,937

Additional water rights were added to the model to quantify the availability of interruptible supplies. The diversions were simulated with a priority date junior to the GCWA municipal and industrial diversions. The interruptible water rights were modeled using an irrigation pattern "IRR4" similar to other irrigation water rights in the lower Brazos Basin. *Table 4* identifies the GCWA water rights used to evaluate the interruptible supply available in each system.

Table 4 – GCWA Interruptible Diversions

Water Rights	Control Point	System
GCWA_3	GCWAAB	AB
GCWA_4	GCWAJC	JC

3. Interruptible Supply Iterative Analysis

3.1 Existing Conditions (Before GCWA Off-Channel Reservoir)

The amount of interruptible water available from each system was quantified by iteratively adjusting the diversion target of the interruptible water right until 75% of the requested annual diversion target was available in 75% of the years modeled. The 2REL table was generated after each model run to record the reliability of each diversion target. The reliability of the interruptible water rights at various diversion targets is shown in *Tables 5* and *6*. Water rights GCWA_3 and GCWA_4 are 75-75 reliable at diversion targets of 40,000 acre-feet per year and 84,000 acre-feet per year.

Table 5 – GCWA_3 Percentage of Years
That Percentage of Diversion Target is Reliable

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_3	50,000	0	0	0	0	72.4	91.4
GCWA_3	40,000	0	0	0	0	79.3	93.1
GCWA_3	30,000	0	0	0	0	81.0	93.1

Table 6 – GCWA_4 Percentage of Years
That Percentage of Diversion Target is Reliable

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_4	100,000	0	0	0	0	46.6	89.7
GCWA_4	90,000	0	0	0	0	62.1	91.4
GCWA_4	89,000	0	0	0	0	63.8	91.4
GCWA_4	85,000	0	0	0	0	74.1	93.1
GCWA_4	84,000	0	0	0	10.3	75.9	93.1
GCWA_4	80,000	0	0	0	29.3	77.6	96.6

3.2 Interruptible Supply with GCWA Reservoir

The GCWA off-channel canal reservoir was added to enhance the reliability of the GCWA municipal and industrial demands. In previous exercises, the total annual amount made reliable by incorporating the GCWA reservoir into the model was approximately 298,155 acre-feet per year. It was assumed that the same amount would be made reliable in this scenario. To produce a total "firm" municipal and industrial supply of 298,155 acre-feet per year, 53,868 acre-feet per year were added to the annual diversion target of water right GCWA_2. The resulting "firm" diversions for municipal and industrial uses are reflected in the *Table 7* below:

Table 7 – GCWA "Firm" Demands (with Reservoir)

Water Rights	Control Point	System	M & I Demands (ac-ft/yr)
GCWA_1	GCWAAB	AB	219,350
GCWA_2	GCWAJC	JC	78,805

The interruptible supply available from the GCWA "JC" system (Note, an interruptible diversion was not modeled for GCWA_3 in this scenario) was evaluated using an iterative process and is shown in *Table 8*. Approximately 28,000 acre-feet per year is 75% reliable 75% of the time. Under this scenario, the total additional "firm" supply available to the GCWA system is approximately 53,800 acre-feet per year. The additional interruptible supply available is approximately 28,000 acre-feet per year.

Table 8 – GCWA_4 Percentage of Years
That Percentage of Diversion Target is Reliable

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_4	30,000	0	1.7	32.8	55.2	74.1	91.4
GCWA_4	28,000	0	1.7	32.8	55.2	77.6	91.4
GCWA_4	25,000	0	1.7	34.5	56.9	77.6	91.4
GCWA_4	20,000	0	1.7	36.2	58.6	79.3	91.4

3.3 Interruptible Supply with GCWA Reservoir - Alternative

An alternative scenario was run with a reduced "firm" supply available to the GCWA system after the inclusion of the GCWA reservoir. The "firm" supply available was reduced from 53,800 acre-feet per year to 39,500 acre-feet per year as previously modeled in the GCWA Off-Channel Canal Reservoir. The alternative interruptible supply scenario was modeled by adding 39,527 acre-feet per year to the annual diversion target of water right GCWA_2. The alternative diversion targets are shown in *Table 9* below.

Table 9 – GCWA "Firm" Demands (alternative scenario)

Water Rights	Control Point	System	M & I Demands (ac-ft/yr)
GCWA_1	GCWAAB	AB	219,350
GCWA_2	GCWAJC	JC	64,464

Reducing the firm diversion from the system with the GCWA off-channel reservoir increased the availability of interruptible supplies available. *Tables 10* and *11* show the reliability of the interruptible diversions at different diversion targets. Approximately 7,000 acre-feet per year and 57,000 acre-feet per year, diverted from water rights GCWA_3 and GCWA_4 respectively, is 75-75 reliable

Table 10 – GCWA_3 Percentage of Years
That Percentage of Diversion Target is Reliable

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_3	10,000	0	0	0	0	74.1	93.1
GCWA_3	8,000	0	0	0	0	74.1	93.1
GCWA_3	7,000	0	0	0	0	75.9	93.1
GCWA_3	5,000	0	0	0	0	77.6	93.1

Table 11 – GCWA_4 Percentage of Years
That Percentage of Diversion Target is Achieved

Water Right	Annual Diversion Target (ac-ft/yr)	Percentage of Target Diversion Amount					
		100%	98%	95%	90%	75%	50%
GCWA_4	60,000	0	13.8	34.5	50	74.1	89.7
GCWA_4	58,000	0	15.5	36.2	50	74.1	91.4
GCWA_4	57,000	0	17.2	36.2	50	75.9	91.4
GCWA_4	55,000	0	17.2	44.8	50	75.9	91.4

4. Summary of Modeling Scenarios

The development of interruptible supplies from the existing GCWA water rights and contracts produces the highest yields before the GCWA reservoir is constructed. Once the reservoir is built, the availability of interruptible supplies from both the GCWA "AB" and the "JC" Canal Systems is highly flexible. Additional "firm" supplies can be provided from the Off-Channel Canal Reservoir resulting in reductions in the interruptible supplies available to irrigators. The results of the three scenarios are summarized in *Table 10*.

Table 10 – GCWA Diversions (ac-ft/yr)

GCWA Diversions	Base	GCWA Reservoir	GCWA Reservoir Alternative
M & I Diversions	244,287	244,287	244,287
Add. Diversions from Reservoir	-	53,868	39,527
Interruptible Supply (GCWA_3)	40,000	-	7,000
Interruptible Supply (GCWA_4)	84,000	28,000	57,000

Water User Group Application:

Water from the Brazoria County Interruptible Irrigation WMS may be used to serve irrigation customers in Brazoria County in the Brazos, San Jacinto-Brazos, and Brazos-Colorado Basins. Delivery to customers would be via the GCWA Canal System.

Issues and Considerations:

The GCWA Off-Channel Reservoir is reflected in the 2011 RWP as operational by 2030. This reservoir, which would store interruptible supplies, would reduce the yield of interruptible irrigation water.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Brazos Saltwater Barrier

DATE: December 28, 2009

SUMMARY

STRATEGY DESCRIPTION: Lower Brazos Saltwater Barrier

SUPPLY QUANTITY: Improve efficiency of using existing supplies by potentially confining the salt wedge to downstream of various locations on the lower Brazos River.

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2020 to 2030

TOTAL STRATEGY COST: $44,470,700 (Costs rounded to nearest $100)

UNIT WATER COST: n/a - This strategy does not increase yield but does improve water quality

INFLUENCE OF SALT-WATER WEDGE IN THE LOWER BRAZOS RIVER

Introduction

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. The purpose of this feasibility study is as follows:

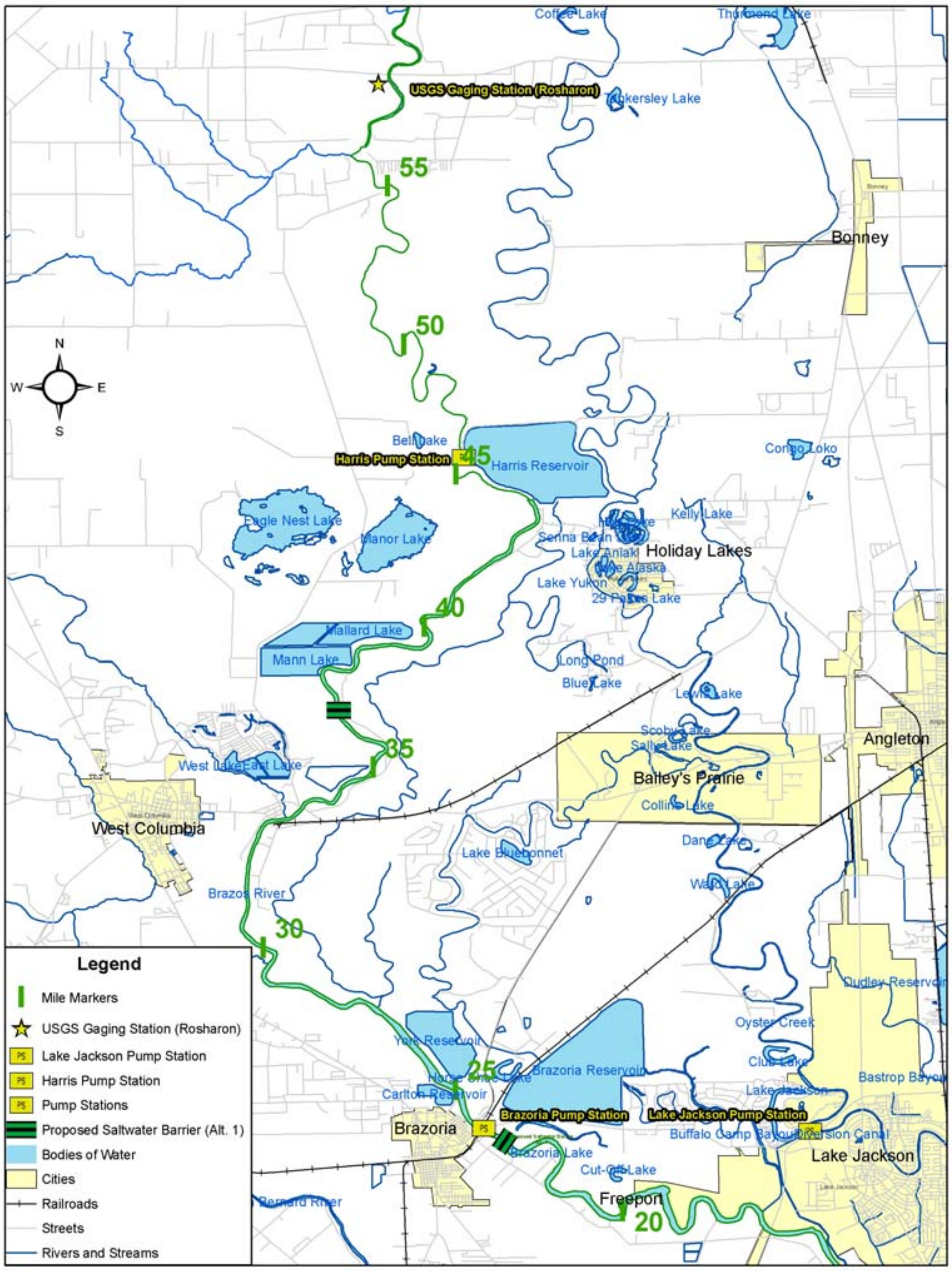
- Quantify the impact on local water users in terms of quality and reliability of fresh water supply.
- Determine the potential size, location and operating requirements for a saltwater barrier in the Brazos River.
- Determine the cost and feasibility of installing a pipeline from Harris Reservoir to Brazoria Reservoir to preserve water quality by avoiding utilizing the bed and banks of Oyster Creek and offsetting the need for a traditional barrier system.

Analysis

Background

There are many factors that affect the location of the salt wedge in the Brazos River. Figure 1 illustrates the Brazos River and notes key features that will form the basis of this analysis and discussion.

Figure 1
Map of Lower Brazos River



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 for water quality releases.

Dow and the BWA share diversion and storage facilities along the Brazos River. As illustrated in Figure 1, 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.

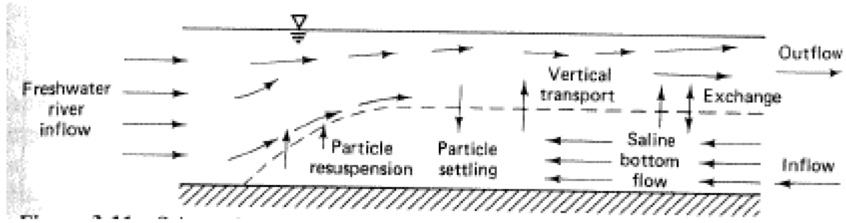
Local Influence of Salt Wedge

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 (see Figure 2). 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.

Figure 3 illustrates the salt content in ppm at the Brazoria and Harris pump stations vs. the Brazos River stream flow as recorded by the USGS station at Rosharon and is based upon data from January 1996 through December 2003. Note that the nearest USGS station is at Rosharon (mile marker 57) upstream of both Brazoria and Harris pump stations. The stream flow at Rosharon does not exactly correlate with the stream flow at Brazoria and Harris pump stations due to the distance between the locations and three irrigation water rights diversions which exist in this stretch of the Brazos River. There is, however, satisfactory correlation to conduct statistical trend analysis comparing stream flows to the salinity in the Brazos River at Brazoria and Harris pump stations. During periods of high flow in the Brazos, local streamflow pushes the salt wedge to the lower Brazos, downstream of the Brazoria pump station. The objective of this statistical analysis is to determine:

- What stream flow is required to keep the salt wedge below the Brazoria pump station and;
- What is the historical probability of Brazos stream flows exceeding this limit?

Figure 2
Schematic of Two-Dimensional Flow in Estuary

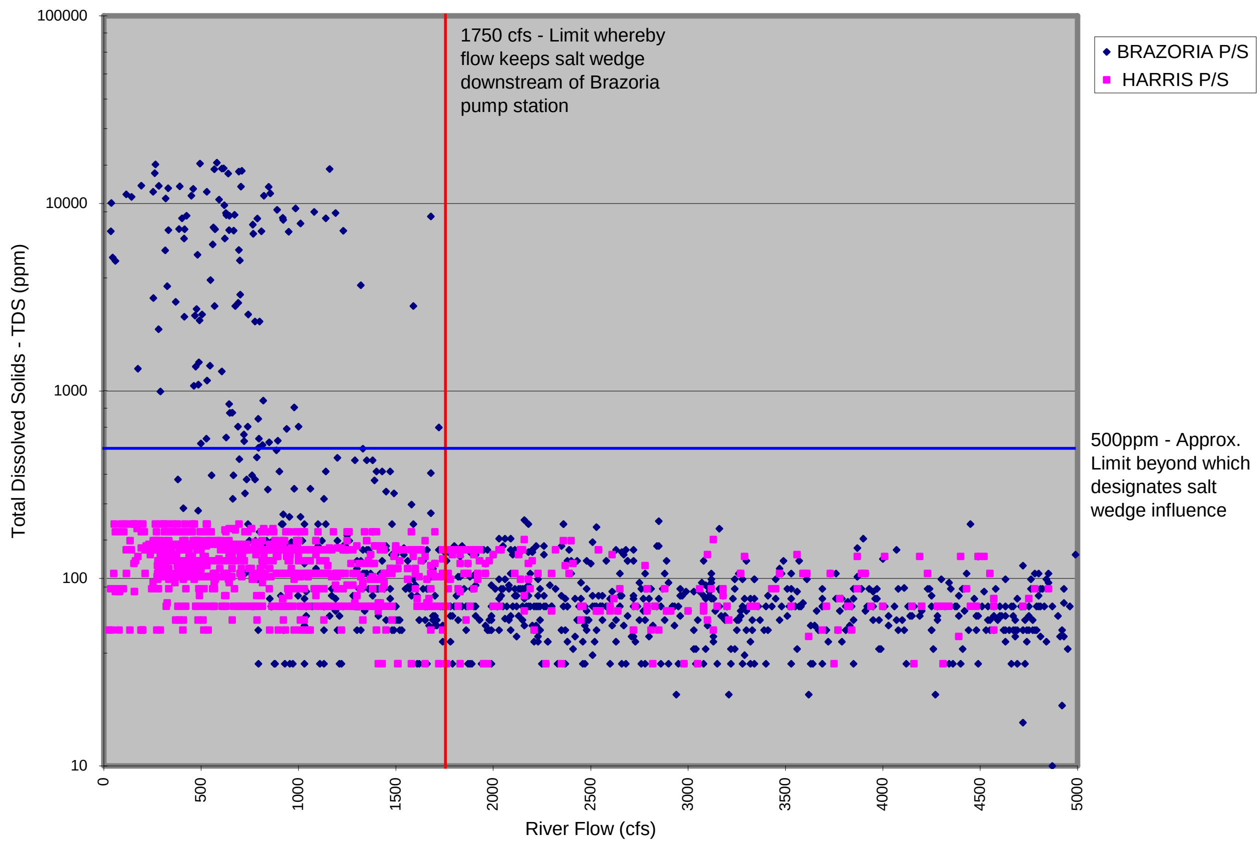


From Thomann, 1987

As illustrated in Figure 3, the salt wedge in the Brazos River does not currently reach the Harris Pump Station. The data also shows that the Brazoria Pump Station is intermittently affected by the salt wedge, particularly during periods when the flow in the Brazos River at Rosharon is less than 1750 cfs. Based on statistical analysis of stream flow data from the USGS Rosharon Gage, it is determined that 1750 cfs corresponds to the 33 percentile mark in the dataset. Therefore, historically the Brazos river stream flow has been insufficient to protect the Brazoria pump station from the salt wedge in a third of cases.

It should also be noted that all reliable flows in the lower Brazos River are fully allocated. That is, during drought of record conditions (and full consumptive use), there is only flow available to meet existing senior water rights. Return and unused flows, which currently maintain the salt wedge position, cannot be expected during drought conditions. Although not all of these flows will be diverted, the net flows in the lower Brazos will be reduced when compared to historical stream flow data, increasing the frequency of the salt wedge affecting the Brazoria pump station. Of particular concern are the Fort Bend Subsidence District groundwater reduction rules. Under the 2003 regulatory plan, communities in Fort Bend County must begin using surface water in 2013. The source of all or most of this water will be the Brazos River.

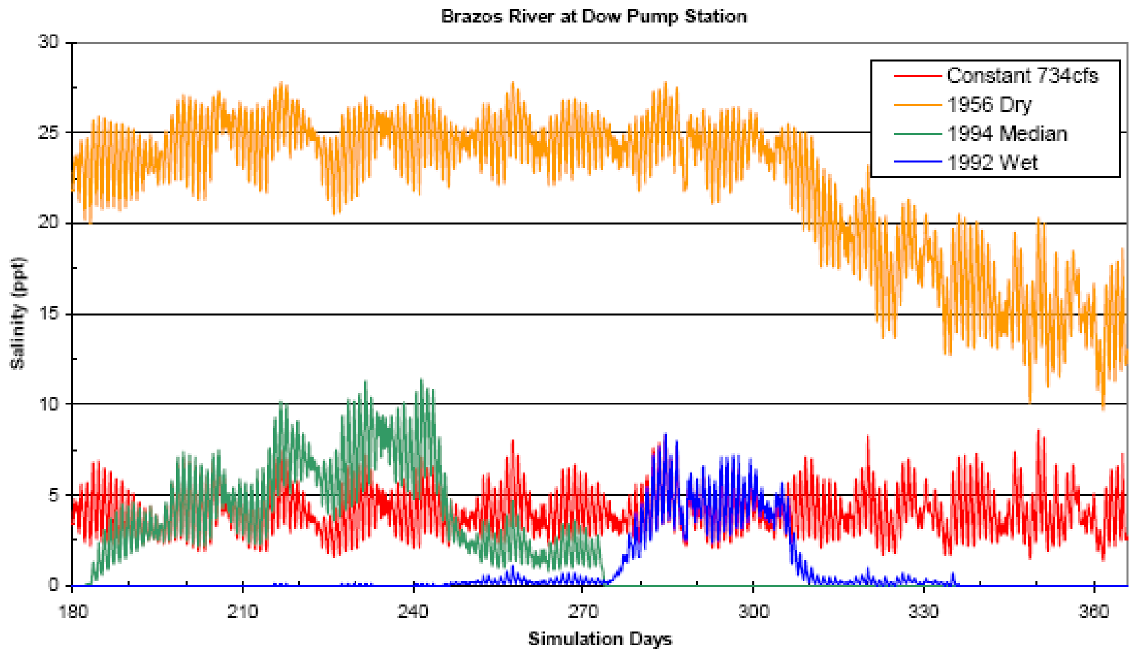
Figure 3
Salinity Vs Stream Flow (Brazos River @ USGS Rosharon Gauging Station)



In the Analysis of Instream Flows for the Lower Brazos River (TWDB, 2004), the TXBLEND3D salinity model was created and calibrated for the Brazos River below SH 36. This model was then run using flows from representative years from the TCEQ Water Availability Model Run 3 (0% return flows), and at a constant flow based on the Allens Creek Reservoir permit condition. The results of the simulations are shown in Figure 4. As can be seen, under full-utilization, the salinity at the Brazoria pump station will exceed the 500 ppm limit (0.5 ppt) in all but the wettest months. In the Brazos G WAM used for planning in this report, some return flows are included. However, that only increases the lowest monthly flow in the simulation (July 1956) from 150 acre-feet to 1,260 acre-feet. That flow is equivalent to the flow in November 1956, resulting in a peak salinity of 21,000 ppm.

During the periods when the salt wedge pushes upstream of the Brazoria pump station, the Harris pump station is used to supply raw water to Dow Chemical and the Brazosport Water Authority. Between the Harris Reservoir and the Lake Jackson Pump Station, there are two wastewater plant discharges, and the Justice Scott State Prison Farm. The wastewater plants discharge up to 4.05 mgd of treated effluent into Oyster Creek. A review of the EPA NPDES database shows that both facilities are operating within their permit requirements (no exceedance violations), but there is an increase in nutrient loading nonetheless. The state farm is a potential source of non-point source pollutants, predominantly nitrogen and phosphorus from fertilizers. These factors reduce the raw water quality of flows conveyed using the bed and banks of Oyster Creek. This reduced water quality increases the treatment cost, making it preferable to use to the Brazoria pump station to the greatest extent possible. It is expected that the majority of this additional cost is associated with the additional filtration needed. This additional filtration requires increased coagulant dosage (alum and other polymers) and a shortened cycle time for sand filters, thereby reducing their efficiency and increasing cost. There may also be additional cost for pathogen controls but this is not anticipated to be significant compared with water from the Brazoria pump station.

Figure 4
Mid-depth, mid-channel salinity at the Dow Chemical diversion point using four different river flow scenarios



From Analysis of Instream Flows for the Lower Brazos River (TWDB, 2004)

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 strategy 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, with a current system rate of $44 per acre-foot. 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.

The spring high tide for Freeport on the Brazos River is approximately 2.5-ft and it is evident from Figure 3 that the tidal influence extends beyond the Brazoria pump station. However, to ensure seasonal supply reliability for Dow Chemical and the regional water users, only the Harris pump station must be protected from the salt wedge. While some bathymetry exists from the 1988 FEMA flood study, the limited cross sections across the river only provide a small number of data points within the area of interest. In the section of the Brazos River between the Brazoria and Harris Pump Stations the channel bottom undulates between -33 to -9 feet (Datum - Mean Sea Level). Making a few assumptions, a basic estimation of the salinity at the Harris pump station may be made using the equations below. Based on this analysis (Table 1), the salt wedge clearly exerts no influence at the previously identified threshold of 1750 cfs. However, when the flow is modeled at 734 cfs, the tidal range of salinities at the Harris intake exceeds the desired limit of 500 ppm. It may be inferred that flows between 800 and 900 cfs will reliably protect the upper intake. When the drought-of-record conditions are modeled, the upstream salinities are greater than 90% of the salinity at the Brazoria intake.

$$s_x = s_0 \exp\left(\frac{Ux}{E}\right)$$ From Thomann, Eq. 3.11a

Where:
s_x = salinity at a point x, for x<0
s_0 = salinity at a point x = 0
U = net non-tidal velocity = Q/A
x = distance (negative upstream, positive downstream)
E = coefficient of dispersion
A = WD (width x depth)

Assume a uniform channel between the Harris and Brazoria intakes:
W = 500 feet (from FEMA flood study, 1989)
D = 20 feet (from TWDB study, 2004)
A = 10,000 sq-ft
E = 250 m^2/s = 2700 ft^2/s (after Raina, 2004)
x = (25 mi – 44 mi) = -19 mi = -100,320 feet

Table 1
Estimated salinity at Harris intake based on modeled salinity at Brazoria intake

S_0	Q	A	U	E	x	S_x
ppm	cfs	sq-ft	fps	ft^2/s	ft	ppm
400	1750	10,000	0.175	2,700	-100,320	0.6
5,000	734	10,000	0.073	2,700	-100,320	327.0
9,000	734	10,000	0.073	2,700	-100,320	588.6
27,000	2.4	10,000	0.000	2,700	-100,320	26,760.3
22,000	20.5	10,000	0.002	2,700	-100,320	20,386.5

These estimates are based on an assumption of full mixing, which is not likely to occur given the irregularity of the channel bathymetry. Additionally, both this estimate and the TXBLEND3D model assume uniform flow during the entire monthly period, which is also unlikely. A topic for follow-on study would be extension of the TXBLEND3D model to a point above the Harris intake, with model runs using actual daily flows during low periods to better determine the relationship between these sites and the actual risk of salt intrusion.

In summary, 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, which will be investigated further in this report.

Conceptual Design for Saltwater Barrier

There are multiple differing design concepts for a saltwater barrier in the lower Brazos River. Based upon the influence of the saltwater wedge previously detailed in this report the barrier should be located downstream of the Brazoria pump station as shown in Figure 6.

Alternatively, the saltwater barrier could be located further upstream to protect only the Harris Reservoir. This may be more cost effective if current bathymetry data can be obtained so that a relatively narrower or shallower point in the river can be found, thus reducing the construction costs of a saltwater barrier (Figure 7). However, from the bathymetric data currently available, a location cannot be identified to show any calculable cost savings.

There are a number of issues that need to be considered during conceptual design including:

- Stream navigability.
- Regional flood levels.
- Environmental considerations

With regard to navigation requirements of the Brazos River, pleasure craft are the only known category that utilizes this section of the stream. During the course of this feasibility report the U.S. Corps of Engineers and the Port of Freeport were contacted to evaluate any commercial navigation requirements. They reported that very occasionally a commercial vessel travels up the lower Brazos River, but only to service Dow Chemical, which is downstream of the proposed barrier location and would not be impacted by the structure. For shallow-draft pleasure craft, a submerged barrier (weir or inflatable barrier) may be considered. However, during low flow periods, the depth of flow over a submerged barrier would be minimal and would pose a hazard to navigation. Additionally, an inflatable barrier would be at risk of puncture by debris carried by storm flows. Therefore, it is preferable to have a gated structure to ensure boating safety and navigability. A saltwater barrier recently completed on the Neches River (as shown in Figure 5) offers a conceptual design for this location (note the navigation channel at the upper left end of the structure). However, the Neches River experiences more commercial traffic and therefore the gated structure for the Brazos is expected to be smaller.

To assess flooding potential, FEMA HEC-2 data and output were obtained for the lower Brazos region. The digital model was not available, but the data and output reports were reviewed with a view to the likely impact and significance of flooding resulting from the proposed saltwater barrier. The flood report details that in this region (between Brazoria and Harris reservoirs), local flooding is mainly influenced by raised local highways and railways crossing through the floodplain, which act as flood retarding structures as illustrated in Figure 8 and Figure 9. The impact from a major flood (1 in 100 years) will be primarily controlled by these retarding structures, but smaller storm events may have a local impact resulting from the proposed saltwater barrier. As the tidal range in the Brazos River is approximately 2.5-feet, the barrier should not be particularly high relative to the river banks, which will significantly limit the impact on upstream flooding. The conditions of sub-critical flow and relatively low barrier mean the local velocity can increase to adjust for reduced cross-sectional area as the water goes over the saltwater barrier, thereby minimizing the impact on upstream flood level. This is a very general overview of the potential flooding impact and detailed analysis of local flooding will need to be investigated for a variety of stream flow cases if this project were to be pursued. This analysis would require additional local survey data, particularly as the community of Brazoria is adjacent to the river in this location and the full range of stream flows in the Brazos will have varying hydraulic impacts as it goes over the proposed saltwater barrier. The existing FEMA study was undertaken in 1989 and reviewed as part of this study. The digital model is not available and therefore this survey, data collection and modeling will need to be undertaken as this project progresses.

Figure 5
Neches River Saltwater Barrier

Photo by U.S. Army Corps of Engineers

Figure 6
Proposed Saltwater Barrier Location (Alternate 1)

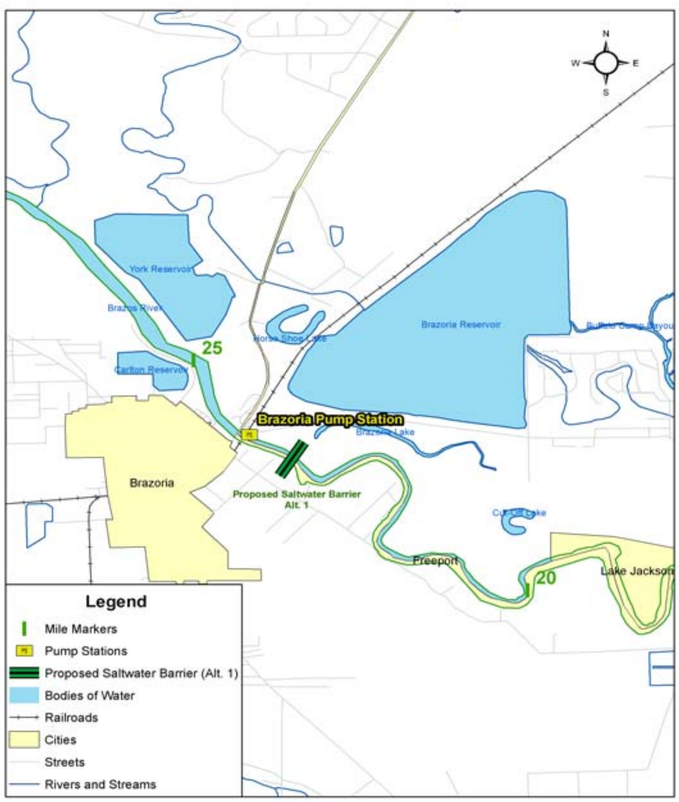


Figure 7
Proposed Saltwater Barrier Location (Alternate 2)

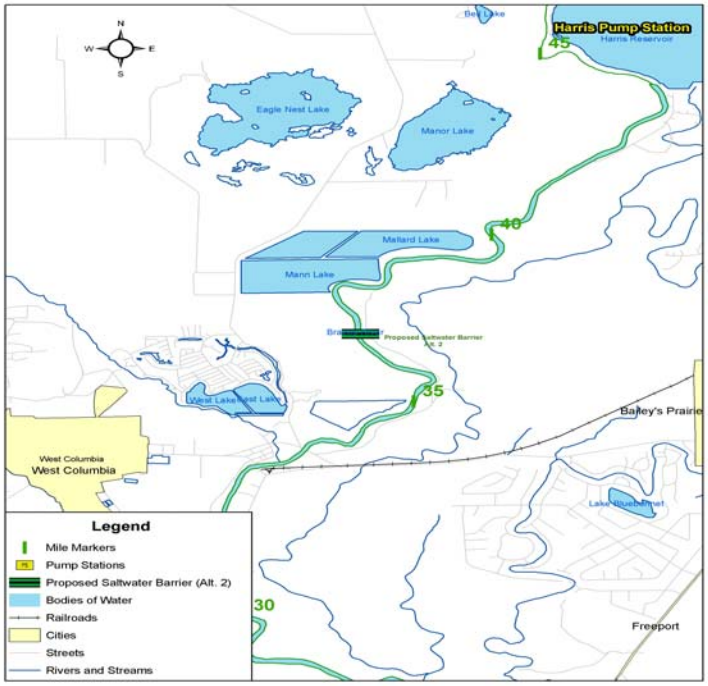


Figure 8
Photo illustrating elevated highway across Brazos flood plain

Figure 9
Photo illustrating elevated railway across Brazos flood plain (adjacent to Brazos River).

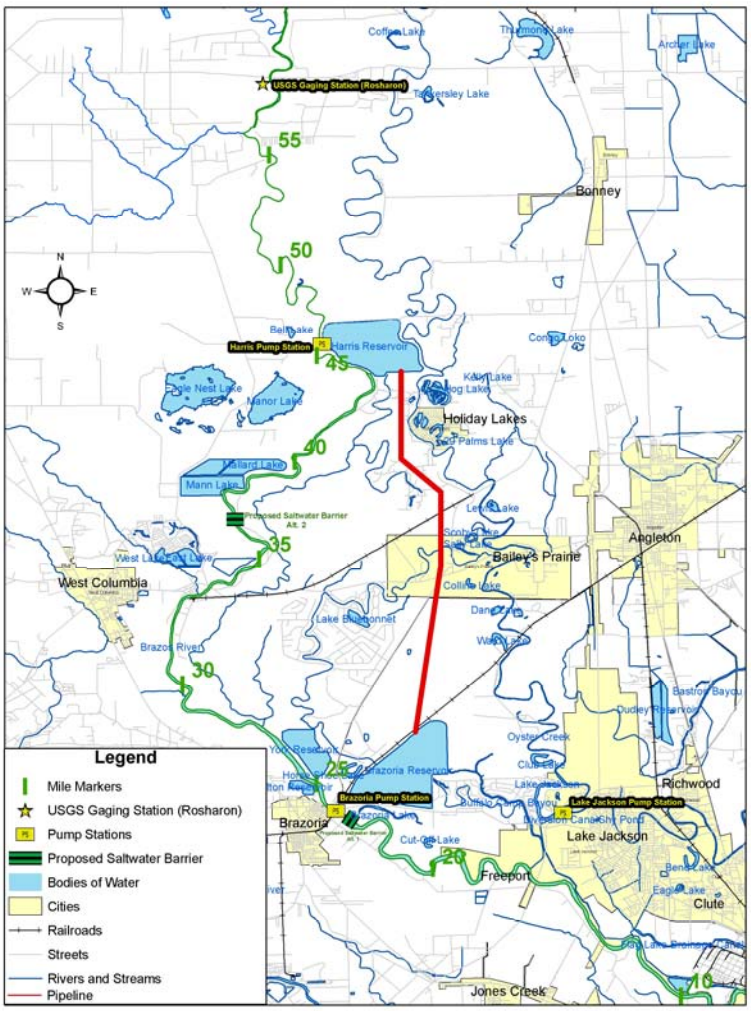
The construction of the proposed Brazos Saltwater Barrier may have both temporary and permanent impacts on the Brazos estuary, and the downstream and immediate upstream reaches of the Brazos River. Temporary construction may include such impacts as increased turbidity, BOD and contaminant loads in the 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 and least productive in the State. 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.

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.

Conceptual Design for Pipeline

Another possible solution to consider would be construction of a pipeline and booster pump station to convey Dow and BWA water directly from Harris Reservoir to Brazoria Reservoir without utilizing Oyster Creek. This will maintain water quality to so that treatment costs would be reduced. A 64-inch diameter pipeline would be needed to carry the total yield of both Dow and BWA permitted water rights. A conceptual alignment was chosen to estimate length of pipe (Figure 10). This is discussed as Option C, below.

Figure 10
Conceptual Pipeline Alignment



Economic Overview

To assess the economic viability of this project some comparative analysis was performed between various alternatives. Costs presented in the 2006 RWP are scaled to September 2008. Alternatives examined include:

- Option A1: Construction of a permanent saltwater barrier downstream of Brazoria Pump Station
    - A preliminary estimate has been prepared for construction of concrete saltwater barrier with a gated structure for pleasure craft navigability as summarized in Table 2.

- Option A2: Construction of a permanent saltwater barrier downstream of Harris Pump Station
    - A detailed estimate cannot be prepared at this time without accurate bathymetric data. The available data indicates bathymetry similar to the Brazoria site, so an equal cost capital cost was assumed.

Table 2
Preliminary Cost Estimate for Brazos River Salt Water Barrier downstream of Brazoria Pump Station

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 26,724,000	$ 26,724,000
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES (30% OF ENGINEERING COST)	1	LS	$ 10,956,840	$ 10,956,840
3	LAND & EASEMENTS	1	LS	$ 655,000	$ 655,000
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 1,310,000	$ 1,310,000
5	INTEREST DURING CONSTRUCTION	1	LS	$4,824,899	$ 4,824,899
	PROJECT COST				$ 44,470,739

- Option B: Continue pumping from the Harris pump station when the Brazoria pump station is affected by the saltwater wedge.
    - Based on historical records the Brazoria pump station can be used in two-thirds of all circumstances as the Brazos stream flow is sufficient to contain the saltwater wedge downstream of the Brazoria pump station.
    - The Harris pump station will be used for the remaining third. Note that even though this is based upon historical flows as water users in the upper Brazos use more of their allocation in future years, it is expected that future years may have smaller flows generally in the Lower Brazos and therefore the Harris pump Station may need to be used more often. This has not been included in this option as it is based purely on historical data.
    - During periods when the Harris pump station is used (one third of the time) there are additional operating costs for the Lake Jackson pump station.
    - Both Dow Chemical and Brazosport Water Authority (BWA) are assumed to use their full water right allocation. This may be conservative as these entities may not use their entire allocation within any given year.
    - During periods when the Harris pump station is used there are also additional cost associated with the treatment for the full municipal water right for BWA (45,000 acft/yr). An estimated differential cost of $0.15 /1000gal was estimated based upon previous indirect reuse studies in the 2006 RWP. As noted earlier in this report the majority of this additional cost is associated with the additional filtration needed

however there may also be additional cost for pathogen controls but this is not anticipated to be a significant portion of the allocated $0.15 /1000gal cost.

- Option C: Construct a pipeline to avoid using the bed and banks of Oyster Creek and increased treatment cost.
    - Based on full use of the Dow Chemical and Brazosport Water Authority (BWA) water rights, a 64-inch pipeline is required.
    - The pipeline, booster pump station, and right-of-way acquisition cost is significant (see Table 3)
    - As noted earlier in this report, the majority of this additional cost associated with the Harris Reservoir is for additional filtration. The cost of a new pipeline exceeds the additional treatment cost.

Table 3
Preliminary Cost Estimate for 64-Inch Diameter Pipeline and Pump Station

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 55,544,000	$ 55,544,000
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES (30% OF ENGINEERING COST)	1	LS	$ 22,794,000	$ 22,794,000
3	LAND & EASEMENTS	1	LS	$ 26,200	$ 26,200
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 7,205,000	$ 7,205,000
5	INTEREST DURING CONSTRUCTION	1	LS	$10,413,772	$ 10,413,772
	PROJECT COST				$ 95,982,972

- Option D: Comparison of the economics of releasing stored water to hold the salt wedge below the Brazoria pump station.
    - Currently historical data suggests that the stream flow is sufficient to contain the salt water wedge below the Brazoria pump time in two thirds of all cases. This corresponds to a required flow rate at the Rosharon gauge of 1750 cfs. Based on historical data the 25 percentile stream flow at the Rosharon gauge is 1340 cfs. It is proposed to release water in the upper Brazos when the flow is greater than 1340 cfs but less than 1750 cfs. The net result of this is that the Brazoria pump station can be used more often thereby reducing additional pumping and treatment costs.
    - The BRA requires payment for this released water at the BRA system rate. This is assumed to be the cost of released water.

Analysis from the 2006 RWP indicated that the additional annual operating cost associated with using the Harris pump station when the Brazos pump station is affected by the salt wedge would be less than the construction cost of a barrier, based on a similar saltwater barrier was constructed in the Neches River which is estimated at $53 million, which was considered when preparing the estimate. It is significantly greater than the current alternative of using the Harris pump station when the Brazoria pump station is affected by the saltwater wedge. The option of releasing stored water from the upper Brazos was significantly more expensive due to the cost of the water released and therefore was not considered further as part of this study. The option of constructing a pipeline to avoid the bed and banks of Oyster Creek to reduce treatment cost is the most costly option. However, the pipeline is sized for the carrying the entire yield of both the Dow and BWA water rights. Whereas the additional cost of pumping and treatment discussed in Option D was only for the amount of the municipal water right.

Conclusion

As is evident from the analysis, it is not economical at this time to install a salt water barrier. However, as upstream water use increases, less water will be available to push the salt wedge below the preferred Brazoria pump station and therefore increase the frequency of pumping from the Harris pump station. This will change the economic picture and it is projected that by the 2020 decade, as population growth and the Fort Bend Subsidence District rules result in greater water use from the Brazos River, the economic break even point will be reached. It will then be economical to install the salt water barrier downstream of the Brazoria pump station. The lead time for such a project is significant given the permit, environmental, design, engineering and construction requirements for a project of this size and sensitivity. Therefore planning and preliminary design work for the project should be undertaken in the near-term for the project to come online as a need arises.

References:

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Engineer Manual 1110-2-2602, Planning and Design of Navigation Locks, U.S. Army Corps of Engineers, September 1995

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Flood Insurance Study, Brazoria County, Texas, Federal Emergency Management Agency, June 1989, with supporting model information provided by FEMA

Principles of Surface Water Quality Modeling and Control, Robert A. Thomann and John A. Mueller, 1987, Chapter 3 – Estuaries, Bays and Harbors

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Freeport Seawater Desalination Project[1]

DATE: April 20, 2005

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Desalination of seawater for municipal use therefore enhancing flows for irrigation and manufacturing uses in the lower Brazos River basin.

SUPPLY QUANTITY: [Max 100mgd]	11,200 ac-ft/yr (10 mgd) – 33,600 ac-ft/yr (30 mgd)
SUPPLY SOURCE:	Gulf of Mexico Seawater
TOTAL STRATEGY COST[2]:	$976,952,150 to $1,257,220,100
TOTAL CAPITAL COST[3]:	$85,233,000 (11,200AF) - $255,699,000 (33,600AF) (Costs rounded to nearest $100)
UNIT WATER COST:	$1,730 to $2,376 per acre-foot (Average unit cost for desalinated water in the years 2010 – 2060 for Options 5 and 1, respectively)

<u>WATER MANAGEMENT STRATEGY ANALYSIS DESCRIPTION</u>

INTRODUCTION

The purpose of this analysis is to address the potential use of desalinated seawater to meet projected water shortages in Region H. This study investigates desalinated seawater to supplement existing and future water supplies that currently serve municipal demands within the lower Brazos River basin.

Since the incorporation of this strategy into the 2006 RWP, events have unfolded that have set back the schedule for project implementation. The project sponsor, Poseidon, is no longer involved in the project and Dow is not currently pursuing this as an alternative source for water. Although there are several hindrances to the development of the project at this point, the alternative of seawater desalination remains a viable and technically achievable option for water supply throughout the course of the length of the planning horizon.

ANALYSIS

Desalination is a process that can be used to obtain potable water from water containing high amounts of salts or other solids. This process has been incorporated into several public and

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[1] This memorandum was prepared using information in the *Freeport Seawater Desalination Project Final Report* prepared by CDM for the Brazos River Authority.

[2] All costs from the Freeport Seawater Desalination Project Final Report have been adjusted from 2006 RWP value to September 2008 value using the Engineering News Record Construction Cost Index, as recommended in TWDB Exhibit B. The total strategy costs are presented in net present value and include costs associated with delivering desalinated water, current and future surface water supplies, administrative fees, and debt defeasance. Groundwater costs are not reflected in the total strategy costs.

[3] The Capital costs were extrapolated from the Texas Water Development Board Report – The Future of Desalination in Texas (Volume 1) Biennial Report on Seawater Desalination dated December 2004. The costs were assumed to be linear with the expansion of the plant.

private water supplies throughout the state. Several small desalination operations are currently used in Brazoria County.

This water management strategy is a review of the Freeport Seawater Desalination Project proposed as a public-private partnership between the Brazos River Authority (BRA) and Poseidon Resources. The preliminary planning for this project was funded through a $500,000 TWDB grant that was awarded for three proposed desalination projects in Freeport (Region H), Brownsville (Region M), and Corpus Christi (Region N). Of these three projects, the Freeport desalination project was recognized by the TWDB in the December 2002 *Report of Recommendations* to Gov. Perry as the most feasible of the three projects at this time.

Despite historically high operating costs, seawater desalination holds several advantages for Region H, including:

- A drought-proof water supply from a constant supply source.
- Provides a high quality water supply that surpasses most drinking water standards and can support industrial applications requiring very stringent water quality standards.
- Provides a diverse solution for providing water resources to customers as an alternative to typical groundwater and surface water sources.
- Reduces demand for raw surface water that can be used to meet industrial needs that require only low or no quality levels.

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 service area for the Freeport seawater desalination plant is shown in *Figure 1*.

Table 1 describes five scenarios that were examined for implementing desalinated seawater as a strategy in the Freeport area. In Option 1, desalinated water would be used only to a minimal degree in order to meet water shortages. In Option 2, BWA's current supplies would be replaced with desalinated water and additional capacity would be diverted for use in the northern portion of Brazoria County and Fort Bend County to meet shortages. In Option 3, GCWA supplies to Missouri City, Pearland, and Sugar Land would be replaced with desalinated water and the resulting surplus could be reallocated to meet other needs in the GCWA service area. Option 4 would replace the GCWA supplies described in Option 3 as well as all supplies to BWA. Finally, a hybrid alternative of Option 2 was created to provide for a constant initial demand while still meeting shortages in the upper portion of the study area. This alternative, Option 5, would immediately replace BWA supplies in their entirety and allow for delivery of desalinated seawater to customers in northern Brazoria County and Fort Bend County when significant shortages begin to develop in 2025.

Table 1
Comparison of Desalination Alternatives

		BRAZOSPORT WATER AUTHORITY (BWA)	
		Use BWA Surface Water to Maximum Capacity	Provide Desalinated Water to BWA Customers for Wholesale Distribution to Customers
GULF COAST WATER AUTHORITY (GCWA)	Use GCWA Surface Water to Maximum Capacity	***Option 1*** Desalinated water used to meet deficits only.	BWA discontinues using its Brazos River surface water supply. ***Option 2*** Desalinated water is supplied to BWA in lieu of using existing surface water. ***Option 5*** Same as Option 2, except infrastructure to convey water to northern part of study area is not constructed in 2025.
	Provide Desalinated Water in Lieu of Raw GCWA Surface Water	***Option 3*** WCID 2 and cities of Missouri City, Pearland, and Sugar Land allow their GCWA option contracts for raw surface water to expire, replacing this supply with desalinated water.	***Option 4*** Desalinated water replaces both BWA and GCWA surface water supplies.

All of the proposed strategies described above call 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 by the year 2060, depending upon the strategy option chosen. Currently, Dow is not interested in sponsoring a desalination WMS 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.

The proposed plant processes are described in the following sentences. 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.

The distribution system recommended by the Freeport Seawater Desalination Project is shown in *Figure 2* and proposes the incorporation of desalinated water into the BWA supply system as well as new conveyance facilities for delivery outside of the BWA service area. This will include transmission along the approximately 45-mile segment between the Freeport plant and the distribution system in northern Brazoria County. Several of these lines will be constructed in parallel to allow for additional capacity as demands require. The total lengths of pipe required for the aforementioned alternatives range from 110 to 140 miles and vary according to the capacity required by the desalination alternative used. This treated water could be introduced directly to the water distribution systems of the customers without further treatment as would be needed for the GCWA raw water supplies currently available to Fort Bend County WCID Number 2, Missouri City, Pearland, and Sugar Land. A blending analysis demonstrated that water from the Freeport plant would be compatible for use in the water systems of Missouri city, the Brazosport Area, and Pearland for the proposed blending levels of all of the alternatives considered, facilitating use throughout the proposed service area.

The possible scenarios for implementing a seawater desalination facility as a management strategy were examined with the future water demands of the service area in mind. The water demand projections for the majority of WUGs in the potential service area were acquired from the approved population and water demand projections published by TWDB for use in the 2006 Regional Water Plans and are consistent with the values presented in *Chapter 2 – Presentation of Population and Water Demands*. However, due to inconsistencies between the TWDB projections and information provide by the Houston-Galveston Area Council (HGAC) and the cities of Lake Jackson and Pearland, the population and water demands used for evaluating each desalination alternative were adjusted for Lake Jackson, Pearland, and County-Other WUGs in both Brazoria and Fort Bend counties. This method of computing population growth and demands also addressed the issue of the expected annexation of several MUDs and the urbanization of unincorporated land surrounding the larger cities.

Costs were estimated from the amount of water desalinated and distributed for each of these scenarios. The costs and the total amount of desalinated water delivered through the 2060 planning period for each of the seawater desalination alternatives are shown in *Table 2* and include debt defeasance for pre-existing infrastructure improvements conducted by the WWPs. Additionally, Option 5 was considered for further study and a rate analysis. This was conducted for each region of the service area and is shown in *Table 3*. Additional detail regarding the development of the project costs included in *Tables 2* and *3* of this technical memorandum are provided in the *Freeport Seawater Desalination Project Final Report* dated November 1, 2004 and prepared by CDM.

Table 2
Summary of Net Present Value Analyses[4]

Option	Net Cost (Adjusted to 2nd Quarter, 2002)					Total Desalianted Water Delivered - 2010 to 2060 (acre-feet)
	Total Net Present Value	Desalinated Water Treatment	Desalinated Water Conveyance	Other Water Sources	Other Costs	
1	$745,765,098	$302,626,451	$141,945,940	$273,121,116	$28,071,591	1,005,763
2	$766,547,117	$330,369,365	$146,088,912	$254,771,910	$35,316,930	1,099,079
3	$924,743,321	$607,221,224	$285,968,573	$18,349,206	$13,204,318	3,076,765
4	$959,710,098	$641,736,864	$297,362,209	$0	$20,611,025	3,167,928
5	$722,112,798	$292,184,503	$123,001,896	$271,790,586	$35,135,813	1,051,614

Table 3
Rate Analysis of Blended Water for Option 5

Year	Water Rate (Adjusted to 2nd Quarter, 2002)		
	Pearland	Ft. Bend County	BWA
2010	$0.65	$0.45	$3.02
2020	$0.85	$0.79	$2.79
2030	$0.91	$1.45	$3.34
2040	$1.04	$1.38	$2.91
2050	$0.88	$1.38	$3.40
2060	$0.96	$1.13	$2.12

[4] Costs include expenses for surface water sources utilized in the desalination alternatives (i.e. cost of GCWA and BWA surface water). Groundwater usage was the same for each option. Therefore, the cost of groundwater is not reflected.

WATER USER GROUP APPLICATION

The desalinated seawater would be used to meet municipal demands in the lower Brazos River basin of Brazoria County, therefore enhancing flows for irrigation and manufacturing WUGs in the lower Brazos River basin that are served by the Chocolate Bayou Water Company and the Dow canal system.

ISSUES AND CONSIDERATIONS

The most important factor in the success of a desalination facility in Freeport is the participation of the local WWPs in such a program. Currently, BWA is expected to have an adequate water supply to continue to meet the needs of its customers from Brazos River diversions and does not have a pressing need to explore additional sources of water. In addition, other, more conventional and lower cost alternative strategies exist to meet water deficits for GCWA. Without financial benefit and an immediate need for expanding alternative resources, BWA and GCWA would likely not participate in the Freeport project. For these reasons, it is imperative that final costs for water are developed through the implementation of a pilot plant and proper funding is secured from state and federal entities to subsidize the desalination program.

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.

Figure 1
Proposed Service Area

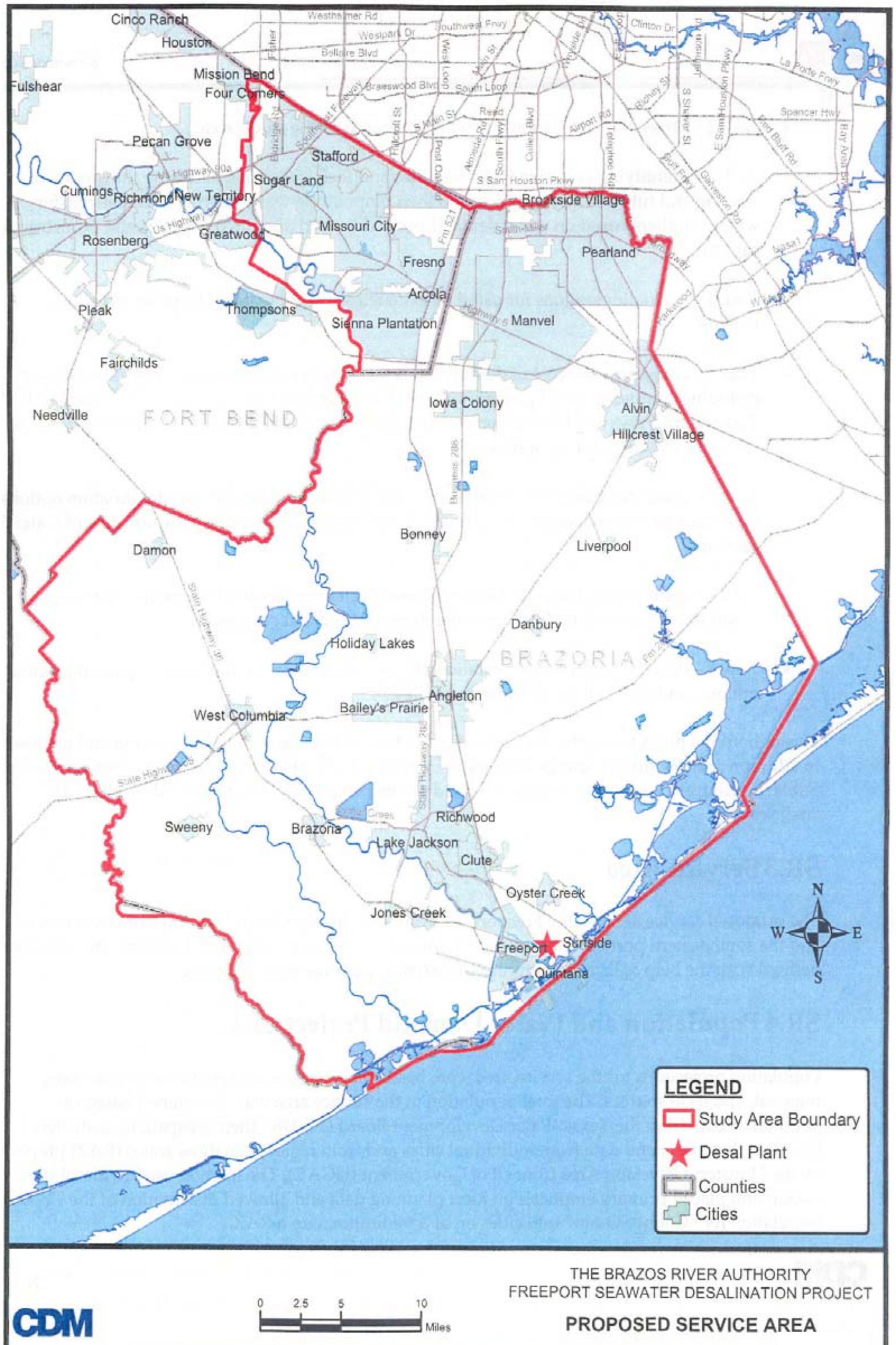
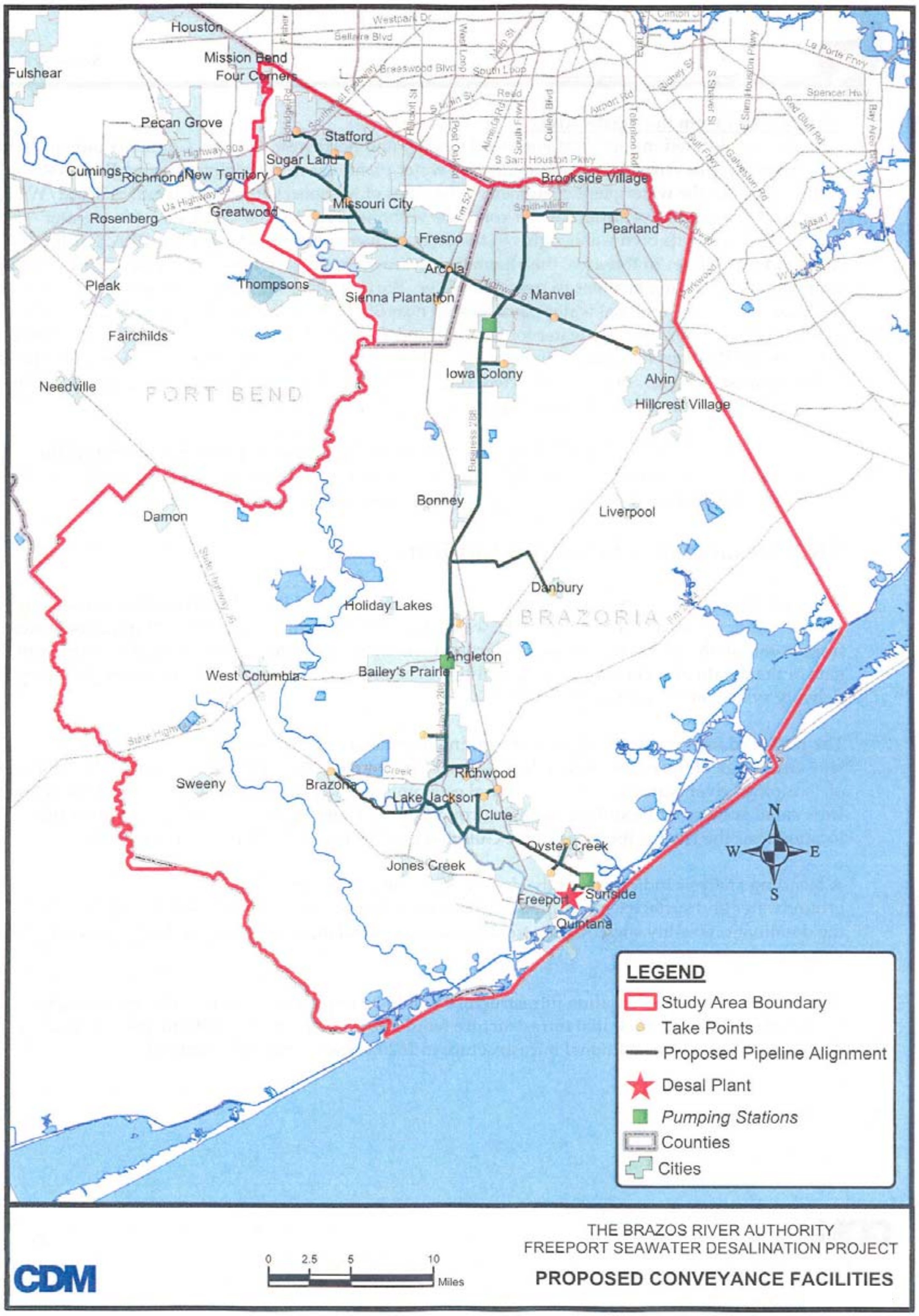


Figure 2
Proposed Conveyance Facilities



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: City of Huntsville Surface Water Treatment Plant Expansion

DATE: January 3, 2010

SUMMARY

STRATEGY DESCRIPTION: Improvement to water treatment facilities for the City of Huntsville.

SUPPLY QUANTITY: 22,400 ac-ft per year (20 mgd of capacity) at ultimate phase

SUPPLY SOURCE: Lake Livingston

IMPLEMENTATION DECADE: 2010

TOTAL STRATEGY COST: $61,023,900 capital cost (estimated using Region H standard cost assumptions). (Costs rounded to nearest $100)

UNIT WATER COST: $587 per acre-foot, based on assumption above.

Water Management Strategy Analysis Description

Introduction:

The City of Huntsville has recently contracted with the Trinity River Authority to increase their current surface water contract from 10 to 20 MGD of supply. In order to utilize this entire contract, the existing surface water treatment facilities that serve the city and surrounding customers will have to be upgraded to a greater capacity.

Analysis:

Costs for additional plant capacity were developed from Region H planning criteria.

Water User Group Application:

City of Huntsville and surrounding areas that are served by the regional system.

Issues and Considerations:

Plant upgrades will have to be implemented as demands increase over the planning horizon. Current projections by TWDB do not capture this level of demand within the planning period.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: Montgomery County MUDs 8 and 9 Brackish Groundwater Desalination

DATE: December 14, 2009

SUMMARY

STRATEGY DESCRIPTION: Development of a brackish groundwater desalination facility that would supplement existing wells, reducing dependence on fresh water formations of the Gulf Coast Aquifer.

SUPPLY QUANTITY:	Up to 2,240 acre-feet per year (average 2.0 MGD)
SUPPLY SOURCE:	Brackish groundwater from the Gulf Coast Aquifer
IMPLEMENTATION DECADE:	2010 (2014) – All water treatment and distribution infrastructure.
TOTAL CAPITAL COST:	$12,000,000
UNIT WATER COST:	$1,171 per acre-foot average annual unit water cost for years 2010-2060

Water Management Strategy Analysis Description

Introduction:

The Lone Star Groundwater Conservation District (LSGCD) has mandated a county-wide reduction in groundwater pumping, limiting groundwater to 70 percent of total county demands, to be met by 2016. A preliminary evaluation of existing groundwater data conducted by the MUDs concluded that a suitable quantity and quality of water exists in the study area in three sand zones ranging from 1,700 to 2,800 feet below msl in depth. Water quality in each of these potential production zones is estimated to be brackish (1,000 to 5,000 milligrams per liter [mg/L] Total Dissolved Solids [TDS]) within the study area. LSGCD has defined acceptable "Alternative Water Sources" to include brackish groundwater produced from geologic formations underlying the Gulf Coast Aquifer, but only to the extent that any such production will not threaten the quality or the quantity of fresh water supplies within the Gulf Coast Aquifer within the District, and to the extent that such production does not cause subsidence within the District.

Analysis:

Montgomery County MUDs 8 and 9 have commissioned a study of the engineering and permitting feasibility of developing and treating this brackish groundwater as an alternate means meet the mandated groundwater reduction. Based on current LSGCD regulations, the MUDs combined groundwater pumping limit (70% of the total permitted pumping amount in 2009) will be approximately 1.16 MGD beginning in 2016. Based on projected demands, the MUDs' maximum unmet demand, or conversion requirement, would begin in 2016 at 0.61 MGD and reaches a maximum of 1.55 MGD in 2035 and after. Therefore, a brackish desalination facility of 2.0 MGD capacity is presently envisioned. If determined feasible, the ongoing analysis will also estimate the implementation and operational costs of such a project.

Water User Group Application:

Treated water would meet shortages for the Montgomery County MUD 8 and 9 WUGs and increase the amount of ground-water derived return flow to Lake Conroe.

Issues and Considerations:

The key permitting consideration is concentrate disposal. TCEQ has undergone rulemaking to develop a general permit for injection wells for reverse osmosis (RO) concentrate disposal, which is now under consideration by the Commission. There is precedent for both surface and injection well disposal of RO concentrate in Texas (over 30 facilities with capacity greater than 0.25 MGD). A second regulatory consideration is whether the target aquifers meet the LSGCD regulations conditions for an alternative water supply. Finally, the estimated costs to develop and operate such a project must be determined feasible. All three of these considerations are included in the current scope of study commissioned by the MUDs.

References:

Texas Water Development Board. 2006. A Desalination Database for Texas. Revised October 2006. Prepared by Jean-Philippe Nicot, Steven Walden, Lauren Greenlee, and John Els. Texas Water Development Board, Austin, Texas.
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www.twdb.state.tx.us/RWPG/rpgm_rpts/2003483509.pdf.

LSGCD Regulations.
http://www.lonestargcd.org/

REGION H WATER MANAGEMENT STRATEGY ANALYSIS
TECHNICAL MEMORANDUM

STRATEGY TITLE: East Texas Water Transfer

DATE: January 3, 2010

SUMMARY

STRATEGY DESCRIPTION: Transfer surplus raw water supplies in the Sabine and/or Neches Basin to serve WUGs in Harris and Montgomery Counties.

SUPPLY QUANTITY: Maximum availability 26,762 acre-feet per year in 2020, increasing to 486,500 acre-feet per year by 2060

SUPPLY SOURCE: Sabine and/or Neches Rivers

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $760,813,300 capital cost (Costs rounded to nearest $100)

UNIT WATER COST: Dependent on volume that would be allocated if selected as an an alternative.

Water Management Strategy Analysis Description

Introduction

By 2020, significant shortages will appear within Montgomery County that can not be met by existing strategies. Additionally, Harris County will experience major shortages in the 2030 decade. This strategy evaluates importation of water from the Sabine and/or Neches River Basins to meet the projected shortfalls. Water will either be pumped from the Sabine River above Orange and conveyed via Sabine River Authority (SRA) canals to the Lower Neches Valley Authority (LNVA) canal system at the LNVA First Lift Pumping Station north of Beaumont or pumped from the Neches River to the LNVA canal systems. LNVA canals will carry the flow west and discharge it into the Trinity River where it can be diverted for use by water providers in the lower Trinity basin. Where possible, existing pumping stations and canals belonging to the SRA and the LNVA will be expanded to carry the additional flows. New canals, pumping stations and pipelines will be constructed where it is not feasible to use existing facilities. Attached Figure 1 shows the pumping stations, pipelines and canals needed to transport water from the Sabine and Neches River to the Trinity River.

With East Texas water supplies to replenish the lower Trinity water, additional withdrawals of Trinity water can be made from Lake Livingston. An integral part of this strategy is a pipeline from Lake Livingston discharging into the West Fork of the San Jacinto River (see Figure 1). This segment ultimately flows into Lake Conroe and then diverted to meet demands throughout the San Jacinto River basin.

Analysis

Table 1 shows the projected shortfall in water supply for the Harris and Montgomery Counties. The Montgomery County shortages developing in 2020 will require the implementation of a significant water management strategy. In 2030, increasing Montgomery County shortages along with Harris County shortages will create a combined deficit of over 100,000 acre-feet per year. Ultimately, as much as 486,000 acre-feet per year of East Texas water will be required to meet shortages. Sufficient supplies of water exist in the Sabine and Neches River watersheds to satisfy all of these demands.

Physical facilities required by this strategy include the following:

- Pumping stations, canals and pipelines to convey Sabine River water to the Neches basin
- Pumping stations and canals to convey Sabine water across the Neches basin into the lower Trinity River
- Pumping stations and pipeline to convey water from Lake Livingston to the San Jacinto basin

Facilities were sized to account for canal losses (assumed to be 85 acre-feet per year per canal-mile) plus 20% for seasonal variations. Losses from the Trinity River and San Jacinto River discharge points to the receiving WWPs have not been included but will require consideration once the take points for those WWPs have been determined.

Sabine-to-Neches Segment: Sabine River water will be pumped from the river at a new pumping station adjacent to the SRA existing river intake. Water will be routed through upgraded SRA canals west to a new pumping station just north of I-10. A new canal will transport water west from this pumping station. A pipeline will carry the flow under the Neches River and deliver the water to the forebay of the LNVA First Lift Pumping Station. These facilities will be needed by 2030 and are estimated to cost $ 293,427,000. Including losses and seasonal peaks, these facilities are sized to deliver 525 mgd to the LNVA pumping station.

Neches-to-Trinity Segment: The existing pumping stations on the LNVA Main Canal have sufficient capacities to carry the added trans-basin flow. Minor upgrades to the Main Canal will be required. A new pumping station will be constructed on the Main Canal near its junction with the Nolte Canal. This facility will pump trans-basin flows into a new canal extending west to a discharge point on the Trinity River. These facilities will be needed by 2030 and are estimated to cost $ 148,403,400. Including losses and seasonal peaks, these facilities are sized to deliver 521 mgd to the lower Trinity River.

Lake Livingston-to-San Jacinto Segment: All facilities in this segment will be new. A pump station with a lake intake located on the western shore of Lake Livingston near the town of Pointblank will pump the flows required in Montgomery County through a 96-in. pipeline to a booster pump station located west of the City of Huntsville. At this point, water will be discharged into the West Fork of the San Jacinto River and will flow into Lake Conroe. These facilities will be needed beginning in 2020 and are sized to deliver 155 mgd. Costs are estimated at $318,982,800.

A transfer of SRA water would require the use of all three segments and would have a total project cost of $760,813,320. Annual costs would range from $32.6 million in to $98.9 million.

It should be noted that these costs <u>do not</u> include the cost of purchasing the water since it is subject to negotiation between the seller (SRA/LNVA) and future buyers. Informal discussions indicate that the pricing of water will be based on "replacement cost" of alternative water supplies. Additionally, this cost includes no estimate for upgrades to existing conveyances required that would deliver Sabine or Neches River water from the Trinity and San Jacinto Rivers to customers. These costs would be considered by the WWPs sponsoring the East Texas transfer strategy. It should be recognized that there is a significant difference within the total project cost of various segments.

Water User Group Application

This strategy transfers raw water from the Sabine and/or Neches Rivers to meet the projected needs of WUGs within Montgomery County experiencing shortages in 2020 and Harris County WUGs in 2030.

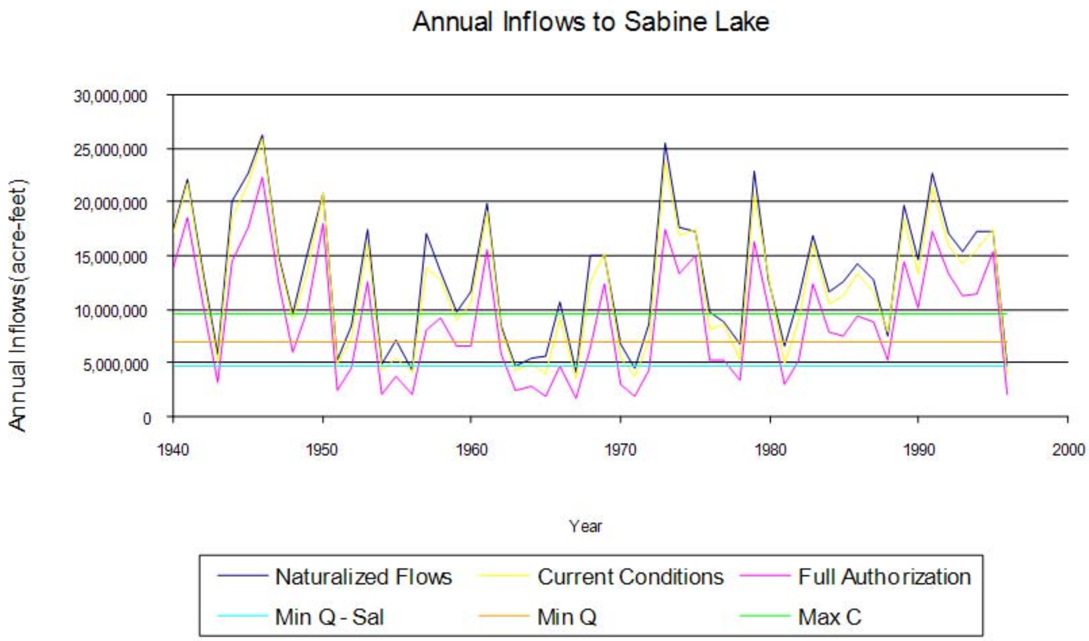
Issues and Considerations

As a result of Senate Bill 1, interbasin transfer water would have water rights junior to other water rights in the basin of origin. Although of concern, this issue may be less relevant in the case of a transfer from the Sabine River below the Toledo Bend Reservoir since the SRA is the only entity owning significant water rights in that segment of the river. This transfer, due to its magnitude, will be perceived as a sensitive management strategy requiring reconciliation of water valuation and other political issues. Valuation issues include the affect of periodic or prolonged low lake levels on property values and recreational revenues in Sabine and Shelby Counties.

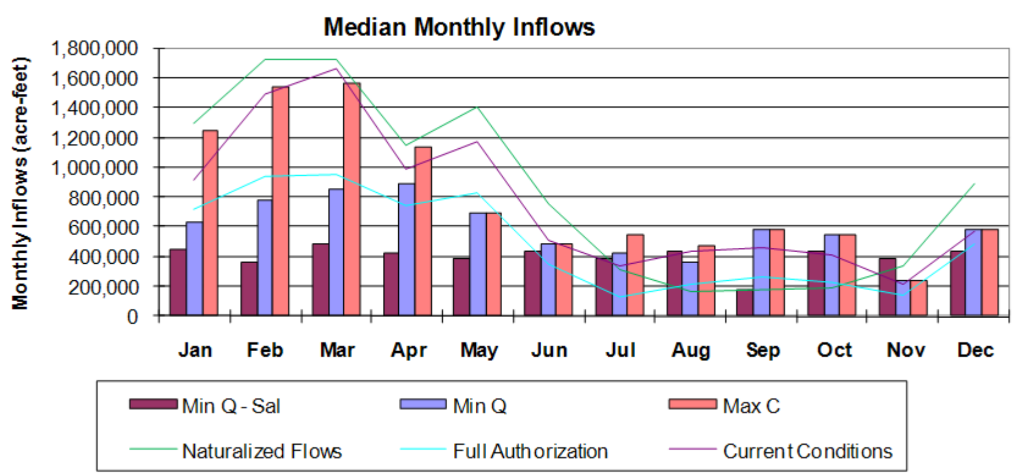
Discussions with representatives of the Region I Planning Group regarding the potential use of East Texas water within Region H occurred in February 2005. The discussions included the coordination of appropriate supply volumes potentially available for transfer to Region H after in-basin needs were fulfilled and in consideration of potential transfers of water to other planning regions including Region C. Further coordination between the Region H and Region I planning groups will be required as this strategy is more fully developed over time. Issues such as environmental impacts and basin of origin compensation will need to be addressed cooperatively by both planning groups to better enable this strategy to be implemented.

The State of Louisiana and local Sabine Lake water interests have historically voiced concern about a large-scale water transfer of the type outlined within this management strategy. This strategy will therefore require further environmental study before the ecological effects can be fully determined. Concerns may also arise regarding the introduction of Sabine and Neches River water into the Trinity basin and Trinity River water from Lake Livingston to the San Jacinto River basin.

The graph below illustrates the annual inflows to Sabine Lake from the Sabine and Neches Basins. The graph also compares inflows values from TCEQ WAM runs 3, 8, and naturalized conditions to target inflows developed by the TWDB and TWPD. The target inflows are Min Qsal, MinQ, and Max C. Min Qsal represents the minimum freshwater inflows to maintain an allowable salinity. MinQ represent the minimum freshwater inflows estimated to maintain a healthy fishery environment. MaxC represents the freshwater inflows at which the estuary production would be maximized.



Median monthly inflow quantities from the Sabine and Neches Rivers developed using naturalized, TCEQ WAM Run 3 and 8 are compared to Sabine Lake inflow targets in the graph below.



Currently, there is approximately 1,500,000 acre-feet per year of water permitted in Toledo Bend Reservoir in the Sabine River basin and approximately 820,000 acre-feet per year of water permitted in Sam Rayburn / Steinhagen Reservoir in the Neches River basin. Based on information in the 2001 Region I Water Plan, it is assumed that of the 820,000 acre-feet of water rights only 210,000 acre-feet per year is available for transfer into Region H. The 820,000 acre-feet per year represents the LNVA permitted supply and does not represent the maximum amount of firm water in Rayburn / Steinhagen Reservoir. Therefore, it was assumed that the remaining amount of supply from the Neches river basin would be comprised of new water rights permits and existing run-of-river water rights. Sabine River Authority of Texas holds approximately 750,000 of water in Toledo Bend Reservoir. Therefore, it was assumed that the full-authorization model (TCEQ WAM Run 3 model) would reflect the transfer of this water out of the river basins because the models do not include return flows. It is assumed that SRA-LA will participate in the transfer of water from Toledo Bend Reservoir. For reference purposes, the percent compliance of the Current Conditions and Naturalized Sabine Lake Inflows are compared in the table below to the Full-Authorization model with respect to estimated monthly inflow targets.

	Percent Compliance of Monthly Inflow Targets		
	Max C	**Min Qsal**	**Min Q**
Naturalized	48	66	56
TCEQ WAM Run 8 - Current Conditions	44	66	54
TCEQ WAM Run 3 - Full Authorization	29	52	38

Information was obtained from WAM Modeling conducted by Turner Collie & Braden Inc., dated 6-23-03.

When reviewing the naturalized flow conditions, the estimated bay and estuary inflow targets are met approximately 48, 66, and 56 percent of the time for Max C, Min Qsal, and Min Q, respectively. The percent inflow target compliance decreases when current water uses and return flows are added into the WAM and further decrease when currently permitted water is completely utilized and no return flows are incorporated into the WAM model. The Sabine Lake Bay and Estuary inflow targets, used to compare the various conditions discussed above, are estimated and not formally adopted by the State as targets. If instream flow requirements are required in the permit amendment process to change water use types and allow interbasin transfers, the amount of this water available for interbasin transfer could decrease. This decrease could potentially make this strategy less desirable due to financial and institutional constraints.

Other Environmental concerns related to construction within the upper West Fork of the San Jacinto River channel may also be an issue. Rectification of some segment of the river may be required. Increased use of stored water from Lake Livingston may result in periodic or prolonged low lake levels, which may adversely impact property values and recreational revenues in Walker, Trinity, San Jacinto and Polk Counties.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Fort Bend County W.C. & I.D. No. 2 GRP

DATE: November 23, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Through regulations imposed by the Fort Bend Subsidence District (FBSD), the Fort Bend County W.C. & I.D. No. 2 Ground Water Reduction Plan (GRP) will reduce ground water use through surface water conversion. Groundwater reduction measures will address Municipal WUG shortages.

SUPPLY QUANTITY: Conversion volumes of 2,296 afy in 2013 and 5,753 afy in 2025

SUPPLY SOURCE: GCWA Canal System (Brazos River water)

IMPLEMENTATION DECADE:	30% reduction – 2013
	60% reduction – 2025

TOTAL STRATEGY COST:	$10,631,500 capital cost, Phase I surface water treatment plant
(Costs rounded to nearest $100)	$7,098,700 capital cost, Phase II surface water treatment plant
	$7,098,700 capital cost, Phase III surface water treatment plant

ANNUAL UNIT WATER COST: $353 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

Texas law allows for the establishment of groundwater planning districts. The Fort Bend Subsidence District, created in 1989, adopted a Regulatory Plan in 2003. The Regulatory Plan outlines how to develop and implement a GRP which requires no more than 70% of the permittee's total water demand can be from groundwater in 2013 and no more than 40% in 2025. These requirements are subject to entities within Area A. Figure 1 shows the FBSD Regulatory Areas. The reduction in groundwater use must be made up by increase in surface water, water reuse, and efficient and water conservation management practices.

Fort Bend County W.C. & I.D. No. 2 (WCID No. 2) is partnering with Harris County MUD No. 122, Fifth Street Water Supply Corporation, and City of Meadows Place for purposes of meeting the required groundwater reduction. WCID No. 2 has obtained 10.5 MGD of raw water supply from GCWA to meet their conversion.

Analysis:

The GRP lays out the planned strategies for meeting the Fort Bend Subsidence District's timeline for our mandated deadlines for partial conversion to non-groundwater sources. WCID No. 2 is partnering in this endeavor with Harris County MUD No. 122, Fifth Street Water Supply Corporation, and City of Meadows Place.

The GRP indicates that a 3 MGD plant will be sufficient to meet 2013 conversion requirements and will delay capital expenditures through over-conversion credits. An additional 3 MGD will be required by 2025, with an additional 3 MGD needed by 2032. WCID No. 2 has contracted with GCWA for 10.5 MGD of raw water supply and has obtained 80 acres of land adjacent to the GCWA canal for treatment plant development. WCID No. 2 is also engaged in water conservation and uses reuse water for internal plant process and cleanup needs.

Water User Group Application:

WCID No. 2 and its partners are starting implementation of this strategy.

Issues and Considerations:

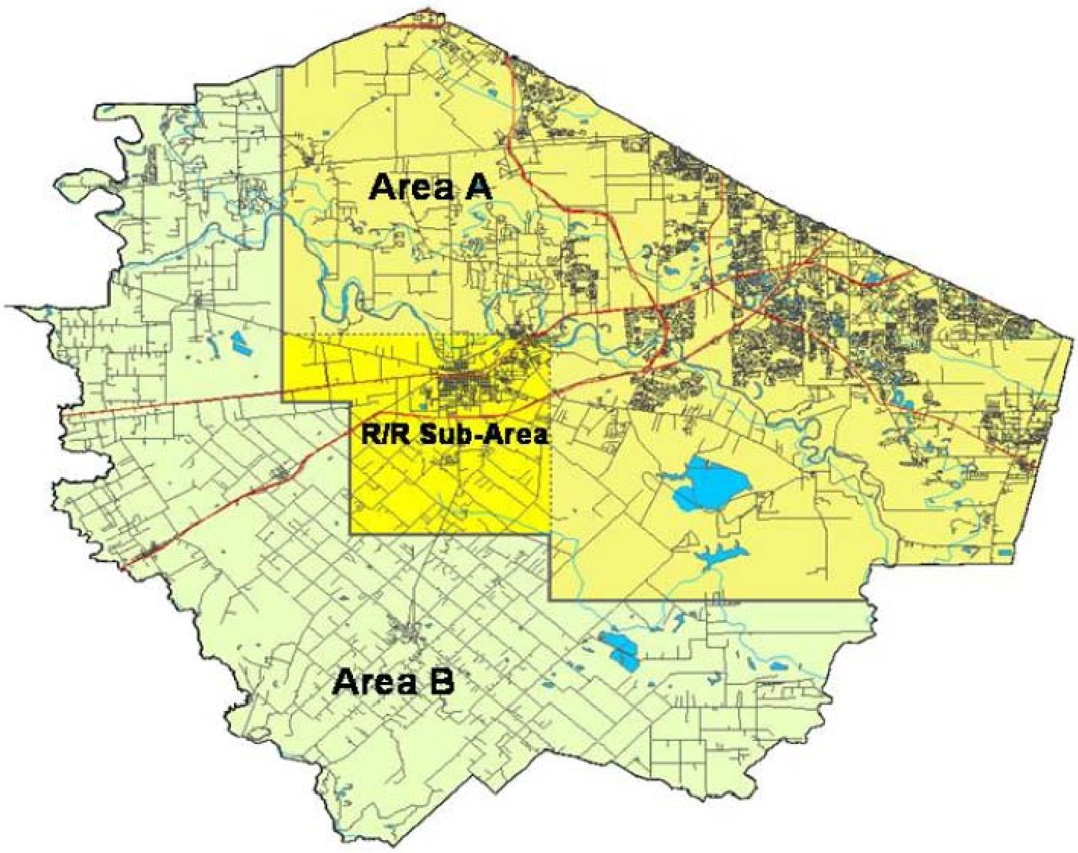
None

References:

Fort Bend Subsidence District 2003 Regulatory Plan, Fort Bend Subsidence District, September 24, 2003

Groundwater Reduction Plan, Fort Bend County W.C. & I.D. No. 2, February 2008

Figure 1
Fort Bend Subsidence District Regulatory Areas



REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Little River Off-Channel Reservoir

DATE: December 15, 2009

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Construction on an off-channel reservoir in Milam County in the Brazos Basin

SUPPLY QUANTITY: 27,225 acre-feet per year

SUPPLY SOURCE: Little River, Brazos Basin

IMPLEMENTATION DECADE: 2030 or 2040

TOTAL STRATEGY COST: $137,356,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $436

<u>Water Management Strategy Analysis Description</u>

Introduction:

The Little River Off-Channel Reservoir was studied by the Brazos G Water Planning Group, but not recommended as a water management strategy in the 2001 Brazos G Regional Water Plan. It is an off-channel reservoir located in Milam County near the City of Cameron. The 2001 Brazos G Water Planning Group analysis of this water management strategy was used in the Region H strategy selection process. The current Brazos G analysis is available in the 2011 Brazos G Regional Water Plan, Section 4B.13.5. 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 Operations.

Water User Group Application:

This strategy would provide supply to WUGs in the Lower Brazos River Basin, and the adjoining Coastal Basins.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: River Plantation MUD GRP

DATE: July 9, 2010

SUMMARY

STRATEGY DESCRIPTION: Additional conversion from existing groundwater supplies to expanded WWTP effluent water usage to irrigate the River Plantation Country Club golf course in order to meet required reductions in groundwater use.

SUPPLY QUANTITY: 168 ac-ft/yr (55 mgy current) – 368 ac-ft/yr (120 mgy)

SUPPLY SOURCE: River Plantation Waste Water Treatment Plan effluent

TOTAL STRATEGY COST: $484,926 capital cost ($221,379 in 2010 and $263,547 in 2020)

UNIT WATER COST: $495 average annual unit water cost

Water Management Strategy Analysis Description

Introduction:

The purpose of this analysis is to incorporate the River Plantation Municipal Utility District (MUD) GRP as a water management strategy in the expansion of water reuse supplies for irrigation. The River Plantation MUD GRP includes two participants: River Plantation MUD and the River Plantation Country Club (RPCC), which is entirely within the MUD. Note that RPCC is not a separate named WUG and hence its demands are included with River Plantation MUD.

Analysis:

Scientific studies conducted by the Lone Star Groundwater Conservation District (LSGCD) have shown that the demand for groundwater in many areas within Montgomery County is exceeding the sustainable yield of the aquifers, and is leading to alarming declines in water level throughout the county. Modeling of future population and water demand has shown that this continued reliance on groundwater would lead to significant problems for water suppliers within the county as well as continued water level decline in aquifers.

In an effort to meet a larger portion of the county’s water demand with surface water, allowing for the decrease in use and reliance on groundwater, the LSGCD adopted the District Regulatory Plan (DRP) “to create a regulatory framework for the District to responsibly regulate and conserve the use of groundwater in Montgomery County. The DRP requires Large Volume Groundwater Users (LVGU) to conduct long-term planning in order to assess their future water needs, and to describe how they will obtain alternative water supplies such that future demands can be met whilst adhering to groundwater reduction requirements adopted by the LSGCD. The DRP established an aquifer sustainable yield of 64,000 acre-feet per year, and requires groundwater use to be reduced to this annual volume by January of 2015.

The LVGUs are defined as entities that produce over 10 million gallons per year, but exclude single family residences and agricultural use of water. There are 204 LVGUs in Montgomery

County and include everything from large municipal systems to smaller public and private utilities, as well as individual industries, businesses, golf courses, and homeowner associations.

Water User Group Application:

The River Plantation MUD began conserving groundwater by using WWTP effluent for golf course irrigation needs in 1988. Water demand projections for the MUD show slight decline, due to near build-out conditions and plumbing code savings. The current GRP lays out the planned strategy for meeting the DRP's timeline for the mandated conversion to non-groundwater sources. The MUD is partnering with RPCC to supply them with an additional 200 acre-feet per year of WWTP effluent for irrigation needs. It is estimated that this expansion will be in place to provide additional reuse water beginning by 2020, allowing for the reduction in groundwater used. **Table 1** below presents the population and water demand projections for River Plantation MUD, as well as supplies from treated effluent to irrigation demand (shown as part of total WUG demand).

Table 1
River Plantation Population and Water Demand Projections

	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Population	3310	3310	3310	3310	3310	3310
Demand (Acre-Feet/Year)	835	824	812	801	798	798
Reuse Supply for golf course irrigation (Ac-Ft/Yr)	168	368	368	368	368	368

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Dow Off-Channel Reservoir and Pump Station Expansion

DATE: June 4, 2010

SUMMARY

STRATEGY DESCRIPTION: The Dow Chemical Company – Texas Operations is considering increasing the total raw water pumping and storage capacity available for use at their industrial plant 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 would firm up existing water rights held by Dow and would be used to meet manufacturing and municipal shortages in Brazoria County The supply quantity indicated is very conservative with respect to the impact on existing and future firm yield. The proposed reservoir is needed to improve reliability of existing firm yield and provide an additional firm yield supply quantity of 21,800 acre-feet/year.

SUPPLY QUANTITY: 21,800 acre-feet/year

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2020

TOTAL STRATEGY COST: $124,468,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $481 per acre-foot

Water Management Strategy Analysis Description

Introduction:

The current supply available from Dow's water rights is 137,475 acre-feet per year. 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 construction of a new, larger reservoir will increase reservoir storage by an additional 44,000 acre-feet to establish a 4- to 8-month supply, bridging the driest months of the critical drought and meet more of Dow's current raw water demand. A new raw water intake and pump station, with a pumping capacity of 201,000 gpm, will make efficient use of the additional storage capacity, and allow Dow to achieve a total reliable supply of 220 cubic feet per second (cfs), equivalent to an annual supply of 159,275 acre-feet per year. Construction of the project would therefore provide an additional 21,800 acre-feet per year of supply.

Analysis:

The new reservoir will have a water depth of 25 feet which will necessitate an embankment height of approximately 32 feet. A major underlying assumption of this conceptual-level study is that geologic conditions would be suitable for constructing an earthen embankment. For the new reservoir, a homogeneous embankment with a vertical chimney filter/drain was assumed for cost estimating purposes. The embankment crest would be 6 feet above the conservation storage level. The outlet works system and spillway would be located adjacent to each other and discharge into Oyster Creek.

Water User Group Application:

The supply developed by the project would be used to better meet projected manufacturing and municipal supply shortages in Brazoria County during drought conditions, based on current demand. Historical use from the Dow reservoir systems has been 80% for Dow's benefit and 20% for non-Dow benefit which includes municipal and other industrial. The municipal beneficiaries of Dow's reservoir systems is through Brazosport Water Authority (BWA) which supplies surface water needs for 7 member cities in southern Brazoria County.

Environmental Impact:

While the specific location of the reservoir expansion is not identified, the project would impact approximately 2,000 acres of land, which is likely 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 sites suggests that any impacts to listed species 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 is anticipated to include fishing and bird watching.

Issues and Considerations:

The development of a project of this nature will require the study and consideration of many issues. These will include, but are not necessarily limited to: TCEQ water rights permitting for additional off-channel storage capacity, U.S. Army Corps of Engineers 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, compliance with TCEQ dam safety regulations including reviews and construction approvals, revisions to FEMA floodplain mapping for the Oyster Creek and Brazos River floodplain, 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.

Table 1
Off-Channel Reservoir Expansion Cost Summary

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$78,490,000	$ 78,490,000
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$27,472,000	$ 27,472,000
3	LAND & EASEMENTS & SURVEYING	1	LS	$ 8,100,000	$ 8,100,000
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 2,000,000	$ 2,000,000
5	INTEREST DURING CONSTRUCTION	1	LS	$ 8,406,000	$ 8,406,000
	PROJECT COST				$ 124,468,000

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE (Off-Channel Reservoi	$ -	$ 6,753,000	$ 6,753,000	$ 6,753,000	$ 6,753,000	$ 6,753,000
2	DEBT SERVICE (Intake and Pump Static	$ -	$ 1,994,000	$ 1,994,000	$ 1,994,000	$ -	$ -
3	OPERATION & MAINTENANCE (O&M)	$ -	$ 1,340,000	$ 1,340,000	$ 1,340,000	$ 1,340,000	$ 1,340,000
4	PUMPING ENERGY COSTS	$ -	$ 397,000	$ 397,000	$ 397,000	$ 397,000	$ 397,000
5	PURCHASE OF WATER	$ -	$ -	$ -	$ -	$ -	$ -
	TOTAL ANNUAL COST	$ -	$ 10,484,000	$ 10,484,000	$ 10,484,000	$ 8,490,000	$ 8,490,000

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$16,287,000	$ 16,287,000
2a	PIPELINES	0	LS	$ -	$ -
2b	PIPELINE CROSSINGS	0	LS	$ -	$ -
3	WATER TREATMENT PLANTS	0	LS	$ -	$ -
4	WATER STORAGE TANKS	0	LS	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1	LS	$62,203,000	$ 62,203,000
6	WELL FIELDS	0	LS	$ -	$ -
7	DAMS & RESERVOIRS	1	LS	$ -	$ -
8	RELOCATIONS	0	LS	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0	LS	$ -	$ -
10	STILLING BASINS	0	LS	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS	0	LS	$ -	$ -
12	OTHER ITEMS	0	LS	$ -	$ -
	PROJECT COST				$ 78,490,000

Table 1 (cont'd)
Off-Channel Reservoir Expansion Cost Summary

ALL FACILITIES

OPERATIONS & MAINTENANCE (O&M) COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	2.5%	%	$16,287,000	$ 407,000
2a	PIPELINES	1.0%	%	$ -	$ -
2b	PIPELINE CROSSINGS	1.0%	%	$ -	$ -
3	WATER TREATMENT PLANTS	1	LS	$ -	$ -
4	WATER STORAGE TANKS	1.0%	%	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1.5%	%	$62,203,000	$ 933,000
6	WELL FIELDS	1.0%	%	$ -	$ -
7	DAMS & RESERVOIRS	2.5%	%	$ -	$ -
8	RELOCATIONS	1.0%	%	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	1.0%	%	$ -	$ -
10	STILLING BASINS	1.0%	%	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS (see previous	1	LS	$ -	$ -
12	OTHER ITEMS	1.0%	%	$ -	$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 1,340,000**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Fort Bend County Off-Channel Reservoir

DATE: July 15, 2010

SUMMARY

STRATEGY DESCRIPTION: Construction of an off-channel reservoir in Fort Bend County to divert and hold currently unappropriated flows from the Brazos River. Water would be available to meet demands in Fort Bend County.

SUPPLY QUANTITY: 46,000 acre-feet

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2050

TOTAL CAPITAL COST: $202,514,788

ANNUAL UNIT WATER COST: $1,893 per acre-foot for allocated volume 2050-2060, true cost $947 per acre-foot of firm yield.

Water Management Strategy Analysis Description

Introduction:

There is currently a portion of the flow in the lower Brazos River basin that is not appropriated by existing permits. This water could be used to meet projected needs in the lower basin. However, storage would be required in order to increase the firm yield of these flows. A portion of demands in the lower Brazos River basin could be met using one or more smaller off-channel reservoirs (OCRs). A preliminary analysis was carried out for a potential OCR project in Fort Bend County. Initial results suggest that an 70,000 af-ft OCR with a 200 MGD pump station could create a 46,000 ac-ft/yr firm yield.

Analysis:

The Fort Bend County OCR was analyzed using the Water Rights Analysis Package (WRAP) to determine the potential increase in firm yield. The reservoir was assumed to be a large square ring-dike structure with a storage depth of approximately 25 feet and 1:6 sideslope. The resultant project area is estimated as slightly above 3,000 acres. Monthly diversions from the stream were limited to reflect the capacity of a 200 MGD pump station. An additional environmental flow limitation was applied to modeled monthly diversions to represent Consensus Criteria for Environmental Flow Needs (CCEFN). Diversions from the channel to the OCR were only permitted when the flows below the diversion location met the CCEFN target for that month. CCEFN targets were calculated from measured flows at the USGS gauge near Richmond. Model outputs indicated a firm yield of 46,000 acre-feet per year. Costs were developed assuming the reservoir as described with an additional small on-channel weir. Costs are shown in greater detail in Table 1.

Water User Group Application:

The water from the Fort Bend County OCR would be expected to serve demands (primarily municipal and industrial) in Fort Bend County.

Environmental Impact:

As no project site assessment has been performed to date, no location-specific environmental assessment is available. The initial proposed reservoir configuration would impact approximately 3,000 acres.

Issues and Considerations:

No location-specific issues have been identified at this time. The estimated unit cost of water for this WMS is above the cost level that could be supported by an agricultural customer base; industrial and municipal users are the most likely customers for this project as they can support the unit cost and are projected to have needs during the planning period.

Table 1
Fort Bend County Off-Channel Reservoir Cost

Summary Sheet

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 92,129,338	$ 92,129,338
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$ 32,245,268	$ 32,245,268
3	LAND & EASEMENTS	1	LS	$ 31,193,430	$ 31,193,430
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 24,974,700	$ 24,974,700
5	INTEREST DURING CONSTRUCTION	1	LS	$ 21,972,051	$ 21,972,051
	PROJECT COST				**$ 202,514,788**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ -	$ -	$ -	$ -	$ 13,459,444	$ 13,459,444
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ -	$ -	$ 2,096,820	$ 2,096,820
3	PUMPING ENERGY COSTS	$ -	$ -	$ -	$ -	$ 28,010,422	$ 28,010,422
4	PURCHASE OF WATER						
	TOTAL ANNUAL COST	**$ -**	**$ -**	**$ -**	**$ -**	**$ 43,566,686**	**$ 43,566,686**

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$ 20,641,358	$ 20,641,358
2a	PIPELINES	0	LS	$ -	$ -
2b	PIPELINE CROSSINGS	0	LS	$ -	$ -
3	WATER TREATMENT PLANTS	0	LS	$ -	$ -
4	WATER STORAGE TANKS	0	LS	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1	LS	$ 71,386,000	$ 71,386,000
6	WELL FIELDS	0	LS	$ -	$ -
7	DAMS & RESERVOIRS	1	LS	$ 101,980.00	$ 101,980
8	RELOCATIONS	0	LS	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0	LS	$ -	$ -
10	STILLING BASINS	0	LS	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS	0	LS	$ -	$ -
12	OTHER ITEMS	0	LS	$ -	$ -
	PROJECT COST				**$ 92,129,338**

Table 1
Fort Bend County Off-Channel Reservoir Cost (continued)

ALL FACILITIES
OPERATIONS & MAINTENANCE (O&M) COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	0.015	%	$ 20,641,358	$ 309,620
2a	PIPELINES	0.010	%	$ -	$ -
2b	PIPELINE CROSSINGS	0.010	%	$ -	$ -
3	WATER TREATMENT PLANTS (see page before previ	1	LS	$ -	$ -
4	WATER STORAGE TANKS	0.010	%	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	0.025	%	$ 71,386,000	$ 1,784,650
6	WELL FIELDS	0.010	%	$ -	$ -
7	DAMS & RESERVOIRS	0.025	%	$ 101,980	$ 2,550
8	RELOCATIONS	0.010	%	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0.010	%	$ -	$ -
10	STILLING BASINS	0.010	%	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS (see previous	1	LS	$ -	$ -
12	OTHER ITEMS	0.010	%	$ -	$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 2,096,820**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Brazoria County Off-Channel Reservoir

DATE: July 15, 2010

SUMMARY

STRATEGY DESCRIPTION: Construction of an off-channel reservoir in Brazoria County to divert and hold currently unappropriated flows from the Brazos River. Water would be available to meet demands in Brazoria County.

SUPPLY QUANTITY: 24,000 acre-feet

SUPPLY SOURCE: Brazos River

IMPLEMENTATION DECADE: 2060

TOTAL CAPITAL COST: $173,898,600 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $1,206 per acre-foot allocated in 2060

Water Management Strategy Analysis Description

Introduction:

There is currently a portion of the flow in the lower Brazos River basin that is not appropriated by existing permits. This water could be used to meet projected needs in the lower basin. However, storage would be required in order to increase the firm yield of these flows. A portion of demands in the lower Brazos River basin could be met using one or more smaller off-channel reservoirs (OCRs). A preliminary analysis was carried out for a potential OCR project in Brazoria County. Initial results suggest that a 60,000 ac-ft OCR with a 100 MGD pump station could create a 24,000 ac-ft/yr firm yield.

Analysis:

The Brazoria County OCR was analyzed using the Water Rights Analysis Package (WRAP) to determine the potential increase in firm yield. Because the Brazoria OCR would likely not be required until 2060, models were carried out with a Fort Bend County OCR already in place. The reservoir was assumed to be a large square ring-dike structure with a storage depth of approximately 20 feet and 1:6 sideslope. The resultant project area is estimated as 3,200 acres. Monthly diversions from the stream were limited to reflect the capacity of a 100 MGD pump station. An additional environmental flow limitation was applied to modeled monthly diversions to represent Consensus Criteria for Environmental Flow Needs (CCEFN). Diversions from the channel to the OCR were only permitted when the flows below the diversion location met the CCEFN target for that month. CCEFN targets were calculated from measured flows at the USGS gauge near Rosharon. Model outputs indicated a firm yield of 24,000 acre-feet per year. Costs were developed assuming the reservoir as described with an additional small on-channel weir. Costs are shown in greater detail in Table 1.

Water User Group Application:

The water from the Brazoria County OCR would be expected to serve demands (primarily municipal and industrial) in Brazoria County.

Environmental Impact:

As no project site assessment has been performed to date, no location-specific environmental assessment is available. The initial proposed reservoir configuration would impact approximately 3,200 acres.

Issues and Considerations:

No location-specific issues have been identified at this time. The estimated unit cost of water for this WMS is above the cost level that could be supported by an agricultural customer base; industrial and municipal users are the most likely customers for this project as they can support the unit cost and are projected to have needs during the planning period.

Table 1
Brazoria County Off-Channel Reservoir Cost

Summary Sheet

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PROJECT COST SUMMARY					
1	CONSTRUCTION (CAPITAL) COST	1	LS	$ 71,895,092	$ 71,895,092
2	ENGINEERING, FINANCIAL & LEGAL SERVICES, AND CONTINGENCIES	1	LS	$ 25,163,282	$ 25,163,282
3	LAND & EASEMENTS	1	LS	$ 31,412,919	$ 31,412,919
4	ENVIRONMENTAL - STUDIES & MITIGATION	1	LS	$ 26,560,000	$ 26,560,000
5	INTEREST DURING CONSTRUCTION	1	LS	$ 18,867,308	$ 18,867,308
	PROJECT COST				**$ 173,898,602**

ITEM	DESCRIPTION	ANNUAL TOTAL					
ANNUAL COST SUMMARY		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	DEBT SERVICE	$ -	$ -	$ -	$ -	$ -	$ 11,557,568
2	OPERATION & MAINTENANCE (O&M)	$ -	$ -	$ -	$ -	$ -	$ 1,691,326
3	PUMPING ENERGY COSTS	$ -	$ -	$ -	$ -	$ -	$ 15,702,812
4	PURCHASE OF WATER						
	TOTAL ANNUAL COST	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 28,951,707**

ALL FACILITIES
CONSTRUCTION COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COST SUMMARY					
1	PUMP STATIONS	1	LS	$ 10,605,112	$ 10,605,112
2a	PIPELINES	0	LS	$ -	$ -
2b	PIPELINE CROSSINGS	0	LS	$ -	$ -
3	WATER TREATMENT PLANTS	0	LS	$ -	$ -
4	WATER STORAGE TANKS	0	LS	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	1	LS	$ 61,188,000	$ 61,188,000
6	WELL FIELDS	0	LS	$ -	$ -
7	DAMS & RESERVOIRS	1	LS	$ 101,980	$ 101,980
8	RELOCATIONS	0	LS	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0	LS	$ -	$ -
10	STILLING BASINS	0	LS	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS	0	LS	$ -	$ -
12	OTHER ITEMS	0	LS	$ -	$ -
	PROJECT COST				**$ 71,895,092**

Table 1
Brazoria County Off-Channel Reservoir Cost (continued)

ALL FACILITIES

OPERATIONS & MAINTENANCE (O&M) COSTS

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
OPERATION & MAINTENANCE (O&M) COST SUMMARY					
1	PUMP STATIONS	0.015	%	$ 10,605,112	$ 159,077
2a	PIPELINES	0.010	%	$ -	$ -
2b	PIPELINE CROSSINGS	0.010	%	$ -	$ -
3	WATER TREATMENT PLANTS (see page before previ	1	LS	$ -	$ -
4	WATER STORAGE TANKS	0.010	%	$ -	$ -
5	OFF-CHANNEL RESERVOIRS	0.025	%	$ 61,188,000	$ 1,529,700
6	WELL FIELDS	0.010	%	$ -	$ -
7	DAMS & RESERVOIRS	0.025	%	$ 101,980	$ 2,550
8	RELOCATIONS	0.010	%	$ -	$ -
9	WATER DISTRIBUTION SYSTEM IMPROVEMENTS	0.010	%	$ -	$ -
10	STILLING BASINS	0.010	%	$ -	$ -
11	WASTEWATER RECLAMATION PLANTS (see previous	1	LS	$ -	$ -
12	OTHER ITEMS	0.010	%	$ -	$ -
	ANNUAL OPERATION & MAINTENANCE COST				**$ 1,691,326**

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Lake Livingston Water Supply & Sewer Service Company (LLWSSSC) Surface Water Project

DATE: July 22, 2010

<u>SUMMARY</u>

STRATEGY DESCRIPTION: Construction of water treatment plant facilities to treat raw surface water

SUPPLY QUANTITY: 954 acre-feet

SUPPLY SOURCE: Lake Livingston

IMPLEMENTATION DECADE: 2010

TOTAL CAPITAL COST: $3,088,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $373 per acre-foot

<u>Water Management Strategy Analysis Description</u>

Introduction:

LLWSSSC has contracted with the Trinity River Authority for raw water supplies through 2040. This water would be treated at two surface water treatment plates, the "East WTP" with a capacity of 1.5 million gallons per day (MGD), and the "North WTP" with a projected capacity of 1.25 MGD.

Analysis:

Anticipated treatment plant configuration for both plants is a conventional, rectangular package plant with an external concrete basin. Disinfection would likely include chlorine dioxide for pre-disinfection and chloramines or chlorine for post-disinfection. Raw water intake would be via either a traditional sump with submersible water pumps or utilize a floating intake structure. Treated water would be stored in a ground storage tank.

Water User Group Application:

Water treated by the SWPs would be expected to serve demands for LLWSSSC.

Environmental Impact:

As no project site assessment has been performed to date, no location-specific environmental assessment is available. There would be considerations based on the type and disposal location of waste residuals from treatment.

Issues and Considerations:

No location-specific issues have been identified at this time.

REGION H WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM

STRATEGY TITLE: Sealy Groundwater Treatment Expansion

DATE: July 2, 2010

SUMMARY

STRATEGY DESCRIPTION: Expansion of existing groundwater well capacity

SUPPLY QUANTITY: 360 acre-feet in 2011, 888 acre-feet in 2060

SUPPLY SOURCE: Expanded Use of the Gulf Coast Aquifer

IMPLEMENTATION DECADE: 2010

TOTAL CAPITAL COST: $6,450,000 (Costs rounded to nearest $100)

ANNUAL UNIT WATER COST: $966 per acre-foot

Water Management Strategy Analysis Description

Introduction:

Sealy, Texas is the largest city in Austin County, located approximately 50 miles west of Houston at the crossroads of Interstate 10 and Hwy. 36. Sealy has several manufacturing and industrial facilities which produce and distribute corrugated boxes, military vehicles, flanges, bricks and concrete products. Currently, the City of Sealy has a maximum daily groundwater supply of 3.3 MGD, or approximately 3,600 acre-feet per year. Additional groundwater supply will need to be developed to meet projected future population and economic growth in the area.

Table 1
Major Area Employers

Employer
BAE Systems
Walmart Distribution Center
Sealy ISD
Walmart Super Center
International Paper Co.
ACME Brick Company
Gulf States Toyota
Rinker Materials
Waterbrook Community Association

Analysis:

With the increased migration of population to the west of Houston, and the increased interest in the available property in the Sealy and the southern Austin county region for residential (high density development), commercial and industrial developments, Sealy is projected to have future population growth and water demands that will exceed current supplies. The existing infrastructure will not be adequate to provide anticipated water needs beginning in the year 2011.

Water User Group Application:

Currently, the City of Sealy is projected significant population and economic growth in two specific areas in the City. In the southwest part of the existing service area, single family residential development and commercial sites are anticipated to begin development. The future development in this area will require a new groundwater plant to meet projected water demands. The new groundwater plant will consist of a water well, groundwater storage tanks, booster pumps and controls. The new plant is projected to cost approximately $2,500,000. Development to the north of the city's service area is expected to require a new water plant due to the elevation difference between the new development and the existing system. The new groundwater plant would also consist of a new groundwater well, ground storage facilities, booster pumps, and a control building. The new plant is projected to cost approximately $3,250,000. Engineering fees for both projects are anticipated to be approximately $700,000. The total cost of the new groundwater plants is anticipated to be $6,450,000.

Environmental Impact:

As no project site assessment has been performed to date, no location-specific environmental assessment is available. There would be considerations based on the type and disposal location of waste residuals from treatment.

Issues and Considerations:

No location-specific issues have been identified at this time.

Appendix 4C

Cost Estimating Procedures

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Contents

List of Tables

Section 1 - Cost Estimating Procedures (TWDB Region H)

The cost estimates of this study are expressed as one of three main categories that were dictated by TWDB guidelines: capital costs, other project costs, and annual project costs. Capital costs consist of all material, labor, and equipment expenses that are expended in the construction activities of a project. Other project costs include expenses that are not directly associated with the construction activities, such as engineering, land and easement acquisition, environmental studies, mitigation, and construction interest. Annual project costs consist of all costs that are incurred by the project upon implementation, either in repayment of borrowed funds or operating and maintaining the facility. *Table 4C-1* illustrates the primary components of the preliminary cost estimate. Cost estimating methods for the technical evaluation of alternatives considered for use in TWDB Region H are explained in the following sections.

Table 4C-1

Major Estimating Categories

CAPITAL COSTS	
1.	**Pump Stations**
2.	**Pipelines**
3.	**Water Treatment Plants**
4.	**Water Storage Tanks**
-	Ground Level
-	Elevated
5.	**Off-Channel Reservoirs**
6.	**Well Fields**
-	Injection
-	Recovery
-	ASR Wells
7.	**Dams & Reservoirs**
8.	**Relocations**
9.	**Water Distribution System Improvements**
10.	**Other Items**

OTHER PROJECT COSTS	
1.	**Engineering, Financial & Legal Services, and Contingencies**
-	Includes Design, Bidding & Construction Phase Services, Geotechnical, and Surveying
2.	**Land and Easements**
-	Land Purchases
-	Temporary Easements
-	Permanent Easements
-	Includes Legal Services, Sales Commissions, & Surveying
3.	**Environmental - Studies and Mitigation**
-	Environmental & Archaeology Studies
-	Permitting
-	Mitigation
4.	**Interest During Construction**

ANNUAL COSTS	
1.	**Debt Service**
2.	**Operation & Maintenance (O&M)**
3.	**Pumping Energy Costs**
4.	**Purchase of Water (if applicable)**

Section 2 – Capital Costs

Capital costs, generally known as construction costs, have been compiled from a variety of reliable sources and analyzed for trends that can be used for estimating purposes. Once a trend has been identified, a set of representative values is entered into a cost table, from which the user can easily and efficiently locate a cost estimate. Each cost table is explained in detail in the following sections.

The original construction cost data was based on values as of the second quarter 2002. All construction cost data was updated and adjusted to September 2008, as required by TWDB (Exhibit C), by using the Engineering News Record's Construction Cost Index (ENR CCI) ratio. The ENR CCI value for the Second Quarter of 2002 was 6508 determined by averaging the index values for April, May, and June of 2002 (6480, 6512, 6532 respectively). The ENR CCI value for September 2008 was 8557.

For example, to update a representative cost from June of 2002 (ENR CCI value 6532), to September 2008, the cost from June of 2002 would be multiplied by the ratio of 8557 over 6532. The ENR CCI values are based on representative steel, cement, and lumber material and labor construction costs, averaged across 20 cities. The index measures the amount of money it would cost to purchase a theoretical quantity of construction material and labor in one year, as opposed to another. Monthly index values are available from 1990 to the present, and annual average values are reported back to 1908, but the base year is 1913 with an arbitrary index value of 100.

2.1 Pump Stations

The cost of a pump station depends upon a wide variety of conditions, including pump discharge, pumping head, pump type, site conditions, desired usage, and structural design. In constructing a preliminary estimate of the cost of a pump station, the intent is not to determine the pump type or details of the station structural design, but rather to estimate the cost of a general station capable of pumping the desired discharge at the necessary head conditions. Regional pump station project cost estimates and construction records were used to adjust published EPA historical pump station cost data. By using a comprehensive and reliable source of pump station cost data, recognizing the trend, and then adjusting that trend to similar projects in the region, a representative set of values for this region was determined. The cost table for this section, shown in *Table 4C-2*, displays the costs for pump stations at a variety of horsepower requirements, based on peak discharge and design head. Higher horsepower requirements may require multiple pump stations.

Pump stations are generally classified as transmission or intake type structures, depending on the source of the water coming into the station. Intake stations normally pump water from a raw water source, such as a river or reservoir, and therefore require an intake structure to insure that proper flow conditions into the station are permitted. Transmission stations normally act as boosters in a plant or pipeline and do not require intake structures since the inlet pipe flow conditions are fairly constant. The total cost for the intake of a pump station has been estimated as an additional 20 percent of the pump station construction cost. While 10 percent is structural additions, the other 10 percent is trash rack screens and miscellaneous rack cleaning equipment.

Table 4C-2

Pump Station Costs

Pump Station Horsepower (HP)	Pump Station Construction Cost ($)
0	0
700	8,790,000
1000	10,812,000
2000	14,739,000
3000	17,037,000
4000	18,668,000
5000	19,932,000
6000	20,964,000
7000	21,838,000
8000	22,595,000
9000	23,262,000
10000	23,859,000
12000	24,893,000
15000	26,157,000
20000	27,787,000

[1] Values as of September 2008.
[2] Add 20 percent for pumps stations with intake structures.
[3] Add 35 percent for pumps stations with standby power.

All electrical costs, with the exception of standby power, are included in the base pump station construction cost. Standby power, normally either a diesel generator or a dual power feed, is necessary to insure that the pump station can remain operational in the event of a power failure. Standby power is an optional feature which has been estimated as an additional 35 percent of the base pump station construction cost.

The costs of pump stations located in water treatment plants are accounted for in the water treatment plant cost table.

2.2 Pipelines

Pipeline capital costs are dependent upon a variety of factors, including pipe material used, trenching slopes and depths, fill material quality, frequency of valves/fittings, number of obstruction crossings, necessity of pavement removal and replacement, utility interference, traffic control, geologic conditions, and degree of urbanization. Due to the lack of significant quantities of rock in the primarily sandy clay soil of the region, only one soil type was analyzed. *Table 4C-3* shows the unit costs for pipe diameters from 6-inches to 144-inches for rural and urban construction.

Table 4C-3

Pipeline Unit Costs

Pipe Diameter (inches)	Rural Construction ($ / LF)	Urban Construction ($ / LF)
6	65	120
8	70	125
10	80	130
12	80	130
14	90	155
16	110	185
18	125	210
20	145	235
24	175	295
27	205	340
30	235	395
33	260	430
36	290	485
42	345	570
48	405	675
54	470	785
60	535	895
64	585	970
66	610	1010
72	690	1140
78	740	1240
84	810	1350
90	880	1465
96	955	1590
102	1030	1710
108	1100	1835
114	1180	1960
120	1250	2090
144	1565	2605

[1] Values as of September 2008.

The previous unit costs are based on open cut construction method with no special crossings. Special crossings at railroads, streets, and rivers will likely be accomplished by horizontal boring, also known as pipe jacking. Horizontal boring costs are shown in *Table 4C-4*.

Table 4C-4

Pipeline Crossing Unit Costs

Pipe Diameter (inches)	Total Cost ($ / inch dia. / LF)
6	800
8	820
10	860
12	850
14	900
16	960
18	1050
20	1030
24	1200
27	1260
30	1330
33	1410
36	1480
42	1660
48	1830
54	2020
60	2220
66	2340
72	2450
78	2550
84	2640
90	2720
96	2800
102	2880
108	2940
114	2740

[1] Values as of September 2008.
[2] Costs based on Horizontal Boring (Jacking).

2.3 Water Treatment Plants

Water treatment plant capital costs are shown in *Table 4C-5* for three alternative treatment methods; Groundwater Chlorination, Direct Filtration, and Conventional Filtration. Groundwater Chlorination process is used almost exclusively on groundwater sources while the other two processes use filtration, mostly for surface water sources. In general, the quality of the source water normally dictates which process is used.

Groundwater is commonly treated by chlorination only because the process is relatively inexpensive compared to filtration, and the treatment equipment is small enough that each groundwater well can normally have its own. The most common of the surface water treatment methods is conventional filtration treatment. When influent suspended solids concentrations are sufficiently low that they are completely removed by filtration and result in a reasonable backwash cycle on the filtration units, direct filtration can be used. The direct filtration plant is essentially the same as the conventional filtration plant except that the sedimentation process is deleted.

Table 4C-5

Water Treatment Plant Costs

Plant Capacity (MGD)	Groundwater Chlorination Plant Cost ($)	Direct Filtration Plant Cost ($)	Conventional Filtration Plant Cost ($)
1	528,000	3,778,000	4,902,000
10	3,077,000	22,853,000	28,565,000
50	9,917,000	73,669,000	92,085,000
75	14,875,000	110,501,000	138,126,000
100	19,834,000	147,334,000	184,168,000
150	29,750,000	221,002,000	276,253,000
200	39,667,000	294,669,000	368,336,000

[1] Values as of September 2008.

As can be seen in *Table 4C-6*, the choice of treatment methods is dictated by both the quality of the influent water source and the intended destination of the treated water. Surface waters treated by direct filtration and wastewater reclamation are not intended for conveyance to a public water distribution system. The reason for this is that surface water and wastewater effluent normally have high suspended solids content, and the treatment processes cannot remove enough of the suspended solids to produce the water quality necessary for public water supplies.

Table 4C-6

Water Treatment Method Descriptions

Water Treatment Method	Source			Destination	
	Groundwater	Surface Water	Wastewater	Aquifer or Non-Potable Use	Public Water System Distribution
Groundwater Chlorination	●			●	●
Direct Filtration	●			●	●
Direct Filtration		●		●	
Conventional (Filtration)		●		●	●
Wastewater Reclamation			●	●	

2.4 Storage Tanks

Storage tanks are used in a variety of different water supply systems including pump stations, distribution systems, and pipelines. Several factors influence the cost of storage tanks including frequency of use, capacity, type of construction material, location, architectural treatment, and corrosion resistance. Steel tanks are normally constructed in elevated or ground-level locations, while prestressed concrete tanks are normally constructed at or below grade. Concrete does not require cathodic protection or any type of protective exterior coating. Below grade tanks require no architectural treatment but have higher excavation and backfill costs. The costs of storage tanks that are shown in *Table 4C-7* are based on ground-level prestressed concrete construction for a range of capacities. The costs of elevated storage tanks that are shown in *Table 4C-8* are based on elevated steel construction for a range of capacities.

Table 4C-7

Ground Level Water Storage Tank Costs

Storage Capacity (MG)	Cost ($)
0.01	224,000
0.05	265,000
0.10	347,000
0.5	686,000
1.0	1,023,000
2.0	1,526,000
4.0	2,296,000
6.0	3,071,000
7.5	3,711,000
9.0	4,225,000
10.0	4,555,000
15.0	6,494,000

[1] Values as of September 2008.
[2] Costs based on ground level prestressed concrete construction.

Table 4C-8

Elevated Water Storage Tank Costs

Storage Capacity (MG)	Cost ($)
0.01	$359,000
0.10	$405,000
0.25	$576,000
0.50	$933,000
0.75	$1,282,000
1.00	$1,641,000

[1] Values as of September 2008.
[2] Costs based on elevated steel construction.

2.5 Off-Channel Reservoirs

An off-channel reservoir is a reservoir that receives minimal or no natural inflow. Two methods are normally employed in the construction of off-channel reservoirs. A dam can be constructed along a minor tributary or a ring dike can be constructed. Since little or no natural inflow reaches the reservoir, water is normally supplied by pumping from a nearby river or other location. The cost of the off-channel reservoir is highly dependent on the height of the levees that are constructed and the area of land that is available for use. Land costs will be considerably higher for a shorter ring dike with a much larger circumference that can still hold the same capacity as a taller ring dike with a smaller circumference. *Table 4C-9* shows the cost of off-channel reservoirs for a range of capacities.

Table 4C-9

Off-Channel Reservoir Costs

Storage Volume (ac-ft)	Ring Dike Cost ($)
500	1,368,000
1,000	1,974,000
2,500	3,278,000
5,000	6,503,000
7,500	8,122,000
10,000	9,540,000
12,500	10,827,000
15,000	15,284,000
17,500	16,621,000
20,000	22,282,000
22,500	23,435,000
25,000	25,083,000

[1] Values as of September 2008.
[2] Values are based on ring dike construction.
[3] Values also used for cost of dams on minor tributaries.

2.6 Well Fields

The cost for public supply wells are shown in *Table 4C-10* and are generalized estimates by LBG-Guyton Associates. The cost estimates include the well drilling and construction, permanent pump equipment, electric motor and discharge head. If engineering and design, construction management and inspection, discharge piping and electrical equipment are to be included, then add 25 to 35 percent to the estimates in *Table 4C-10*. The well cost estimates do not include the capital costs or other water facilities or equipment listed in this Section.

Table 4C-10

Public Supply Well Costs

Well Depth (feet)	Well Capacity (gpm)				
	200	400	700	1,000	1,500
Static Water Level Less than 200 Feet Below Land Surface					
300	$270,000	$350,000	$410,000	-	-
500	$310,000	$390,000	$460,000	$650,000	-
700	$340,000	$410,000	$510,000	$700,000	$770,000
1,000	$400,000	$485,000	$580,000	$770,000	$840,000
1,500	$460,000	$500,000	$650,000	$850,000	$925,000
Static Water Level Between 200 and 300 Feet Below Land Surface					
500	-	-	-	-	-
700	$340,000	$460,000	$550,000	$720,000	$780,000
1,000	$420,000	$540,000	$630,000	$800,000	$870,000
1,500	$480,000	$560,000	$700,000	$875,000	$950,000
Static Water Level Between 300 and 400 Feet Below Land Surface					
500	-	-	-	-	-
700	$370,000	$510,000	$630,000	$800,000	$850,000
1,000	$440,000	$580,000	$700,000	$870,000	$920,000
1,500	$500,000	$600,000	$800,000	$950,000	$1,000,000
Static Water Level Between 400 and 500 Feet Below Land Surface					
1,000	$450,000	$590,000	$710,000	$880,000	-
1,500	$520,000	$640,000	$840,000	$1,000,000	-

[1] Cost estimates as of September 2008.

[2] Costs based on underreamed, gravel-packed wells with steel casing and stainless steel screens, pump discharge head and electric motor.

[3] Costs estimated by LBG-Guyton Associates.
[4] Irrigation well costs assumed to be 50% to 60% of public water supply well cost estimates.

2.7 Dams and Reservoirs

Dam and reservoir construction costs were estimated on an individual case basis due to the unique nature of each project. Most dams and reservoirs that are currently under consideration have been studied in detail in the past and the previous cost estimates normally include both construction cost and other project costs. In most cases, the cost estimates from these previous studies were used, after adjusting the costs with the ENR CCI to September 2008.

2.8 Relocations

In some cases, projects required the use of lands that contain existing facilities or improvements. While relocation of existing utilities, roads, homes, businesses, and other facilities is oftentimes an option, outright purchase cost of the land must be allowed for in cases where it is not deemed acceptable to relocate. Relocation cost estimates are addressed on an individual project basis due to the variation in the cost of the land and facilities which require relocation.

2.9 Water Distribution System Improvements

A water distribution system is used to distribute water throughout the service area by means of pump stations, piping, valves, storage tanks, and a variety of other equipment and facilities. When a city or entity requires additional water, improvements to the water distribution system are normally necessary. The cost of the water distribution system improvements varies considerably based on the extent of the existing and proposed facilities and the wide variety of facilities that make up a water distribution system. Costs are estimated on an individual basis using previous proposed water distribution facility studies and cost estimates.

2.10 Stilling Basins

Stilling basins are normally used in water distribution systems to decrease the water flow velocity and allow sediments to settle out prior to discharging into a canal, reservoir, or other body of water. Stilling basin costs are estimated based on a target detention time of two hours and includes all excavation and hauling costs necessary to construct the basin. Optional mechanical sedimentation basin dredging equipment is not included. Stilling basin construction costs, when applicable, are estimated as $2,800 per cfs of discharge.

2.11 Wastewater Reclamation Plants

Wastewater effluent can be treated and reclaimed for aquifer injection or non-potable use. The reverse osmosis membrane treatment method, including denitrification, was used to estimate the wastewater reclamation plant costs that are shown in *Table 4C-11*. Reclaimed wastewater should not be sent directly to a public water distribution system.

Table 4C-11

Wastewater Reclamation Plant Costs

Plant Capacity (MGD)	**Wastewater Reclamation Plant Cost ($)**
1	7,121,400
10	35,692,600
50	72,651,800
75	108,977,800
100	145,303,800
150	217,955,600
200	290,607,600

[1] Values as of September 2008

[2] Based on Reverse Osmosis Membrane process, with Denitrification, from Trans-Texas Water Program, Southeast Area, Technical Memorandum entitled "Wastewater Reclamation", March 19, 1998.

Section 3 - Other Project Costs

3.1 Engineering, Financial and Legal Services, and Contingencies

Engineering, financial, legal services, and contingencies are estimated as a lump sum, according to TWDB guidelines, as 30 percent of the total construction cost for pipelines and 35 percent of the total construction cost for all other types of projects.

3.2 Land and Easements

Land related costs for a project are typically one of two types: either cost of land permanently purchased for construction of a facility or easement costs. The amount and cost of land purchased for various types of projects is considered on an individual project basis taking into consideration similar project experience. Easement costs, on the other hand, can vary considerably in a single project based on the variety of site conditions that a pipeline may encounter along its path. Easements are generally acquired for pipeline projects and can normally be classified as temporary or permanent. Permanent easements are purchase of the land that the pipeline will remain in once it is completed including a wide enough buffer zone to allow maintenance access and to protect the pipeline from other parallel utilities. Temporary easements are “rented” during the construction phase to allow extra room for material and equipment staging as well as other construction related activities.

Land related costs include legal services, sales commissions, and surveying. Ten percent of the total land and easement costs is added to account for all legal services, sales commissions, and surveying associated with the land related purchases. Land costs can vary considerably throughout the region based on the degree of urbanization and other economic factors. County appraisal district records, previous project estimates, and other land value sources are used to estimate the land related costs.

3.3 Environmental and Archaeology Studies, Permitting, and Mitigation

Costs for environmental studies, archaeological studies, permitting, and mitigation are estimated on an individual project basis taking into consideration previous project estimates, the judgement of qualified professionals, and any other available information. In the case of reservoir projects, mitigation costs were generally equal to the land value of the acreage that would be inundated.

3.4 Interest During Construction

Interest during construction is calculated as the cost of the interest on the borrowed funds less the return on the unspent portion of the borrowed funds that are invested during construction. Interest during construction is calculated, according to TWDB guidelines, as the total interest accrued by a 6 percent annual interest rate on the total borrowed funds at the end of the construction phase less a 4 percent annual rate of return on investment of unspent funds. A standard construction period of 2 years is used to calculate interest.

Section 4 – Annual Costs

Annual costs are expenses which the owner of the project can expect once the project is completed. Each of these costs is described in detail in the following subsections.

4.1 Debt Service

Debt service is the total annual payment that is required to repay borrowed funds. Debt service was calculated according to TWDB Section 4.1.2 of Exhibit C, assuming an annual interest rate of 6 percent and a repayment period of 40 years for reservoir projects and 20 years for all other projects.

4.2 Operation and Maintenance

Operation and maintenance (O&M) costs include all labor and materials required to run the facility and keep it operational including periodic repair and/or replacement of facility equipment. In accordance with TWDB guidelines, O&M costs are calculated as 1.0 percent of the total estimated construction costs for pipelines, distribution facilities, tanks, and wells, 1.5 percent of the total estimated construction costs for dams and reservoirs, and 2.5 percent of the total estimated construction costs for intake structures and pump stations. Water treatment plant O &M cost estimates are shown in *Table 4C-12* below.

Table 4C-12

Operation and Maintenance Costs For Water Treatment Plants

Plant Capacity (MGD)	Groundwater Chlorination Plant Cost ($)	Direct Filtration Plant Cost ($)	Conventional (Filtration) Plant Cost ($)	Wastewater Reclamation Plant Cost ($)
0	**0**	**0**	**0**	**0**
1	63,000	221,000	276,000	300,000
10	369,000	2,214,000	2,764,000	3,000,000
50	1,190,000	11,057,000	13,821,000	15,000,000
75	1,785,000	16,585,000	20,724,000	22,493,000
100	2,380,000	22,100,000	28,700,000	29,999,000
150	3,570,000	33,156,000	41,449,000	44,986,000
200	4,760,000	44,200,000	55,256,000	59,985,000

[1] Values as of September 2008.

4.3 Pumping Energy Costs

Per TWDB guidelines, power costs are calculated on an annual basis using calculated horsepower input and a power purchase cost of $0.09 per KWh.

4.4 Purchase of Water

The purchase of water, if applicable to the management strategy being considered, is dependent on the source and type (raw or treated) of water being purchased. The cost is addressed on an individual project basis due to the wide variety of water types and sources.

Section 5 - Presentation of Cost Estimates

Each water management strategy is provided with a cost estimate that shows total construction costs, total project costs (the sum of construction costs and other project costs), and total annual project costs. The unit cost of each alternative per unit of water delivered (total project cost per acre-foot of water delivered) is also presented for further comparison. Each site specific alternative was presented in as much detail in the estimate as is necessary to accurately estimate the management strategy that is being considered. Detailed cost estimates are completed for each WWP in *Appendix 4C-1* and for each WUG in *Appendix 4C-2*. Where possible, WWP-level capital costs are developed from information provided by project sponsors; where sponsor data is not available, costs were developed using the methodology outlined in this appendix and include engineering, legal cost, and contingencies. WUG-level costs were developed using the methodology described in this appendix.

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Region H
Table 4C-1: WWP-Level Project Cost

WMS	Source Identifiers									Project Volume (ac-ft/yr)							Capital Costs ($)					
WMS	Source Name	Source RWPG	Source Basin	Source County	Source ID	Source Basin ID	ID + Basin	Sponsor / Purchaser WWP	WWP ID	2010	2020	2030	2040	2050	2060	Peak Value	2010	2020	2030	2040	2050	2060
Contractual Strategies																						
BRA to Brazosport Water Authority Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	BRAZOSPORT WATER AUTHORITY	2000	0	116	124	1,557	3,183	5,435	5,435	$0	$0	$0	$0	$0	$0
BRA to GCWA Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	GULF COAST WATER AUTHORITY	325	0	12,165	27,627	31,782	37,777	42,624	42,624	$0	$0	$0	$0	$0	$0
BRA to GCWA Contract - Brazos Main Stem System	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	GULF COAST WATER AUTHORITY	325	0	4,324	4,324	4,324	4,324	4,324	4,324	$0	$0	$0	$0	$0	$0
BRA to GCWA Contract - Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	GULF COAST WATER AUTHORITY	325	0	0	0	0	0	4,517	4,517	$0	$0	$0	$0	$0	$0
BRA to GCWA Contract - SysOps Supply	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	GULF COAST WATER AUTHORITY	325	0	1,290	8,057	14,099	14,099	14,099	14,099	$0	$0	$0	$0	$0	$0
BRA to NRG Contract - Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	NRG	398300	0	0	0	0	0	8,500	8,500	$0	$0	$0	$0	$0	$0
BRA to Richmond-Rosenberg Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	RICHMOND-ROSENBERG	999905	0	0	0	1,091	2,970	1,848	2,970	$0	$0	$0	$0	$0	$0
BRA to Richmond-Rosenberg Contract - Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	RICHMOND-ROSENBERG	999905	0	0	0	0	90	3,797	3,797	$0	$0	$0	$0	$0	$0
BRA to Sugar Land -Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	SUGAR LAND	999906	0	0	0	231	490	449	490	$0	$0	$0	$0	$0	$0
BRA to Sugar Land -Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	SUGAR LAND	999906	0	0	0	0	0	922	922	$0	$0	$0	$0	$0	$0
BRA to Sugar Land - SysOps Supply	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	SUGAR LAND	999906	0	1,027	2,947	3,385	3,385	3,385	3,385	$0	$0	$0	$0	$0	$0
COH to Baytown Area Water Authority - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	BAYTOWN AREA WATER AUTHORITY	15	0	26	262	398	535	692	692	$0	$0	$0	$0	$0	$0
COH to BRA Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	BRAZOS RIVER AUTHORITY	331	0	27,498	25,201	57,886	69,755	69,755	69,755	$0	$0	$0	$0	$0	$0
COH to CHCRWA Contract - Lake Houston	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	10030	10	1003010	CHCRWA	999902	0	977	862	720	631	546	977	$0	$0	$0	$0	$0	$0
COH to CHCRWA Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	CHCRWA	999902	0	794	1,552	1,711	1,800	1,885	1,885	$0	$0	$0	$0	$0	$0
COH to City of Pasadena Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	CITY OF PASADENA	651900	1,865	2,278	2,665	3,153	3,579	4,068	4,068	$0	$0	$0	$0	$0	$0
COH to NFBWA Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NFBWA	999901	0	444	17,971	31,161	41,172	50,442	50,442	$0	$0	$0	$0	$0	$0
COH to NHCRWA Contract - Houston Indirect Reuse	HOUSTON INDIRECT REUSE	H	SAN JACINTO	HARRIS	3510101	10	351010110	NHCRWA	999904	0	0	0	18,130	31,629	0	31,629	$0	$0	$0	$0	$0	$0
COH to NHCRWA Contract - Lake Houston	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	10030	10	1003010	NHCRWA	999904	0	30,880	30,880	32,734	29,030	25,398	32,734	$0	$0	$0	$0	$0	$0
COH to NHCRWA Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NHCRWA	999904	0	25,573	52,161	32,177	17,382	57,643	57,643	$0	$0	$0	$0	$0	$0
COH to North Channel Water Authority Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NORTH CHANNEL WATER AUTHORITY	607473	1,954	2,392	2,869	3,511	4,157	4,912	4,912	$0	$0	$0	$0	$0	$0
COH to SJRA Contract - Lake Conroe	CONROE LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	10060	10	1006010	SAN JACINTO RIVER AUTHORITY	240	0	36,377	55,538	54,582	53,581	52,534	55,538	$0	$0	$0	$0	$0	$0
COH to WHCRWA Contract - Lake Livingston	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	WHCRWA	999907	1,241	31,837	46,324	52,759	55,549	58,402	58,402	$0	$0	$0	$0	$0	$0
GCWA to City of Galveston Contract - Brazos Main Stem System	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	CITY OF GALVESTON	316200	0	1,225	1,225	1,225	1,225	1,225	1,225	$0	$0	$0	$0	$0	$0
GCWA to City of Galveston Contract - Brazos Run-of-River	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B	12	3461205322B12	CITY OF GALVESTON	316200	0	5,360	5,360	5,360	5,360	5,360	5,360	$0	$0	$0	$0	$0	$0
GCWA to City of Galveston Contract - San Jacinto-Brazos Run-of-River	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A	11	3461105357A11	CITY OF GALVESTON	316200	0	677	677	677	677	677	677	$0	$0	$0	$0	$0	$0
GCWA to Fort Bend County WCID #2 Contract - SysOps Supply	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	FORT BEND COUNTY WCID #2	821000	0	491	1,092	1,092	1,092	1,092	1,092	$0	$0	$0	$0	$0	$0
GCWA to Galveston County WCID #1 Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	GALVESTON COUNTY WCID #1	316325	0	131	274	305	340	379	379	$0	$0	$0	$0	$0	$0
GCWA to Galveston County WCID #1 Contract - Brazos Main Stem System	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	GALVESTON COUNTY WCID #1	316325	0	107	107	107	107	107	107	$0	$0	$0	$0	$0	$0
GCWA to Galveston County WCID #1 Contract - Brazos Run-of-River	BRAZOS RIVER RUN-OF-RIVER	H	BRAZOS	FORT BEND	3461205322B	12	3461205322B12	GALVESTON COUNTY WCID #1	316325	0	469	469	469	469	469	469	$0	$0	$0	$0	$0	$0
GCWA to Galveston County WCID #1 Contract - San Jacinto-Brazos Run-of-River	SAN JACINTO-BRAZOS RIVER RUN-OF-RIVER	H	SAN JACINTO-BRAZOS	BRAZORIA	3461105357A	11	3461105357A11	GALVESTON COUNTY WCID #1	316325	0	59	59	59	59	59	59	$0	$0	$0	$0	$0	$0
GCWA to Missouri City Contract - Allens Creek	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	MISSOURI CITY	999903	0	0	68	321	571	594	594	$0	$0	$0	$0	$0	$0
GCWA to Missouri City Contract - Fort Bend OCR	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	MISSOURI CITY	999903	0	0	0	0	0	4,501	4,501	$0	$0	$0	$0	$0	$0
GCWA to Missouri City Contract - SysOps Supply	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	MISSOURI CITY	999903	0	713	6,262	10,340	10,340	10,340	10,340	$0	$0	$0	$0	$0	$0
SJRA to COH Contract - Lake Houston	HOUSTON LAKE/RESERVOIR	H	SAN JACINTO	RESERVOIR	10030	10	1003010	SAN JACINTO RIVER AUTHORITY	240	0	0	1,356	5,300	3,872	2,428	5,300	$0	$0	$0	$0	$0	$0
TRA to Houston Transfer	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	CITY OF HOUSTON	396200	0	0	116,738	123,524	123,524	123,524	123,524	$0	$0	$0	$0	$0	$0
TRA to SJRA Transfer	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	SAN JACINTO RIVER AUTHORITY	240	0	0	0	7,935	39,096	76,476	76,476	$0	$0	$0	$302,781,597	$0	$0
Groundwater Reduction Plans																						
CHCRWA GRP	Multiple	H	Multiple	Multiple	Multiple	Multiple	Multiple	CHCRWA	999902	2,375	4,146	4,789	4,806	4,806	4,806	4,806	$0	$0	$0	$0	$0	$0
COH GRP	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	CITY OF HOUSTON	396200	3,762	11,417	16,809	19,870	22,399	24,990	24,990	$0	$0	$0	$0	$0	$0
Fort Bend WCID #2 GRP	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	FORT BEND COUNTY WCID #2	821000	0	2,296	5,753	5,753	5,753	5,753	5,753	$0	$10,631,491	$7,098,683	$7,098,683	$0	$0
NFBWA GRP	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NFBWA	999901	35,009	61,021	70,363	84,943	96,103	106,402	106,402	$0	$0	$0	$0	$0	$0
NHCRWA GRP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	34,714	91,167	117,755	99,625	81,126	117,755	117,755	$0	$0	$0	$0	$0	$0
Missouri City GRP	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	MISSOURI CITY	999903	0	5,182	9,431	13,149	13,149	17,562	17,562	$0	$51,260,490	$40,810,500	$0	$0	$0
Richmond Rosenberg GRP (WFB SWTP)	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	RICHMOND-ROSENBERG	999905	7,500	7,500	7,500	7,500	7,500	7,500	7,500	$0	$43,205,325	$29,963,475	$29,897,900	$0	$14,153,450
SJRA WRAP	Multiple	H	Multiple	Multiple	Multiple	Multiple	Multiple	SAN JACINTO RIVER AUTHORITY	240	0	36,377	55,538	62,517	92,677	129,010	129,010	$0	$380,000,000	$180,000,000	$200,000,000	$140,000,000	$0
Sugar Land GRP	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	SUGAR LAND	999906	0	1,587	7,987	8,656	8,915	9,796	9,796	$0	$82,825,000	$78,535,049	$0	$0	$0
WHCRWA GRP	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	WHCRWA	999907	21,678	52,274	66,761	73,196	75,985	78,839	78,839	$0	$0	$0	$0	$0	$0
Reservoir Strategies																						
Allens Creek Reservoir	ALLENS CREEK LAKE/RESERVOIR	H	BRAZOS	RESERVOIR	12900	12	1290012	BRAZOS RIVER AUTHORITY / CITY OF HOUSTON	331 / 396200	0	57,393	55,096	87,781	99,650	99,650	99,650	$0	$222,752,400	$0	$0	$0	$0
Brazoria Off-Channel Reservoir	BRAZORIA OCR	H	BRAZOS	RESERVOIR	BRAOCR	12	BRAOCR12	BRAZOS RIVER AUTHORITY	331	0	0	0	0	0	24,000	24,000	$0	$0	$0	$0	$0	$173,898,602
Dow Off-Channel Reservoir	DOW OFFCHANNEL RESERVOIR	H	BRAZOS	RESERVOIR	DOWOCR	12	DOWOCR12	THE DOW CHEMICAL CO.	237200	0	21,800	21,800	21,800	21,800	21,800	0	$0	$124,468,000	$0	$0	$0	$0
Fort Bend Off-Channel Reservoir	FORT BEND OCR	H	BRAZOS	RESERVOIR	FBCOCR	12	FBCOCR12	BRAZOS RIVER AUTHORITY	331	0	0	0	0	90	45,943	45,943	$0	$0	$0	$0	$202,514,788	$0
GCWA Off-Channel Reservoir	GCWA OFFCHANNEL RESERVOIR	H	SAN JACINTO-BRAZOS	RESERVOIR	GCWAOC	11	GCWAOC11	GULF COAST WATER AUTHORITY	325	0	0	39,500	39,500	39,500	39,500	39,500	$0	$0	$197,448,012	$0	$0	$0
Reuse Strategies																						
Wastewater Reuse for Industry	WASTEWATER REUSE FOR INDUSTRY	H	SAN JACINTO	HARRIS	3610101	10	361010110	CITY OF HOUSTON	396200	0	0	0	0	0	67,200	67,200	$0	$0	$0	$0	$0	$332,051,761
Permit / Other Strategies																						
BRA System Operations Permit	BRA SYSTEM OPERATIONS PERMIT	H	BRAZOS	RESERVOIR	120B0	12	120B012	BRAZOS RIVER AUTHORITY	331	0	6,621	18,870	25,350	25,350	25,350	25,350	$0	$0	$0	$0	$0	$0
Freeport Desalination	GULF OF MEXICO SEA WATER	H	GULF	RESERVOIR	4124999	24	412499924	BRAZOS RIVER AUTHORITY	331	0	0	0	0	33,600	33,600	33,600	$0	$0	$0	$255,699,000	$0	$0
Houston Bayous Permit	SAN JACINTO RUN-OF-RIVER HOUSTON BAYOUS	H	SAN JACINTO	HARRIS	34UNPERMITTED	10	34UNPERMITTED10	CITY OF HOUSTON	396200	0	0	0	0	0	0	0	$0	$20,956,000	$0	$0	$0	$0
Infrastructure Strategies																						
Brazos Saltwater Barrier	BRAZOS RIVER AUTHORITY MAIN STEM STYSTEM	G	BRAZOS	RESERVOIR	120E0	12	120E012	BRAZOS RIVER AUTHORITY	331	0	0	0	0	0	0	0	$0	$44,470,739	$0	$0	$0	$0
CHCRWA Transmission	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CHCRWA	999902	2,375	4,146	4,789	4,806	4,806	4,806	4,806	$0	$0	$0	$0	$0	$0
CHCRWA Internal Distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CHCRWA	999902	2,375	4,146	4,789	4,806	4,806	4,806	4,806	$0	$0	$0	$0	$0	$0
CLCND West Chambers County System	TRINITY RIVER RUN-OF-RIVER	H	TRINITY	CHAMBERS	3460804279B	08	3460804279B08	CHAMBERS LIBERTY COUNTIES NAVIGATIONAL DISTRICT	150	0	1,691	1,978	2,235	2,511	2,804	2,804	$0	$20,380,000	$0	$0	$0	$0
COH Treatment Expansion	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CITY OF HOUSTON	396200	16,000	280,000	128,000	64,000	48,000	48,000	280,000	$66,895,529	$975,979,521	$446,248,855	$223,261,769	$166,643,243	$166,643,243
COH Distribution Expansion	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CITY OF HOUSTON	396200	TBD	TBD	TBD	TBD	TBD	TBD	TBD	$0	$229,390,000	$31,650,000	$0	$0	$0
Huntsville WTP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	CITY OF HUNTSVILLE	410000	11,200	11,200	11,200	11,200	11,200	11,200	11,200	$61,023,906	$0	$0	$0	$0	$0
Luce Bayou	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	CITY OF HOUSTON	396200	0	128,259	206,276	207,629	205,171	270,742	270,742	$0	$253,916,914	$0	$0	$0	$0
NFBWA 2025 Shared Transmission (w/ WHCRWA)	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NFBWA	999901	0	21,878	39,405	52,595	62,606	71,876	71,876	$0	$14,000,000	$142,000,000	$57,000,000	$0	$0
NFBWA Internal Distribution	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	NFBWA	999901	35,009	61,021	70,363	84,943	96,103	106,402	106,402	$74,000,000	$15,000,000	$106,000,000	$10,000,000	$10,000,000	$10,000,000
NHCRWA Internal 2010 Distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	34,714	34,714	34,714	34,714	34,714	34,714	34,714	$153,149,640	$0	$0	$0	$0	$0
NHCRWA Internal 2020 Distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	0	91,167	91,167	91,167	91,167	91,167	91,167	$0	$345,292,192	$0	$0	$0	$0
NHCRWA Internal 2030 Distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	0	0	117,755	117,755	117,755	117,755	117,755	$0	$0	$37,439,584	$0	$0	$0
NHCRWA Transmission 2010	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	34,714	34,714	34,714	34,714	34,714	34,714	34,714	$80,690,624	$0	$0	$0	$0	$0
NHCRWA Transmission 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	0	91,167	91,167	91,167	91,167	91,167	91,167	$0	$172,558,512	$0	$0	$0	$0
NHCRWA Transmission 2030	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NHCRWA	999904	0	0	117,755	117,755	117,755	117,755	117,755	$0	$0	$0	$0	$0	$0
WHCRWA Internal Distribution	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	WHCRWA	999907	21,678	52,274	66,761	73,196	75,985	78,839	78,839	$135,309,000	$340,470,000	$76,693,000	$0	$0	$0
WHCRWA 2020 Shared Transmission (w/ NFBWA)	LIVINGSTON-WALLISVILLE SYSTEM	H	TRINITY	RESERVOIR	084H0	08	084H008	WHCRWA	999907	21,678	52,274	66,761	73,196	75,985	78,839	78,839	$45,110,193	$244,974,000	$0	$0	$0	$0
Alternative Strategies																						

Region H
Table 4C-1: WWP-Level Project Cost

WMS	Total Capital Cost	Total Annual Costs ($/year) 2010	2020	2030	2040	2050	2060	Source	Notes
Contractual Strategies									
BRA to Brazosport Water Authority Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
BRA to GCWA Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
BRA to GCWA Contract - Brazos Main Stem System	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
BRA to GCWA Contract - Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
BRA to GCWA Contract - SysOps Supply	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
BRA to NRG Contract - Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
BRA to Richmond-Rosenberg Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0		
BRA to Richmond-Rosenberg Contract - Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
BRA to Sugar Land -Allens Creek	$0	$0	$0	$0	$0	$0	$0		
BRA to Sugar Land -Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
BRA to Sugar Land - SysOps Supply	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to Baytown Area Water Authority - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to BRA Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to CHCRWA Contract - Lake Houston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to CHCRWA Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to City of Pasadena Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to NFBWA Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to NHCRWA Contract - Houston Indirect Reuse	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to NHCRWA Contract - Lake Houston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to NHCRWA Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to North Channel Water Authority Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
COH to SJRA Contract - Lake Conroe	$0	$0	$0	$0	$0	$0	$0		
COH to WHCRWA Contract - Lake Livingston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to City of Galveston Contract - Brazos Main Stem System	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to City of Galveston Contract - Brazos Run-of-River	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to City of Galveston Contract - San Jacinto-Brazos Run-of-River	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Fort Bend County WCID #2 Contract - SysOps Supply	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Galveston County WCID #1 Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Galveston County WCID #1 Contract - Brazos Main Stem System	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Galveston County WCID #1 Contract - Brazos Run-of-River	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Galveston County WCID #1 Contract - San Jacinto-Brazos Run-of-River	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Missouri City Contract - Allens Creek	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
GCWA to Missouri City Contract - Fort Bend OCR	$0	$0	$0	$0	$0	$0	$0		
GCWA to Missouri City Contract - SysOps Supply	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
SJRA to COH Contract - Lake Houston	$0	$0	$0	$0	$0	$0	$0	Region H 2011 RWP	No cost as infrastructure reflected under other strategies. Raw water cost not assumed.
TRA to Houston Transfer	$0	$0	$0	$0	$0	$0	$0	Region H RWP Tech Memo	Strategy cost associated with Luce Bayou
TRA to SJRA Transfer	$302,781,597	$0	$0	$0	$37,101,862	$37,101,862	$10,703,983	Region H RWP Tech Memo	Cost associated with development of conveyance infrastructure.
Groundwater Reduction Plans									
CHCRWA GRP	$0	$0	$0	$0	$0	$0	$0	No data available	No data available
COH GRP	$0	$0	$0	$0	$0	$0	$0	Region H RWP Tech Memo - Treatment	No cost as volume and treatment / distribution is associated with other strategies.
Fort Bend WCID #2 GRP	$24,828,857	$0	$1,310,164	$2,312,320	$2,387,576	$1,768,681	$1,149,785	FBC WCID 2 GRP	Annual O&M includes electic cost
NFBWA GRP	$0	$0	$0	$0	$0	$0	$0	NFBWA GRP	No cost as volume and treatment / distribution is associated with other strategies.
NHCRWA GRP	$0	$0	$0	$0	$0	$0	$0	NHCRWA GRP	No cost as volume and treatment / distribution is associated with other strategies.
Missouri City GRP	$92,070,990	$0	$5,750,635	$10,328,943	$5,859,820	$2,301,775	$2,301,775	Missouri City GRP	Annual O&M cost assumed as 2.5% of project capital cost. No annual energy cost assumed due to limited information.
Richmond Rosenberg GRP (WFB SWTP)	$117,220,150	$0	$6,652,597	$13,441,309	$16,083,787	$13,471,435	$17,440,442	West FBC Regional SWTP PER	
SJRA WRAP	$900,000,000	$0	$42,630,132	$62,823,352	$52,130,132	$52,142,749	$34,705,838	SJRA WRAP Part 2	Annual costs beyond debt service estimated from SJRA WRAP Part II. O&M costs include electricity.
Sugar Land GRP	$161,360,049	$0	$17,561,104	$17,561,104	$3,493,000	$3,493,000	$3,493,000	Sugar Land CIP, Sugar Land GRP	Assuming O&M constant after 2014. No annual energy cost assumed due to limited information.
WHCRWA GRP	$0	$0	$0	$0	$0	$0	$0	WHCRWA Summary	No cost as volume and treatment / distribution is associated with other strategies.
Reservoir Strategies									
Allens Creek Reservoir	$222,752,400	$0	$18,706,144	$18,706,144	$18,706,144	$18,706,144	$3,901,678	Region H RWP Tech Memo	
Brazoria Off-Channel Reservoir	$173,898,602	$0	$0	$0	$0	$0	$28,951,707		
Dow Off-Channel Reservoir	$124,468,000	$0	$10,484,000	$10,484,000	$10,484,000	$8,490,000	$8,490,000		
Fort Bend Off-Channel Reservoir	$202,514,788	$0	$0	$0	$0	$43,566,686	$43,566,686		
GCWA Off-Channel Reservoir	$197,448,012	$0	$0	$32,678,970	$32,678,970	$32,678,970	$32,678,970	Region H 2011 RWP	
Reuse Strategies									
Wastewater Reuse for Industry	$332,051,761	$0	$0	$0	$0	$0	$60,010,614	Region H RWP Tech Memo	
Permit / Other Strategies									
BRA System Operations Permit	$0	$0	$0	$0	$0	$0	$0	HDR, Inc.	
Freeport Desalination	$255,699,000	$0	$0	$0	$28,685,479	$28,685,479	$6,392,475	Region H 2011 RWP	Assuming O&M as 2.5 percent of capital cost. No annual energy cost assumed due to limited information.
Houston Bayous Permit	$20,956,000	$0	$1,827,040	$1,827,040	$0	$0	$0	Region H RWP Tech Memo	
Infrastructure Strategies									
Brazos Saltwater Barrier	$44,470,739	$0	$4,988,930	$4,988,930	$1,111,768	$1,111,768	$1,111,768	Region H RWP Tech Memo	Annual O&M cost assumed as 2.5% of project capital cost. No annual energy cost assumed due to limited information.
CHCRWA Transmission	$0	$0	$0	$0	$0	$0	$0	No data available	No data available
CHCRWA Internal Distribution	$0	$0	$0	$0	$0	$0	$0	No data available	No data available
CLCND West Chambers County System	$20,380,000	$0	$1,980,621	$1,980,621	$203,800	$203,800	$203,800	CLCND Funding App	Annual O&M cost assumed as 1.0% of project capital cost. No annual energy cost assumed due to limited information.
COH Treatment Expansion	$2,045,672,161	$7,670,034	$121,707,226	$168,015,257	$109,009,300	$89,583,305	$89,598,340	Estimated using Reg H procedures	Energy costs not assumed due to limited data.
COH Distribution Expansion	$261,040,000	$0	$22,293,166	$25,369,057	$5,369,791	$2,610,400	$2,610,400	No data available	Not enough data available to estimate costs at this time.
Huntsville WTP	$61,023,906	$10,120,710	$10,120,710	$4,800,368	$4,800,368	$4,800,368	$4,800,368	Standard Region H assumptions	Annual O&M cost assumed as 2.5% of project capital cost. Assumes 10 MGD plant and pump station capacity.
Luce Bayou	$253,916,914	$0	$31,798,394	$31,798,394	$9,660,760	$9,660,760	$9,660,760	Luce Bayou Alternatives Analysis	O&M and electric scaled using CCI
NFBWA 2025 Shared Transmission (w/ WHCRWA)	$213,000,000	$0	$1,220,584	$13,600,791	$17,349,727	$4,969,520	$0	NFBWA Table from BGE	O&M costs not included as they include part of COH infrastructure O&M. No annual energy cost assumed due to limited information.
NFBWA Internal Distribution	$225,000,000	$6,451,657	$7,759,425	$10,549,331	$10,113,409	$1,743,692	$1,743,692	NFBWA Table from BGE	O&M costs not included as they include part of COH infrastructure O&M. No annual energy cost assumed due to limited information.
NHCRWA Internal 2010 Distribution	$153,149,640	$14,883,780	$14,883,780	$1,531,496	$1,531,496	$1,531,496	$1,531,496		
NHCRWA Internal 2020 Distribution	$345,292,192	$0	$33,557,069	$33,557,069	$3,452,922	$3,452,922	$3,452,922		
NHCRWA Internal 2030 Distribution	$37,439,584	$0	$0	$3,638,549	$3,638,549	$374,396	$374,396		
NHCRWA Transmission 2010	$80,690,624	$7,841,883	$7,841,883	$806,906	$806,906	$806,906	$806,906		
NHCRWA Transmission 2020	$172,558,512	$0	$16,770,023	$16,770,023	$1,725,585	$1,725,585	$1,725,585		
NHCRWA Transmission 2030	$0	$0	$0	$0	$0	$0	$0		
WHCRWA Internal Distribution	$552,472,000	$13,149,945	$46,238,371	$41,894,891	$12,211,165	$5,524,720	$5,524,720	WHCRWA Summary	Annual O&M cost assumed as 1.0% of project capital cost. No annual energy cost assumed due to limited information.
WHCRWA 2020 Shared Transmission (w/ NFBWA)	$290,084,193	$4,384,014	$28,191,704	$24,258,792	$2,900,842	$2,900,842	$2,900,842	WHCRWA Summary	Annual O&M cost assumed as 1.0% of project capital cost. No annual energy cost assumed due to limited information.
Alternative Strategies									

				Pump Stations		Connection Costs	Treatment Plants			Wells		Other Capital Costs							Debt Service						Operations and Maintenance						Energy					
WUG Name	wug_basin	WUG County	WUG-County-Basin Identifier	Booster Pump Stations	Raw Water Pump Stations	Pipeline Connections	Surface Water Treatment Plants	Groundwater Treatment Plants	Direct Reuse Plants	Municipal Supply Wells	Agricultural Wells	Land and Easements	Mitigation	Capital Costs for Irrigation Conservation	Engineering, Contingencies, Financial and Legal Services	Interest During Construction	Project-Specific Capital Costs	Total Capital Cost	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	08001300002011	$0	$206,255	$0	$4,257,163	$0	$0	$0	$0	$0	$0	$0	$1,562,196	$492,112	$0	$6,517,726	$0	$0	$94,629	$198,807	$271,295	$369,438	$0	$0	$39,893	$83,816	$154,333	$239,759	$0	$0	$3,241	$6,810	$12,539	$19,480
AMES	TRINITY	LIBERTY	08067600014608	$0	$0	$0	$0	$87,198	$0	$95,160	$0	$0	$0	$0	$63,825	$20,106	$0	$266,290	$0	$4,520	$8,629	$7,807	$8,629	$10,889	$0	$2,211	$4,220	$6,029	$8,440	$11,354	$0	$1,621	$3,094	$4,420	$6,188	$8,324
ANAHUAC	NECHES-TRINITY	CHAMBERS	08001500003607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANAHUAC	TRINITY	CHAMBERS	08001500003608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	08001800002011	$199,976	$0	$68,773	$0	$54,786	$0	$59,791	$0	$48,462	$48,462	$0	$134,164	$50,179	$0	$664,594	$29,418	$38,869	$11,916	$2,465	$4,029	$16,609	$3,371	$7,992	$9,198	$9,198	$10,067	$12,821	$3,364	$5,795	$6,802	$6,728	$8,423	$10,902
ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	08099800007911	$0	$0	$0	$0	$306,180	$0	$334,325	$0	$0	$0	$0	$224,177	$70,619	$0	$935,300	$0	$21,773	$52,987	$38,815	$17,874	$20,955	$0	$10,646	$25,904	$29,622	$34,645	$39,870	$0	$7,808	$19,006	$21,731	$25,414	$29,245
BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	08401200008411	$539,433	$0	$184,708	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$253,449	$87,759	$0	$1,162,319	$0	$101,336	$101,336	$0	$0	$0	$0	$15,333	$15,333	$15,333	$15,333	$15,333	$0	$15,470	$15,470	$15,470	$15,470	$15,470
BAILEY'S PRAIRIE	SAN JACINTO-BRAZOS	BRAZORIA	08081700002011	$0	$0	$0	$0	$11,575	$0	$12,632	$0	$0	$0	$0	$8,473	$2,669	$0	$35,349	$0	$616	$1,027	$822	$1,027	$1,644	$0	$301	$502	$703	$1,005	$1,507	$0	$221	$368	$516	$737	$1,105
BAILEY'S PRAIRIE	BRAZOS	BRAZORIA	08081700002012	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$0	$0	$0	$0	$74	$74
BAYOU VISTA	SAN JACINTO-BRAZOS	GALVESTON	08075900008411	$0	$0	$0	$0	$3,087	$0	$3,369	$0	$0	$0	$0	$2,259	$712	$0	$9,426	$0	$616	$822	$205	$0	$0	$0	$301	$402	$402	$402	$402	$0	$221	$295	$295	$295	$295
BAYTOWN	TRINITY-SAN JACINTO	CHAMBERS	08004200003609	$0	$0	$0	$0	$21,607	$0	$23,580	$0	$0	$0	$0	$15,815	$4,982	$0	$65,984	$0	$1,849	$2,876	$1,849	$1,849	$2,055	$0	$904	$1,407	$1,809	$2,311	$2,813	$0	$663	$1,031	$1,326	$1,694	$2,063
BAYTOWN	TRINITY-SAN JACINTO	HARRIS	08004200010109	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$205	$1,438	$1,233	$0	$0	$0	$100	$703	$703	$703	$703	$0	$74	$516	$516	$516	$516
BAYTOWN	SAN JACINTO	HARRIS	08004200010110	$0	$0	$0	$0	$3,087	$0	$3,369	$0	$0	$0	$0	$2,259	$712	$0	$9,426	$0	$205	$205	$0	$205	$616	$0	$100	$100	$100	$201	$402	$0	$74	$74	$74	$147	$295
BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	08082200003609	$0	$165,715	$0	$3,419,851	$137,159	$0	$149,899	$0	$0	$0	$0	$1,355,418	$426,974	$0	$5,655,016	$36,546	$263,561	$284,382	$109,956	$110,911	$119,514	$17,862	$113,764	$137,942	$160,105	$184,686	$210,475	$13,112	$9,413	$12,335	$14,798	$17,385	$19,923
BEACH CITY	TRINITY	CHAMBERS	08082200003608	$0	$25,676	$0	$530,140	$24,693	$0	$26,948	$0	$0	$0	$0	$212,610	$66,975	$0	$887,042	$6,575	$46,736	$49,724	$18,169	$16,257	$12,432	$3,215	$20,140	$24,169	$27,796	$31,020	$33,035	$2,357	$1,522	$1,923	$2,292	$2,701	$2,939
BEASLEY	BRAZOS	FORT BEND	08101200007912	$0	$0	$0	$0	$6,173	$0	$6,737	$0	$0	$0	$0	$4,519	$1,423	$0	$18,853	$0	$205	$411	$616	$822	$822	$0	$100	$201	$402	$603	$804	$0	$74	$147	$295	$442	$589
BEASLEY	BRAZOS-COLORADO	FORT BEND	08101200007913	$0	$0	$0	$0	$63,277	$0	$69,054	$0	$0	$0	$0	$46,316	$14,590	$0	$193,238	$0	$2,260	$4,931	$5,547	$6,985	$9,040	$0	$1,105	$2,412	$3,818	$5,828	$8,239	$0	$810	$1,768	$2,799	$4,273	$6,041
BELLAIRE	SAN JACINTO	HARRIS	08004600010110	$2,253,087	$0	$769,828	$0	$80,245	$0	$87,581	$0	$48,462	$48,462	$0	$1,116,760	$359,709	$0	$4,764,135	$215,953	$254,871	$77,982	$79,931	$77,919	$80,557	$34,427	$44,345	$54,288	$61,082	$67,242	$74,474	$35,359	$43,880	$52,425	$59,227	$65,390	$72,634
BELLVILLE	BRAZOS	AUSTIN	08004800000812	$0	$0	$0	$0	$536,756	$0	$586,963	$0	$0	$0	$0	$393,302	$123,895	$0	$1,640,916	$0	$58,451	$96,841	$58,111	$29,992	$26,501	$0	$28,540	$47,302	$56,945	$61,968	$69,904	$0	$20,995	$34,770	$41,842	$45,525	$51,345
BLUE BELL MANOR UTILITY COMPANY	SAN JACINTO	HARRIS	08402600010110	$0	$0	$0	$0	$318,210	$0	$347,799	$0	$0	$0	$0	$233,103	$73,430	$0	$972,542	$28,752	$74,518	$56,039	$10,272	$0	$0	$14,056	$36,416	$41,440	$41,440	$41,440	$41,440	$10,313	$26,740	$30,424	$29,982	$29,613	$29,613
BOLIVAR PENINSULAR SUD	NECHES-TRINITY	GALVESTON	08402700008407	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA	BRAZOS	BRAZORIA	08007200002012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA	BRAZOS-COLORADO	BRAZORIA	08007200002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA COUNTY MUD #1	SAN JACINTO-BRAZOS	BRAZORIA	08403000002011	$0	$0	$0	$0	$1,265,287	$0	$1,387,827	$0	$0	$0	$0	$928,590	$292,518	$0	$3,874,222	$0	$61,515	$133,231	$134,252	$132,010	$142,005	$0	$30,031	$65,019	$95,546	$129,446	$164,829	$0	$22,100	$47,882	$70,350	$95,323	$121,400
BRAZORIA COUNTY MUD #2	BRAZOS	BRAZORIA	08403100002012	$0	$0	$0	$0	$1,577,126	$0	$1,734,784	$0	$0	$0	$0	$1,159,168	$365,153	$0	$4,836,230	$0	$77,826	$166,422	$167,846	$165,410	$175,973	$0	$37,952	$81,119	$119,762	$161,750	$205,506	$0	$27,993	$59,890	$88,398	$119,411	$151,750
BRAZORIA COUNTY MUD #3	SAN JACINTO-BRAZOS	BRAZORIA	08403200002011	$0	$0	$0	$0	$912,815	$0	$998,764	$0	$0	$0	$0	$669,052	$210,760	$0	$2,791,391	$0	$44,538	$96,036	$96,446	$95,013	$102,382	$0	$21,761	$46,916	$68,877	$93,333	$118,886	$0	$15,985	$34,475	$50,608	$68,582	$87,367
BRAZORIA COUNTY MUD #4	SAN JACINTO-BRAZOS	BRAZORIA	08403300002011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA COUNTY MUD #5	SAN JACINTO-BRAZOS	BRAZORIA	08403400002011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRITMOORE UTILITIES	SAN JACINTO	HARRIS	08403600010110	$597,709	$0	$205,490	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$281,120	$96,472	$0	$1,277,715	$26,170	$61,461	$51,878	$28,443	$22,085	$21,493	$2,831	$8,698	$11,455	$13,425	$15,125	$16,998	$2,824	$8,692	$11,443	$13,407	$15,101	$16,968
BROOKSHIRE	BRAZOS	WALLER	08007700023712	$0	$0	$0	$0	$808,238	$0	$884,234	$0	$0	$0	$0	$592,365	$186,603	$0	$2,471,440	$0	$25,468	$62,424	$78,421	$92,349	$111,582	$0	$12,452	$30,514	$50,776	$75,631	$105,265	$0	$9,134	$22,394	$37,274	$55,543	$77,348
BROOKSIDE VILLAGE	SAN JACINTO-BRAZOS	BRAZORIA	08007800002011	$0	$0	$0	$0	$95,686	$0	$104,424	$0	$0	$0	$0	$70,038	$22,063	$0	$292,211	$0	$2,876	$8,013	$10,067	$10,684	$12,533	$0	$1,407	$3,919	$6,330	$9,144	$12,459	$0	$1,031	$2,873	$4,641	$6,704	$9,134
BUFFALO	TRINITY	LEON	08008300014508	$0	$0	$0	$0	$40,897	$0	$44,633	$0	$0	$0	$0	$29,936	$9,430	$0	$124,896	$0	$7,396	$10,889	$3,493	$0	$0	$0	$3,617	$5,325	$5,325	$5,325	$5,325	$0	$2,652	$3,904	$3,610	$3,241	$3,462
BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	08008500010110	$410,590	$0	$140,768	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$192,975	$68,705	$0	$909,963	$79,335	$79,335	$0	$0	$0	$0	$11,672	$11,672	$11,672	$11,672	$11,672	$11,672	$11,737	$11,516	$11,295	$11,173	$11,001	$11,001
CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	08404300010110	$591,702	$0	$203,431	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$278,297	$95,583	$0	$1,265,936	$25,431	$59,694	$50,850	$28,739	$22,381	$21,937	$2,708	$8,404	$11,161	$13,181	$14,881	$16,827	$2,701	$8,398	$11,148	$13,161	$14,856	$16,796
CENTERVILLE	TRINITY	LEON	08010500014508	$0	$0	$0	$0	$16,205	$0	$17,685	$0	$0	$0	$0	$11,861	$3,737	$0	$49,488	$0	$2,876	$4,315	$1,438	$0	$0	$0	$1,407	$2,110	$2,110	$2,110	$2,110	$0	$1,031	$1,547	$1,326	$1,179	$1,252
CHIMNEY HILL MUD	SAN JACINTO	HARRIS	08405300010110	$103,963	$0	$35,765	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$48,905	$23,325	$0	$308,927	$0	$0	$14,634	$14,634	$12,300	$12,300	$0	$0	$912	$912	$2,957	$2,957	$0	$0	$909	$761	$2,947	$2,897
CLEAR BROOK CITY MUD WOODMEADOWS	SAN JACINTO	HARRIS	08406300010110	$0	$0	$0	$0	$29,323	$0	$32,001	$0	$0	$0	$0	$21,464	$6,761	$0	$89,549	$0	$3,698	$7,807	$4,109	$0	$0	$0	$1,809	$3,818	$3,818	$3,818	$3,818	$0	$1,326	$2,799	$2,799	$2,799	$2,799
CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	08076400008411	$0	$30,868	$0	$637,414	$64,029	$0	$69,897	$0	$0	$0	$0	$280,773	$88,447	$0	$1,171,429	$17,050	$100,218	$85,080	$1,913	$0	$0	$8,338	$43,395	$44,201	$44,201	$44,201	$44,201	$6,114	$2,922	$2,988	$2,988	$2,988	$2,988
CLEVELAND	SAN JACINTO	LIBERTY	08011600014610	$0	$0	$0	$0	$145,061	$0	$158,320	$0	$0	$0	$0	$106,183	$33,449	$0	$443,014	$0	$4,931	$10,478	$10,478	$14,792	$23,215	$0	$2,411	$5,124	$7,536	$12,358	$18,889	$0	$1,768	$3,757	$5,525	$9,061	$13,849
CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	08011800002011	$124,822	$0	$42,949	$0	$33,954	$0	$37,054	$0	$48,485	$48,485	$0	$83,573	$34,246	$0	$453,567	$0	$0	$15,582	$19,487	$12,599	$20,057	$0	$0	$1,999	$3,046	$5,287	$7,971	$0	$0	$1,620	$2,504	$4,420	$6,777
COLDSPRING	TRINITY	SAN JACINTO	08012200020408	$0	$0	$0	$0	$47,844	$0	$52,212	$0	$0	$0	$0	$35,019	$11,032	$0	$146,107	$0	$4,725	$8,629	$6,164	$3,493	$1,849	$0	$2,311	$4,220	$5,325	$5,928	$6,230	$0	$1,694	$3,094	$3,904	$4,346	$4,567
COLDSPRING	SAN JACINTO	SAN JACINTO	08012200020410	$0	$0	$0	$0	$13,119	$0	$14,316	$0	$0	$0	$0	$9,602	$3,025	$0	$40,062	$0	$1,438	$2,465	$1,644	$822	$411	$0	$703	$1,206	$1,507	$1,608	$1,708	$0	$516	$884	$1,105	$1,179	$1,252
CONROE	SAN JACINTO	MONTGOMERY	08013000017010	$21,728,665	$0	$6,990,676	$0	$1,273,987	$0	$1,574,779	$0	$48,485	$48,485	$0	$11,048,837	$3,488,445	$0	$46,202,360	$362,681	$1,781,720	$1,950,435	$620,991	$852,507	$1,625,422	$167,883	$405,363	$494,065	$508,966	$636,586	$781,007	$137,754	$315,507	$411,763	$426,790	$571,542	$738,762
CONSOLIDATED WSC	TRINITY	WALKER	08407100023608	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$205	$205	$0	$0	$0	$0	$100	$100	$100	$100	$100	$0	$74	$74	$0	$0	$0
CONSUMERS WATER INC	SAN JACINTO	HARRIS	08407200010110	$721,239	$0	$247,937	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$339,212	$114,772	$0	$1,520,084	$23,363	$58,801	$57,190	$38,487	$34,059	$35,241	$2,364	$8,255	$11,871	$14,653	$17,532	$20,510	$2,357	$8,250	$11,860	$14,635	$17,508	$20,479
CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	08407200017010	$0	$0	$0	$0	$304,731	$0	$332,641	$0	$0	$0	$0	$223,080	$70,273	$0	$930,725	$7,807	$18,285	$21,572	$23,626	$30,404	$39,234	$3,818	$8,942	$14,367	$20,496	$29,235	$39,680	$2,799	$6,556	$10,534	$15,028	$21,437	$29,098
COUNTY-OTHER	BRAZOS	AUSTIN	08075700800812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	BRAZOS-COLORADO	AUSTIN	08075700800813	$0	$0	$0	$0	$50,930	$0	$55,580	$0	$0	$0	$0	$37,279	$11,743	$0	$155,533	$0	$5,342	$9,245	$5,547	$2,465	$2,671	$0	$2,612	$4,522	$5,325	$5,727	$6,632	$0	$1,915	$3,315	$3,904	$4,199	$4,862
COUNTY-OTHER	COLORADO	AUSTIN	08075700800814	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$616	$1,027	$411	$205	$411	$0	$301	$502	$502	$603	$703	$0	$221	$368	$368	$442	$516
COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	08075702002011	$5,920,547	$0	$1,982,600	$0	$1,774,694	$339,302	$2,117,110	$0	$48,462	$48,462	$0	$4,246,989	$1,345,772	$0	$17,823,937	$638,283	$989,140	$494,676	$234,496	$233,783	$330,336	$105,111	$267,978	$373,136	$428,436	$490,733	$562,019	$116,145	$227,110	$289,234	$317,349	$336,330	$362,702
COUNTY-OTHER	BRAZOS	BRAZORIA	08075702002012	$126,423	$0	$43,482	$0	$0	$1,805	$0	$0	$48,485	$48,485	$0	$60,098	$26,851	$0	$355,629	$0	$26,322	$27,510	$2,045	$2,160	$2,638	$0	$2,855	$3,053	$3,605	$4,230	$4,453	$0	$2,848	$3,045	$3,193	$3,413	$3,634
COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	08075702002013	$2,118,817	$0	$721,716	$0	$282,301	$78,509	$308,219	$0	$48,462	$48,462	$0	$1,228,347	$394,861	$0	$5,229,693	$258,949	$302,720	$87,102	$71,216	$66,245	$82,013	$41,599	$58,217	$79,920	$96,404	$114,575	$134,233	$43,020	$55,863	$66,692	$73,370	$81,523	$90,681
COUNTY-OTHER	NECHES-TRINITY	CHAMBERS	08075703603607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	TRINITY	CHAMBERS	08075703603608	$0	$64,812	$0	$1,337,587	$148,680	$0	$162,531	$0	$0	$0	$0	$599,763	$188,933	$0	$2,502,306	$39,621	$218,163	$178,542	$0	$0	$0	$19,363	$94,715	$94,715	$94,715	$94,715	$94,715	$14,217	$6,122	$5,893	$5,664	$5,500	$5,435
COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	08075703603609	$0	$35,027	$0	$723,265	$80,215	$0	$87,581	$0	$0	$0	$0	$324,131	$102,105	$0	$1,352,324	$21,362	$117,901	$96,539	$0	$0	$0	$10,445	$51,144	$51,144	$51,144	$51,144	$51,144	$7,661	$3,307	$3,274	$3,241	$3,176	$3,241
COUNTY-OTHER	SAN JACINTO	FORT BEND	08075707907910	$0	$943,233	$0	$18,679,957	$0	$373,594	$0	$0	$0	$0	$0	$6,998,874	$2,204,735	$0	$29,200,393	$0	$21,994	$58,675	$433,055	$1,381,443	$2,090,774	$0	$9,268	$25,867	$218,072	$715,399	$1,280,159	$0	$753	$2,071	$17,042	$55,781	$99,775
COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	08075707907911	$0	$5,258,985	$0	$69,435,968	$1,231,319	$2,389,555	$1,383,616	$0	$0	$0	$0	$27,894,805	$8,787,222	$0	$116,381,470	$0	$11,299	$29,787	$1,996,916	$5,890,221	$8,138,451	$0	$5,526	$14,566	$1,140,569	$4,170,963	$7,678,752	$0	$4,052	$10,681	$162,333	$428,117	$704,525
COUNTY-OTHER	BRAZOS	FORT BEND	08075707907912	$0	$6,957,436	$0	$86,355,310	$1,622,107	$3,351,514	$1,883,840	$0	$0	$0	$0	$35,059,572	$11,044,216	$0	$146,273,996	$0	$56,202	$809,368	$3,458,759	$7,052,160	$9,237,873	$0	$27,445	$535,488	$2,234,571	$5,914,664	$10,336,632	$0	$20,184	$156,218	$317,136	$604,471	$941,634
COUNTY-OTHER	BRAZOS-COLORADO	FORT BEND	08075707907913	$0	$0	$0	$0	$0	$30,682	$0	$0	$0	$0	$0	$10,739	$3,383	$0	$44,803	$0	$0	$1,608	$2,413	$1,953	$1,494	$0	$0	$6,000	$9,000	$13,286	$14,571	$0	$0	$344	$516	$761	$835
COUNTY-OTHER	NECHES-TRINITY	GALVESTON	08075708408407	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	08075708408411	$0	$905,814	$0	$15,603,120	$0	$0	$0	$0	$0	$0	$0	$5,778,127	$1,820,184	$0	$24,107,245	$0	$2,101,779	$2,101,779	$0	$0	$0	$0	$1,071,101	$1,071,101	$1,071,101	$1,071,101	$1,071,101	$0	$87,056	$87,056	$87,056	$87,056	$87,056
COUNTY-OTHER	TRINITY-SAN JACINTO	HARRIS	08075710110109	$0	$0	$0	$0	$0	$23,462	$0	$0	$0	$0	$0	$8,212	$2,587	$0	$34,261	$0	$0	$2,987	$2,987	$0	$0	$0	$0	$11,143	$11,143	$11,143	$11,143	$0	$0	$638	$0	$0	$0
COUNTY-OTHER	SAN JACINTO	HARRIS	08075710110110	$22,479,537	$9,940,632	$7,058,571	$98,125,522	$0	$7,916,755	$0	$0	$48,485	$48,485	$0	$50,932,356	$16,052,266	$0	$212,602,609	$0	$0	$811,456	$7,884,228	$15,942,930	$10,651,437	$0	$0	$514,834	$6,243,432	$16,003,656	$17,513,824	$0	$0	$152,953	$917,170	$1,699,427	$2,097,881
COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	08075710110111	$175,378	$0	$60,265	$0	$0	$46,925	$0	$0	$48,462	$48,462	$0	$98,899	$39,070	$0	$517,461	$39,141	$39,141	$5,974	$5,974	$0	$0	$4,987	$4,987	$27,273	$27,273	$27,273	$27,273	$4,985	$0	$2,849	$1,326	$1,203	$1,326
COUNTY-OTHER	TRINITY	LEON	08075714514508	$0	$0	$0	$0	$18,520	$0	$20,211	$0	$0	$0	$0	$13,556	$4,270	$0	$56,557	$0	$4,109	$4,931	$822	$0	$0	$0	$2,010	$2,412	$2,412	$2,412	$2,412	$0	$1,473	$1,768	$1,105	$589	$810
COUNTY-OTHER	BRAZOS	LEON	08075714514512	$0	$0	$0	$0	$20,063	$0	$21,895	$0	$0	$0	$0	$14,686	$4,626	$0	$61,270	$0	$4,315	$5,342	$1,027	$0	$0	$0	$2,110	$2,612	$2,612	$2,612	$2,612	$0	$1,547	$1,915	$1,252	$737	$958
COUNTY-OTHER	NECHES	LIBERTY	08075714614606	$0	$0	$0	$0	$103,402	$0	$112,845	$0	$0	$0	$0	$75,686	$23,842	$0	$315,776	$0	$5,136	$10,067	$10,067	$10,684	$12,327	$0	$2,512	$4,923	$7,435	$10,148	$13,464	$0	$1,842	$3,610	$5,451	$7,440	$9,871
COUNTY-OTHER	NECHES-TRINITY	LIBERTY	08075714614607	$0	$0	$0	$0	$6,945	$0	$7,579	$0	$0	$0	$0	$5,084	$1,601	$0	$21,209	$0	$205	$616	$822	$822	$822	$0	$100	$301	$502	$703	$904	$0	$74	$221	$368	$516	$663
COUNTY-OTHER	TRINITY	LIBERTY	08075714614608	$0	$0	$0	$0	$1,215,303	$0	$1,333,931	$0	$0	$0	$0	$892,232	$281,064	$0	$3,722,530	$0	$32,034	$94,979	$129,767	$138,538	$162,746	$0	$15,659	$46,385	$78,996	$113,984	$158,328	$0	$11,492	$34,107	$58,122	$83,904	$116,685
COUNTY-OTHER	TRINITY-SAN JACINTO	LIBERTY	08075714614609	$0	$0	$0	$0	$125,778	$0	$137,267	$0	$0	$0	$0	$92,066	$29,002	$0	$384,112	$0	$6,164	$12,327	$12,327	$12,944	$14,998	$0	$3,014	$6,029	$9,043	$12,359	$16,378	$0	$2,210	$4,420	$6,630	$9,061	$12,007
COUNTY-OTHER	SAN JACINTO	LIBERTY	08075714614610	$0	$0	$0	$0	$872,146	$0	$954,131	$0	$0	$0	$0	$639,197	$201,355	$0	$2,666,829	$0	$43,104	$84,774	$84,979	$89,895	$104,423	$0	$21,062	$41,425	$62,587	$85,347	$113,588	$0	$15,470	$30,424	$45,967	$62,689	$83,462
COUNTY-OTHER	TRINITY	MADISON	08075715715708	$0	$0	$0	$0	$127,309	$0	$138,951	$0	$0	$0	$0	$93,191	$29,356	$0	$388,808	$0	$12,532	$21,777	$9,245	$0	$12,121	$0	$6,128	$10,650	$10,650	$10,650	$16,577	$0	$4,494	$7,808	$5,083	$7,367	$12,155
COUNTY-OTHER	BRAZOS	MADISON	08075715715712	$0	$0	$0	$0	$12,347	$0	$13,474	$0	$0	$0	$0	$9,037	$2,847	$0	$37,705	$0	$822	$1,438	$1,027	$1,027	$1,438	$0	$402	$703	$904	$1,206	$1,608	$0	$295	$516	$663	$884	$1,179
COUNTY-OTHER	SAN JACINTO	MONTGOMERY	08075717017010	$25,504,488	$0	$7,765,291	$0	$10,685,607	$9,218,016	$18,461,972	$0	$48,485	$48,485	$0	$25,072,381	$7,906,042	$0	$104,710,766	$711,150	$1,758,956	$2,347,447	$3,028,722	$3,698,926	$4,341,483	$299,973	$701,857	$1,859,920	$3,214,141	$4,753,426	$6,557,739	$293,850	$759,339	$1,269,763	$1,822,742	$2,084,548	$2,253,019
COUNTY-OTHER	TRINITY	POLK	08075718718708	$0	$0	$0	$0	$274,643	$0	$299,798	$0	$0	$0	$0	$201,054	$63,335	$0	$838,829	$0	$14,586	$25,474	$21,161	$27,939	$37,386	$0	$7,133	$12,458	$17,481	$26,120	$35,762	$0	$5,230	$9,134	$12,818	$19,153	$26,225
COUNTY-OTHER	TRINITY	SAN JACINTO	08075720420408	$0	$0	$0	$0	$206,595	$0	$225,690	$0	$0	$0	$0	$151,300	$47,661	$0	$631,246	$0	$35,726	$55,035	$19,309	$0	$0	$0	$17,462	$26,903	$26,903	$26,903	$26,903	$0	$12,818	$19,742	$9,134	$2,431	$0
COUNTY-OTHER	SAN JACINTO	SAN JACINTO	08075720420410	$0	$0	$0	$0	$201,348	$0	$219,795	$0	$0	$0	$0	$147,400	$46,433	$0	$614,976	$0	$21,773	$37,797	$24,036	$12,738	$7,807	$0	$10,646	$18,481	$22,400	$24,711	$26,218	$0	$7,808	$13,554	$16,427	$18,122	$19,227
COUNTY-OTHER	TRINITY	TRINITY	08075722822808	$0	$0	$0	$0	$27,008	$0	$29,474	$0	$0	$0	$0	$19,769	$6,227	$0	$82,478	$0	$6,575	$7,191	$616	$0	$0	$0	$3,215	$3,517	$3,517	$3,517	$3,517	$0	$2,357	$2,578	$1,547	$0	$0
COUNTY-OTHER	TRINITY	WALKER	08075723623608	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$205	$205	$0	$0	$0	$0	$100	$100	$100	$100	$100	$0	$74	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO	WALKER	08075723623610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO	WALLER	08075723723710	$0	$0	$0	$0	$937,644	$0	$1,026,554	$0	$0	$0	$0	$687,469	$216,562	$0	$2,868,229	$0	$35,316	$79,239	$86,618	$102,984	$128,132	$0	$17,261	$38,723	$59,585	$89,020	$122,127	$0	$12,670	$28,435	$43,757	$65,415	$89,798
COUNTY-OTHER	BRAZOS	WALLER	08075723723712	$0	$0	$0	$0	$166,650	$0	$181,900	$0	$0	$0	$0	$121,992	$38,429	$0	$508,971	$0	$0	$5,753	$13,354	$22,188	$31,020	$0	$0	$2,813	$6,531	$13,664	$21,700	$0	$0	$2,063	$4,788	$10,018	$15,912
CROSBY MUD	SAN JACINTO	HARRIS	08407800010110	$0	$0	$0	$0	$20,835	$0	$22,737	$0	$0	$0	$0	$15,250	$4,804	$0	$63,627	$0	$2,876	$5,547	$2,671	$0	$0	$0	$1,407	$2,713	$2,713	$2,713	$2,713	$0	$1,031	$1,989	$1,989	$1,989	$1,989
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	HARRIS	08408100010110	$35,566	$0	$12,241	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$16,733	$13,187	$0	$174,651	$9,883	$11,664	$2,820	$1,930	$1,633	$1,633	$123	$419	$592	$740	$864	$1,012	$123	$417	$589	$737	$859	$1,007
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	MONTGOMERY	08408100017010	$0	$0	$0	$0	$1,108,555	$0	$1,215,191	$0	$0	$0	$0	$813,311	$256,203	$0	$3,393,260	$21,157	$52,781	$68,990	$84,975	$120,548	$158,083	$10,345	$25,804	$44,066	$67,325	$102,906	$144,404	$7,587	$18,932	$32,339	$49,429	$75,654	$106,299
CUT AND SHOOT	SAN JACINTO	MONTGOMERY	08085400017010	$387,153	$0	$133,052	$0	$66,359	$0	$72,423	$0	$48,485	$48,485	$0	$230,646	$80,576	$0	$1,067,179	$7,396	$17,668	$57,937	$48,407	$13,190	$26,966	$3,617	$8,641	$15,044	$15,168	$17,237	$19,650	$2,652	$6,335	$6,409	$6,532	$8,594	$11,001
DAISETTA	NECHES	LIBERTY	08014900014606	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$205	$411	$411	$411	$822	$0	$100	$201	$301	$402	$703	$0	$74	$147	$221	$295	$516
DAISETTA	TRINITY	LIBERTY	08014900014608	$0	$0	$0	$0	$8,489	$0	$9,263	$0	$0	$0	$0	$6,213	$1,957	$0	$25,922	$0	$411	$616	$411	$822	$1,438	$0	$201	$301	$402	$703	$1,105	$0	$147	$221	$295	$516	$810
DANBURY	SAN JACINTO-BRAZOS	BRAZORIA	08069300002011	$0	$0	$0	$0	$30,095	$0	$32,843	$0	$0	$0	$0	$22,028	$6,939	$0	$91,906	$0	$0	$1,438	$2,876	$3,698	$5,136	$0	$0	$703	$1,407	$2,512	$3,919	$0	$0	$516	$1,031	$1,842	$2,873
DAYTON	TRINITY	LIBERTY	08015200014608	$0	$0	$0	$0	$1,620,486	$0	$1,783,627	$0	$0	$0	$0	$1,191,440	$375,319	$0	$4,970,872	$0	$86,769	$167,036	$156,261	$164,184	$190,354	$0	$42,284	$81,419	$118,483	$161,453	$211,168	$0	$31,234	$60,111	$87,440	$119,190	$156,022
DEER PARK	SAN JACINTO	HARRIS	08015400010110	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$0	$4,713	$0	$0	$411	$411	$0	$0	$0	$0	$201	$201	$201	$201	$0	$0	$147	$147	$147	$147
DEER PARK	SAN JACINTO-BRAZOS	HARRIS	08015400010111	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$0	$4,713	$0	$205	$411	$205	$0	$0	$0	$100	$201	$201	$201	$201	$0	$74	$147	$147	$147	$147
DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	08016500008411	$868,743	$0	$297,541	$0	$373,201	$0	$411,801	$0	$48,485	$48,485	$0	$682,950	$223,058	$0	$2,954,263	$99,940	$220,826	$142,049	$25,762	$9,792	$10,978	$48,644	$67,231	$70,749	$71,513	$72,376	$73,338	$36,022	$21,240	$26,003	$26,765	$27,624	$28,582
EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	08409800017010	$1,151,873	$0	$394,914	$0	$156,569	$0	$170,952	$0	$48,485	$48,485	$0	$656,008	$214,570	$0	$2,841,855	$16,845	$41,697	$131,951	$115,403	$50,489	$90,665	$8,237	$20,388	$36,680	$38,060	$45,074	$53,134	$6,041	$14,954	$16,452	$17,827	$24,850	$32,928
EL DORADO UD	SAN JACINTO	HARRIS	08410100010110	$0	$0	$0	$0	$405,540	$0	$442,959	$0	$0	$0	$0	$296,975	$93,551	$0	$1,239,025	$26,699	$66,730	$56,054	$23,625	$16,025	$17,669	$13,053	$32,616	$40,451	$44,169	$48,288	$52,810	$9,576	$23,941	$29,687	$32,413	$35,433	$38,748
EL LAGO	SAN JACINTO-BRAZOS	HARRIS	08069500010111	$266,961	$0	$91,737	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$125,544	$47,464	$0	$628,630	$45,753	$49,018	$5,194	$3,562	$2,227	$2,227	$6,087	$6,629	$6,950	$7,221	$7,320	$7,591	$6,090	$6,630	$6,949	$7,219	$7,317	$7,587
FAIRCHILDS	BRAZOS	FORT BEND	08101900007912	$0	$296,695	$0	$6,123,080	$0	$0	$0	$0	$0	$0	$0	$2,246,921	$707,809	$0	$9,374,506	$0	$119,450	$337,921	$341,738	$289,431	$356,124	$0	$50,370	$142,646	$194,628	$264,742	$344,930	$0	$4,093	$11,590	$15,813	$21,510	$28,025
FIRST COLONY MUD #9	BRAZOS	FORT BEND	08411300007912	$755,396	$0	$259,385	$0	$299,532	$0	$328,430	$0	$48,485	$48,485	$0	$574,960	$189,039	$0	$2,503,712	$0	$70,085	$148,375	$117,396	$58,794	$30,804	$0	$34,196	$48,876	$55,378	$58,650	$60,498	$0	$25,193	$38,625	$28,410	$25,415	$25,193
FLO COMMUNITY WSC	TRINITY	LEON	08411400014508	$0	$0	$0	$0	$123,421	$0	$134,740	$0	$0	$0	$0	$90,356	$28,463	$0	$376,981	$0	$21,978	$32,867	$10,889	$0	$0	$0	$10,746	$16,071	$16,071	$16,071	$16,071	$0	$7,882	$11,786	$11,492	$10,387	$10,976
FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	08411700007912	$418,853	$0	$144,027	$0	$214,234	$0	$234,112	$0	$48,485	$48,485	$0	$353,929	$119,412	$0	$1,581,536	$0	$48,511	$102,492	$76,027	$31,388	$13,347	$0	$11,848	$33,927	$37,592	$39,145	$39,811	$0	$9,699	$26,495	$19,030	$15,937	$14,611
FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	08411800007912	$269,804	$0	$92,748	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$126,893	$47,892	$0	$634,307	$0	$30,012	$55,302	$25,290	$0	$0	$0	$3,469	$7,673	$7,673	$7,673	$7,673	$0	$3,462	$7,661	$7,661	$7,661	$7,661
FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	08411900007912	$360,200	$0	$123,767	$0	$82,558	$0	$90,108	$0	$48,485	$48,485	$0	$229,822	$80,316	$0	$1,063,741	$0	$49,791	$92,741	$42,950	$0	$0	$0	$11,001	$20,993	$20,993	$20,993	$20,993	$0	$9,282	$18,121	$17,753	$13,996	$12,375
FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	08412100007911	$870,619	$0	$298,670	$0	$402,350	$0	$442,959	$0	$48,485	$48,485	$0	$705,109	$230,038	$0	$3,046,716	$0	$94,880	$196,383	$148,080	$63,903	$22,666	$0	$46,203	$65,673	$73,417	$76,297	$77,184	$0	$34,181	$52,081	$36,563	$30,891	$29,123
FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	08412200007911	$0	$1,352,305	$0	$26,842,762	$0	$531,514	$0	$0	$0	$0	$0	$10,054,303	$3,167,235	$0	$41,948,119	$0	$67,668	$1,003,947	$1,630,310	$1,614,355	$1,959,250	$0	$252,429	$665,397	$965,166	$1,370,481	$1,833,398	$0	$14,463	$48,022	$72,380	$105,317	$142,935
FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	08412600007912	$380,835	$0	$130,844	$0	$88,728	$0	$96,845	$0	$48,485	$48,485	$0	$244,038	$84,795	$0	$1,123,055	$0	$52,437	$97,913	$45,476	$0	$0	$0	$11,772	$22,383	$22,383	$22,383	$22,383	$0	$9,920	$19,300	$18,785	$14,807	$13,113
FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	08412700007912	$280,143	$0	$96,296	$0	$61,730	$0	$67,370	$0	$48,485	$48,485	$0	$176,939	$63,657	$0	$843,105	$0	$40,727	$72,273	$32,779	$1,233	$0	$0	$8,566	$15,402	$16,004	$16,004	$16,004	$0	$7,219	$13,407	$13,849	$10,903	$9,650
FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	08412800007912	$224,960	$0	$77,349	$0	$48,614	$0	$53,054	$0	$48,485	$48,485	$0	$141,392	$52,460	$0	$694,797	$0	$34,688	$58,110	$25,887	$2,465	$0	$0	$6,899	$11,522	$12,727	$12,727	$12,727	$0	$5,820	$10,141	$11,025	$8,741	$7,710
FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	08412900007912	$0	$663,755	$0	$13,633,526	$0	$0	$0	$0	$0	$0	$0	$5,004,048	$1,576,340	$0	$20,877,668	$0	$241,243	$696,478	$748,518	$681,484	$830,449	$0	$101,946	$295,758	$419,866	$584,669	$772,840	$0	$8,283	$24,031	$34,115	$47,506	$62,795
FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	08413200010110	$402,585	$0	$138,457	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$189,365	$67,568	$0	$894,899	$21,440	$46,141	$35,965	$18,087	$13,053	$13,793	$2,044	$6,150	$8,023	$9,157	$10,192	$11,449	$2,038	$6,139	$8,005	$9,134	$10,166	$11,418
FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	08021700002011	$820,608	$0	$281,967	$0	$224,502	$0	$245,059	$0	$48,485	$48,485	$0	$550,248	$181,255	$0	$2,400,609	$0	$32,464	$78,880	$85,384	$81,919	$91,447	$0	$6,861	$21,537	$32,192	$42,184	$52,568	$0	$5,648	$17,508	$26,471	$35,310	$44,764
FREEPORT	BRAZOS	BRAZORIA	08021700002012	$0	$0	$0	$0	$37,812	$0	$41,264	$0	$0	$0	$0	$27,677	$8,719	$0	$115,472	$0	$1,849	$4,725	$4,725	$3,698	$3,493	$0	$904	$2,311	$3,215	$4,120	$4,924	$0	$663	$1,694	$2,357	$3,020	$3,610
FRIENDSWOOD	SAN JACINTO-BRAZOS	GALVESTON	08021900008411	$0	$0	$0	$0	$30,866	$0	$33,685	$0	$0	$0	$0	$22,593	$7,117	$0	$94,262	$0	$5,753	$8,218	$2,465	$0	$0	$0	$2,813	$4,019	$4,019	$4,019	$4,019	$0	$2,063	$2,947	$2,799	$2,947	$2,947
FRIENDSWOOD	SAN JACINTO-BRAZOS	HARRIS	08021900010111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	08086900007911	$97,054	$0	$33,391	$0	$0	$155,213	$0	$0	$48,485	$48,485	$0	$99,980	$39,415	$0	$522,022	$0	$13,189	$19,760	$6,571	$15,819	$25,752	$0	$49,200	$73,714	$73,714	$74,824	$76,475	$0	$2,819	$4,223	$4,223	$5,328	$6,973
FULSHEAR	BRAZOS	FORT BEND	08086900007912	$154,141	$0	$53,017	$0	$0	$232,819	$0	$0	$48,485	$48,485	$0	$153,992	$56,429	$0	$747,367	$0	$19,783	$29,641	$9,857	$20,409	$35,518	$0	$73,800	$110,572	$110,572	$112,444	$114,955	$0	$4,228	$6,335	$6,335	$8,201	$10,706
GALENA PARK	SAN JACINTO	HARRIS	08022600010110	$99,711	$0	$34,313	$0	$1,543	$0	$1,684	$0	$48,462	$48,462	$0	$48,038	$23,048	$0	$305,262	$12,405	$12,851	$2,044	$2,638	$5,639	$11,126	$543	$617	$1,015	$1,188	$1,952	$3,037	$540	$614	$957	$1,129	$1,890	$2,971
GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	08022700008411	$5,397,706	$0	$1,749,979	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$2,501,690	$795,984	$0	$10,542,328	$0	$919,128	$919,128	$0	$0	$0	$0	$152,442	$152,442	$152,442	$152,442	$152,442	$0	$178,318	$178,318	$178,318	$178,318	$178,318
GALVESTON COUNTY MUD #1	SAN JACINTO-BRAZOS	GALVESTON	08413500008411	$0	$0	$0	$0	$6,173	$0	$6,737	$0	$0	$0	$0	$4,519	$1,423	$0	$18,853	$0	$1,027	$1,644	$616	$0	$0	$0	$502	$804	$804	$804	$804	$0	$368	$589	$589	$589	$589
GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	08413600008411	$0	$781,119	$0	$13,903,936	$3,087	$0	$3,369	$0	$0	$0	$0	$5,142,028	$1,619,805	$0	$21,453,343	$0	$1,870,194	$1,870,400	$205	$0	$0	$0	$921,573	$921,673	$921,673	$921,673	$921,673	$0	$75,097	$75,171	$75,171	$75,171	$75,171
GREEN TRAILS MUD	SAN JACINTO	HARRIS	08414300010110	$0	$0	$0	$0	$925,183	$0	$1,013,922	$0	$0	$0	$0	$678,687	$213,795	$0	$2,831,586	$45,972	$136,799	$130,653	$62,625	$46,215	$47,447	$22,460	$66,706	$86,169	$97,316	$108,765	$120,514	$16,501	$49,208	$63,499	$71,676	$80,074	$88,693
GROVETON	TRINITY	TRINITY	08025500022808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
H M W SUD	SAN JACINTO	MONTGOMERY	08414700017010	$2,969,451	$0	$1,009,509	$0	$515,669	$0	$565,910	$0	$48,485	$48,485	$0	$1,771,189	$565,867	$0	$7,494,564	$57,837	$137,698	$381,580	$305,727	$102,680	$209,986	$28,241	$67,180	$115,918	$116,583	$132,995	$151,511	$20,774	$49,503	$50,755	$51,418	$67,993	$86,728
HARDIN	TRINITY	LIBERTY	08087800014608	$0	$0	$0	$0	$76,395	$0	$83,371	$0	$0	$0	$0	$55,918	$17,615	$0	$233,299	$0	$3,904	$7,396	$7,396	$8,013	$9,040	$0	$1,909	$3,617	$5,526	$7,536	$9,947	$0	$1,400	$2,652	$4,052	$5,525	$7,293
HARDIN WSC	TRINITY	LIBERTY	08414800014608	$0	$0	$0	$0	$410,315	$0	$448,012	$0	$0	$0	$0	$300,415	$94,634	$0	$1,253,376	$0	$20,952	$41,082	$40,261	$42,314	$48,062	$0	$10,245	$20,088	$29,931	$40,778	$53,430	$0	$7,514	$14,733	$21,952	$29,908	$39,190
HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	08414900010110	$21,679	$0	$7,461	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$10,199	$11,129	$0	$147,390	$12,850	$12,850	$0	$0	$0	$0	$617	$617	$617	$617	$617	$617	$614	$344	$98	$74	$74	$74
HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	08415000010110	$312,559	$0	$107,262	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$146,937	$54,203	$0	$717,885	$62,589	$62,589	$0	$0	$0	$0	$8,887	$8,887	$8,887	$8,887	$8,887	$8,887	$8,913	$6,532	$6,139	$5,230	$5,181	$5,181
HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	08415100010110	$289,392	$0	$99,558	$0	$6,945	$0	$7,579	$0	$48,462	$48,462	$0	$141,216	$52,401	$0	$694,016	$24,397	$31,654	$13,864	$14,319	$14,386	$14,534	$2,536	$4,074	$5,437	$6,719	$7,828	$9,135	$2,529	$3,928	$5,181	$6,458	$7,563	$8,864
HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	08415300010110	$0	$0	$0	$0	$418,661	$0	$457,276	$0	$0	$0	$0	$306,578	$96,576	$0	$1,279,090	$20,952	$62,212	$58,927	$27,528	$20,134	$21,777	$10,245	$30,407	$39,046	$43,868	$48,892	$54,518	$7,514	$22,320	$28,656	$32,192	$35,875	$40,000
HARRIS COUNTY MUD #119 INWOOD NORTH	SAN JACINTO	HARRIS	08415400010110	$0	$0	$0	$0	$510,917	$0	$560,015	$0	$0	$0	$0	$374,826	$118,075	$0	$1,563,834	$43,309	$120,524	$93,033	$15,818	$0	$0	$21,162	$58,818	$66,553	$66,553	$66,553	$66,553	$15,543	$43,315	$48,987	$48,030	$47,440	$47,440
HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	08415700010110	$0	$0	$0	$0	$2,314,478	$0	$2,575,227	$0	$0	$0	$0	$1,711,397	$539,112	$0	$7,140,214	$86,160	$281,814	$301,049	$183,831	$155,244	$156,872	$41,989	$135,890	$187,161	$225,409	$262,867	$301,904	$31,013	$102,615	$140,626	$168,840	$196,465	$225,268
HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	08415900010110	$0	$0	$0	$0	$713,556	$0	$784,863	$0	$0	$0	$0	$524,447	$165,207	$0	$2,188,073	$62,740	$165,914	$128,026	$24,852	$0	$0	$30,627	$80,828	$92,979	$92,979	$92,979	$92,979	$22,541	$59,742	$68,656	$68,140	$68,140	$68,140
HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	08416000010110	$0	$0	$0	$0	$1,179,997	$0	$1,293,509	$0	$0	$0	$0	$865,727	$272,715	$0	$3,611,947	$38,801	$133,074	$147,408	$94,805	$85,184	$87,028	$18,963	$64,872	$90,824	$111,186	$132,448	$153,710	$13,923	$47,882	$66,961	$81,915	$97,532	$113,149
HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	08416100010110	$0	$0	$0	$0	$2,118,066	$0	$2,342,800	$0	$0	$0	$0	$1,561,304	$491,831	$0	$6,514,003	$60,494	$217,424	$257,072	$182,442	$166,632	$168,055	$29,534	$105,359	$154,100	$194,220	$235,325	$276,134	$21,731	$78,748	$114,844	$144,457	$174,807	$204,936
HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	08416200010110	$0	$0	$0	$0	$878,020	$0	$960,868	$0	$0	$0	$0	$643,611	$202,746	$0	$2,685,244	$33,470	$109,056	$114,387	$67,347	$56,272	$57,708	$16,360	$53,226	$72,189	$86,145	$99,699	$114,356	$12,007	$39,190	$53,112	$63,352	$73,297	$84,052
HARRIS COUNTY MUD #158	SAN JACINTO	HARRIS	08416500010110	$21,679	$0	$7,461	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$10,199	$11,132	$0	$147,440	$0	$0	$12,854	$12,854	$0	$0	$0	$0	$617	$617	$617	$617	$0	$0	$614	$491	$467	$442
HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	08417000010110	$0	$0	$0	$0	$768,442	$0	$840,444	$0	$0	$0	$0	$563,110	$177,387	$0	$2,349,383	$30,393	$97,419	$100,906	$58,117	$48,062	$49,294	$14,858	$47,568	$64,128	$75,978	$87,627	$100,079	$10,902	$34,991	$47,146	$55,838	$64,383	$73,518
HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	08417400010110	$0	$0	$0	$0	$1,007,857	$0	$1,104,030	$0	$0	$0	$0	$739,160	$232,845	$0	$3,083,892	$39,621	$127,202	$132,119	$76,777	$63,658	$64,889	$19,363	$62,039	$83,800	$99,560	$114,918	$131,278	$14,217	$45,746	$61,731	$73,297	$84,567	$96,575
HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	08417900010110	$504,783	$0	$173,374	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$237,355	$82,686	$0	$1,095,121	$29,860	$82,140	$65,024	$13,338	$594	$0	$3,444	$12,136	$14,255	$14,353	$14,353	$14,353	$3,438	$12,155	$14,266	$14,365	$14,217	$14,217
HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	08418200010110	$898,592	$0	$308,209	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$422,380	$140,971	$0	$1,867,076	$59,375	$141,021	$102,366	$21,759	$1,039	$0	$8,352	$21,930	$25,374	$25,547	$25,547	$25,547	$8,373	$22,050	$25,488	$25,660	$25,414	$25,414
HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	08418300010110	$0	$0	$0	$0	$459,946	$0	$503,593	$0	$0	$0	$0	$337,239	$106,234	$0	$1,407,012	$41,260	$107,879	$81,410	$14,791	$0	$0	$20,163	$52,675	$59,908	$59,908	$59,908	$59,908	$14,807	$38,748	$44,052	$43,683	$43,683	$43,683
HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	08418400010110	$401,771	$0	$138,066	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$188,943	$67,435	$0	$893,139	$32,367	$69,860	$45,501	$8,008	$0	$0	$3,861	$10,094	$11,425	$11,425	$11,425	$11,425	$3,855	$10,092	$11,418	$11,271	$11,001	$11,001
HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	08418500010110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,131,600	$6,131,600	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	08418600010110	$2,110,101	$0	$723,734	$0	$134,226	$0	$146,530	$0	$48,462	$48,462	$0	$1,090,107	$351,314	$0	$4,652,936	$95,125	$162,678	$130,655	$125,008	$117,397	$117,979	$14,300	$31,498	$47,558	$57,851	$67,078	$77,468	$14,414	$29,221	$43,045	$53,383	$62,640	$73,076
HARRIS COUNTY MUD #55	SAN JACINTO-BRAZOS	HARRIS	08418700010111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	08418900010110	$311,044	$0	$107,006	$0	$17,749	$0	$19,369	$0	$48,462	$48,462	$0	$159,309	$58,100	$0	$769,500	$23,363	$32,354	$17,037	$16,201	$16,756	$18,533	$2,364	$4,654	$6,721	$8,077	$9,506	$11,157	$2,357	$4,322	$6,089	$7,440	$8,864	$10,509
HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	08419000010110	$0	$0	$0	$0	$509,259	$0	$556,647	$0	$0	$0	$0	$373,067	$117,521	$0	$1,556,494	$29,367	$83,934	$75,518	$30,813	$20,134	$20,955	$14,356	$41,005	$51,250	$56,073	$61,096	$66,320	$10,534	$30,129	$37,643	$41,179	$44,862	$48,693
HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	08419100010110	$0	$0	$0	$0	$437,912	$0	$478,329	$0	$0	$0	$0	$320,684	$101,020	$0	$1,337,945	$21,362	$64,057	$61,388	$29,376	$21,777	$23,215	$10,445	$31,307	$40,448	$45,673	$51,098	$57,025	$7,661	$22,983	$29,687	$33,518	$37,495	$41,842
HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	08419300010110	$598,243	$0	$205,629	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$281,355	$96,550	$0	$1,278,746	$0	$13,003	$47,853	$54,980	$40,407	$43,504	$0	$641	$6,435	$9,781	$13,151	$17,012	$0	$638	$6,433	$9,773	$13,137	$16,992
HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	08419500010110	$0	$0	$0	$0	$425,567	$0	$465,697	$0	$0	$0	$0	$311,942	$98,266	$0	$1,301,472	$37,161	$98,472	$76,307	$14,997	$0	$0	$18,162	$48,094	$55,427	$55,427	$55,427	$55,427	$13,333	$35,359	$40,737	$40,221	$40,516	$40,516
HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	08419600010110	$443,519	$0	$152,450	$0	$6,945	$0	$7,579	$0	$48,462	$48,462	$0	$213,673	$75,225	$0	$996,316	$49,274	$56,383	$13,272	$12,096	$13,941	$18,384	$6,672	$8,185	$9,475	$10,461	$11,792	$13,517	$6,679	$8,054	$9,233	$10,215	$11,541	$13,260
HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	08419700010110	$571,138	$0	$196,388	$0	$30,867	$0	$33,685	$0	$48,462	$48,462	$0	$291,227	$99,656	$0	$1,319,885	$37,228	$54,335	$30,155	$27,861	$29,923	$32,877	$4,669	$9,303	$12,334	$14,797	$17,308	$20,261	$4,665	$8,570	$11,247	$13,702	$16,207	$19,153
HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	08419800010110	$664,876	$0	$228,189	$0	$8,489	$0	$9,263	$0	$48,462	$48,462	$0	$318,786	$108,337	$0	$1,434,863	$83,689	$91,983	$15,905	$16,359	$16,164	$16,756	$12,397	$14,107	$15,770	$17,224	$18,457	$20,009	$12,474	$14,045	$15,543	$16,992	$18,219	$19,766
HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	08419900010110	$182,723	$0	$62,848	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$85,950	$34,991	$0	$463,435	$19,961	$36,843	$20,443	$3,561	$0	$0	$1,799	$4,605	$5,197	$5,197	$5,197	$5,197	$1,793	$4,592	$5,181	$5,132	$5,009	$5,009
HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	08420000010110	$186,684	$0	$64,160	$0	$772	$0	$842	$0	$48,462	$48,462	$0	$88,360	$35,750	$0	$473,493	$38,552	$38,701	$502	$353	$742	$2,227	$4,889	$4,914	$5,039	$5,039	$5,162	$5,409	$4,886	$4,911	$5,010	$5,010	$5,132	$5,378
HEDWIG VILLAGE	SAN JACINTO	HARRIS	08026900010110	$404,853	$0	$138,839	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$190,292	$67,860	$0	$898,769	$76,429	$76,577	$445	$1,188	$891	$594	$11,189	$11,214	$11,263	$11,411	$11,411	$11,510	$11,246	$11,271	$11,320	$11,467	$11,418	$11,565
HEMPSTEAD	BRAZOS	WALLER	08027100023712	$0	$0	$0	$0	$2,658,081	$0	$2,980,291	$0	$0	$0	$0	$1,973,430	$621,656	$0	$8,233,458	$0	$96,703	$219,602	$263,180	$305,288	$357,948	$0	$47,083	$106,751	$174,702	$254,326	$346,971	$0	$34,844	$79,264	$130,092	$190,129	$260,700
HILLCREST	SAN JACINTO-BRAZOS	BRAZORIA	08088100002011	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$0	$205	$0	$0	$0	$0	$0	$100	$0	$0	$0	$0	$0	$74
HILSHIRE VILLAGE	SAN JACINTO	HARRIS	08102500010110	$18,215	$0	$6,269	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$8,569	$10,619	$0	$140,641	$0	$9,887	$12,262	$2,375	$0	$0	$0	$123	$518	$518	$518	$518	$0	$123	$516	$467	$467	$467
HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	08027900008411	$0	$63,082	$0	$1,301,933	$772	$0	$842	$0	$0	$0	$0	$478,320	$150,677	$0	$1,995,626	$0	$173,987	$173,987	$0	$0	$0	$0	$73,438	$73,438	$73,438	$73,438	$73,438	$0	$6,033	$5,959	$5,959	$5,959	$5,959
HOLIDAY LAKES	SAN JACINTO-BRAZOS	BRAZORIA	08077900002011	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$0	$205	$0	$0	$0	$0	$0	$100	$0	$0	$0	$0	$0	$74
HOUSTON	SAN JACINTO	FORT BEND	08028500007910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HOUSTON	SAN JACINTO-BRAZOS	FORT BEND	08028500007911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HOUSTON	SAN JACINTO	HARRIS	08028500010110	$0	$17,989,201	$0	$191,599,528	$0	$0	$0	$0	$0	$0	$0	$73,356,055	$23,108,100	$0	$306,052,884	$0	$0	$0	$5,714,153	$9,950,854	$20,968,932	$0	$0	$0	$5,058,600	$8,257,370	$26,485,078	$0	$0	$0	$409,839	$669,533	$2,167,421
HOUSTON	SAN JACINTO-BRAZOS	HARRIS	08028500010111	$0	$0	$0	$0	$261,204	$0	$285,481	$0	$0	$0	$0	$191,340	$60,275	$0	$798,300	$0	$42,489	$69,599	$27,110	$0	$0	$0	$20,762	$34,016	$34,016	$34,016	$34,016	$0	$15,249	$24,972	$24,972	$24,972	$24,972
HOUSTON	SAN JACINTO	MONTGOMERY	08028500017010	$0	$0	$0	$0	$531,038	$0	$580,226	$0	$0	$0	$0	$388,942	$122,522	$0	$1,622,728	$0	$12,737	$35,537	$49,909	$63,246	$78,830	$0	$6,229	$17,376	$30,630	$48,292	$69,154	$0	$4,567	$12,744	$22,468	$35,433	$50,755
HUMBLE	SAN JACINTO	HARRIS	08028900010110	$3,748,402	$0	$1,279,251	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$1,759,679	$562,237	$0	$7,446,493	$128,610	$373,765	$346,849	$162,289	$112,874	$113,166	$19,874	$60,696	$77,611	$87,686	$96,379	$106,503	$20,135	$62,321	$79,411	$89,528	$98,245	$108,410
HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	08029000010110	$1,219,974	$0	$417,603	$0	$36,268	$0	$39,580	$0	$48,462	$48,462	$0	$599,699	$196,829	$0	$2,606,877	$147,846	$164,485	$32,777	$31,985	$29,775	$30,809	$23,077	$27,435	$31,643	$34,277	$36,592	$39,398	$23,450	$27,158	$30,743	$33,370	$35,678	$38,477

WUG Name	wug_basin	WUG County	Annual Costs for Municipal Conservation						Annual Costs for Irrigation Conservation						Project-Specific Annual Costs						Total Annual Cost					
			2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
ALVIN	SAN JACINTO-BRAZOS	BRAZORIA	$0	$36,210	$46,434	$48,138	$50,481	$53,676	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$36,210	$184,197	$337,571	$488,648	$682,353
AMES	TRINITY	LIBERTY	$0	$1,818	$2,020	$2,222	$2,424	$2,828	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,170	$17,963	$20,478	$25,681	$33,395
ANAHUAC	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANAHUAC	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANGLETON	SAN JACINTO-BRAZOS	BRAZORIA	$30,033	$30,033	$30,246	$30,459	$31,098	$32,376	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$66,185	$82,689	$58,162	$48,850	$53,617	$72,708
ARCOLA	SAN JACINTO-BRAZOS	FORT BEND	$4,444	$4,848	$5,252	$5,858	$6,262	$7,070	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,444	$45,075	$103,149	$96,026	$84,195	$97,140
BACLIFF MUD	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$132,139	$132,139	$30,803	$30,803	$30,803
BAILEY'S PRAIRIE	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,138	$1,897	$2,041	$2,769	$4,256
BAILEY'S PRAIRIE	BRAZOS	BRAZORIA	$0	$0	$0	$202	$202	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$202	$581	$581
BAYOU VISTA	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,138	$1,519	$902	$697	$697
BAYTOWN	TRINITY-SAN JACINTO	CHAMBERS	$6,390	$14,058	$15,123	$15,975	$17,040	$18,318	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,390	$17,474	$20,437	$20,959	$22,894	$25,249
BAYTOWN	TRINITY-SAN JACINTO	HARRIS	$112,251	$224,502	$225,780	$226,845	$230,892	$236,643	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$112,251	$224,881	$228,437	$229,297	$232,111	$237,862
BAYTOWN	SAN JACINTO	HARRIS	$6,603	$13,419	$13,419	$13,419	$13,632	$14,058	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,603	$13,798	$13,798	$13,593	$14,185	$15,371
BEACH CITY	TRINITY-SAN JACINTO	CHAMBERS	$3,030	$4,040	$4,848	$5,656	$6,464	$7,272	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$70,550	$390,778	$439,507	$290,515	$319,446	$357,184
BEACH CITY	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$1,010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,147	$68,398	$75,816	$48,257	$49,978	$49,416
BEASLEY	BRAZOS	FORT BEND	$0	$202	$202	$202	$202	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581	$961	$1,515	$2,069	$2,417
BEASLEY	BRAZOS-COLORADO	FORT BEND	$0	$1,010	$1,212	$1,414	$1,616	$1,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,185	$10,323	$13,578	$18,702	$25,138
BELLAIRE	SAN JACINTO	HARRIS	$50,481	$53,889	$57,510	$61,131	$64,965	$69,225	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$336,221	$396,985	$242,205	$261,371	$275,516	$296,890
BELLVILLE	BRAZOS	AUSTIN	$0	$27,368	$30,789	$32,655	$33,588	$35,143	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$135,354	$209,702	$189,553	$171,073	$182,893
BLUE BELL MANOR UTILITY COMPANY	SAN JACINTO	HARRIS	$6,464	$6,262	$6,262	$6,060	$6,060	$6,060	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$59,585	$143,936	$134,165	$87,754	$77,113	$77,113
BOLIVAR PENINSULAR SUD	NECHES-TRINITY	GALVESTON	$20,837	$22,392	$23,014	$23,325	$23,325	$23,636	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$20,837	$22,392	$23,014	$23,325	$23,325	$23,636
BRAZORIA	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA COUNTY MUD #1	SAN JACINTO-BRAZOS	BRAZORIA	$0	$22,392	$29,545	$35,454	$41,985	$49,138	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$136,038	$275,677	$335,602	$398,764	$477,372
BRAZORIA COUNTY MUD #2	BRAZOS	BRAZORIA	$0	$29,545	$37,942	$45,717	$53,803	$62,511	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$173,316	$345,373	$421,723	$500,374	$595,740
BRAZORIA COUNTY MUD #3	SAN JACINTO-BRAZOS	BRAZORIA	$0	$16,172	$21,148	$25,502	$30,167	$35,143	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$98,456	$198,575	$241,433	$287,095	$343,778
BRAZORIA COUNTY MUD #4	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRAZORIA COUNTY MUD #5	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BRITMOORE UTILITIES	SAN JACINTO	HARRIS	$5,252	$6,262	$7,070	$7,878	$8,686	$9,696	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$37,077	$85,113	$81,845	$63,153	$60,997	$65,155
BROOKSHIRE	BRAZOS	WALLER	$0	$15,550	$19,282	$23,325	$27,990	$33,899	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$62,604	$134,614	$189,796	$251,513	$328,094
BROOKSIDE VILLAGE	SAN JACINTO-BRAZOS	BRAZORIA	$0	$3,232	$3,636	$3,838	$4,242	$4,646	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,546	$18,441	$24,876	$30,774	$38,772
BUFFALO	TRINITY	LEON	$0	$4,242	$4,444	$4,444	$4,444	$4,444	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,907	$24,562	$16,872	$13,010	$13,231
BUNKER HILL VILLAGE	SAN JACINTO	HARRIS	$27,990	$27,679	$27,368	$27,057	$27,057	$27,057	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$130,734	$130,202	$50,335	$49,902	$49,730	$49,730
CANDLELIGHT HILLS SUBDIVISION	SAN JACINTO	HARRIS	$5,050	$5,858	$6,868	$7,676	$8,686	$9,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,890	$82,354	$80,026	$62,756	$60,804	$65,054
CENTERVILLE	TRINITY	LEON	$0	$2,222	$2,424	$2,222	$2,222	$2,222	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,536	$10,396	$7,096	$5,511	$5,584
CHIMNEY HILL MUD	SAN JACINTO	HARRIS	$0	$8,086	$11,507	$11,507	$11,196	$11,196	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,086	$27,962	$27,814	$29,400	$29,350
CLEAR BROOK CITY MUD WOODMEADOWS	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,833	$14,424	$10,726	$6,617	$6,617
CLEAR LAKE SHORES	SAN JACINTO-BRAZOS	GALVESTON	$3,232	$3,232	$3,232	$3,232	$3,232	$3,232	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,734	$149,767	$135,501	$52,334	$50,421	$50,421
CLEVELAND	SAN JACINTO	LIBERTY	$0	$7,464	$15,861	$23,325	$27,057	$28,301	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,574	$35,220	$46,864	$63,268	$84,254
CLUTE	SAN JACINTO-BRAZOS	BRAZORIA	$7,242	$14,271	$17,040	$17,466	$18,318	$19,170	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,242	$14,271	$36,241	$42,502	$40,624	$53,975
COLDSPRING	TRINITY	SAN JACINTO	$0	$2,020	$2,222	$2,424	$2,424	$2,424	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,750	$18,165	$17,817	$16,191	$15,070
COLDSPRING	SAN JACINTO	SAN JACINTO	$0	$606	$606	$606	$606	$606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,263	$5,161	$4,862	$4,215	$3,977
CONROE	SAN JACINTO	MONTGOMERY	$152,082	$197,025	$250,062	$310,341	$389,790	$484,149	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$820,400	$2,699,614	$3,106,325	$1,867,088	$2,450,425	$3,629,339
CONSOLIDATED WSC	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$379	$100	$100	$100
CONSUMERS WATER INC	SAN JACINTO	HARRIS	$7,464	$9,641	$12,129	$14,306	$16,483	$18,971	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,548	$84,947	$93,050	$82,080	$85,583	$95,201
CONSUMERS WATER INC	SAN JACINTO	MONTGOMERY	$4,043	$4,354	$5,598	$6,842	$8,708	$10,885	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,467	$38,137	$52,071	$65,992	$89,784	$118,897
COUNTY-OTHER	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	BRAZOS-COLORADO	AUSTIN	$0	$3,434	$3,636	$3,838	$3,838	$3,838	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$13,303	$20,718	$18,614	$16,229	$18,003
COUNTY-OTHER	COLORADO	AUSTIN	$0	$404	$404	$404	$404	$404	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,542	$2,301	$1,685	$1,654	$2,034
COUNTY-OTHER	SAN JACINTO-BRAZOS	BRAZORIA	$112,918	$123,826	$137,158	$148,268	$161,600	$176,144	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$972,457	$1,608,054	$1,294,204	$1,128,549	$1,222,446	$1,431,202
COUNTY-OTHER	BRAZOS	BRAZORIA	$1,414	$1,414	$1,616	$1,616	$1,616	$1,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,414	$33,439	$35,223	$10,458	$11,419	$12,543
COUNTY-OTHER	BRAZOS-COLORADO	BRAZORIA	$47,470	$50,298	$53,328	$55,550	$58,580	$61,812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$391,038	$467,098	$287,042	$296,540	$320,922	$368,739
COUNTY-OTHER	NECHES-TRINITY	CHAMBERS	$606	$606	$606	$404	$404	$404	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$606	$606	$606	$404	$404	$404
COUNTY-OTHER	TRINITY	CHAMBERS	$2,828	$2,626	$2,626	$2,424	$2,424	$2,424	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$76,029	$321,626	$281,776	$102,803	$102,639	$102,574
COUNTY-OTHER	TRINITY-SAN JACINTO	CHAMBERS	$1,818	$1,818	$1,616	$1,616	$1,616	$1,414	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,286	$174,170	$152,573	$56,001	$55,936	$55,799
COUNTY-OTHER	SAN JACINTO	FORT BEND	$1,212	$1,010	$1,212	$6,868	$21,412	$37,976	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,212	$33,025	$87,824	$675,038	$2,174,035	$3,508,684
COUNTY-OTHER	SAN JACINTO-BRAZOS	FORT BEND	$5,656	$5,252	$4,242	$46,056	$138,774	$241,592	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,656	$26,129	$59,276	$3,345,874	$10,628,075	$16,763,320
COUNTY-OTHER	BRAZOS	FORT BEND	$0	$12,322	$54,338	$108,272	$215,736	$343,602	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$116,153	$1,555,411	$6,118,738	$13,787,031	$20,859,741
COUNTY-OTHER	BRAZOS-COLORADO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,952	$11,929	$16,000	$16,900
COUNTY-OTHER	NECHES-TRINITY	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,259,936	$3,259,936	$1,158,157	$1,158,157	$1,158,157
COUNTY-OTHER	TRINITY-SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,768	$14,130	$11,143	$11,143
COUNTY-OTHER	SAN JACINTO	HARRIS	$0	$0	$166,246	$381,780	$676,700	$988,184	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,645,489	$15,426,610	$34,322,713	$31,251,326
COUNTY-OTHER	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$49,113	$44,128	$36,096	$34,573	$28,476	$28,599
COUNTY-OTHER	TRINITY	LEON	$0	$4,040	$4,848	$3,030	$1,616	$2,222	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,632	$13,959	$7,369	$4,617	$5,444
COUNTY-OTHER	BRAZOS	LEON	$0	$4,242	$4,646	$3,434	$2,020	$2,626	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,214	$14,515	$8,325	$5,369	$6,196
COUNTY-OTHER	NECHES	LIBERTY	$0	$2,020	$2,222	$2,626	$2,828	$3,232	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,510	$20,822	$25,579	$31,100	$38,894
COUNTY-OTHER	NECHES-TRINITY	LIBERTY	$0	$202	$202	$202	$202	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581	$1,340	$1,894	$2,243	$2,591
COUNTY-OTHER	TRINITY	LIBERTY	$0	$34,946	$38,582	$42,420	$46,662	$51,914	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$94,131	$214,053	$309,305	$383,088	$489,673
COUNTY-OTHER	TRINITY-SAN JACINTO	LIBERTY	$0	$2,424	$2,828	$3,030	$3,434	$3,838	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$13,812	$25,604	$31,030	$37,798	$47,221
COUNTY-OTHER	SAN JACINTO	LIBERTY	$0	$16,766	$19,190	$21,412	$24,038	$27,270	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$96,402	$175,813	$214,945	$261,969	$328,743
COUNTY-OTHER	TRINITY	MADISON	$0	$10,504	$10,706	$10,908	$11,110	$11,514	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$33,658	$50,941	$35,886	$29,127	$52,367
COUNTY-OTHER	BRAZOS	MADISON	$0	$808	$1,212	$1,212	$1,414	$1,414	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,327	$3,869	$3,806	$4,531	$5,639
COUNTY-OTHER	SAN JACINTO	MONTGOMERY	$256,944	$304,616	$430,462	$581,558	$800,324	$1,054,642	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,561,917	$3,524,768	$5,907,591	$8,647,163	$11,337,224	$14,206,883
COUNTY-OTHER	TRINITY	POLK	$0	$18,382	$19,594	$20,200	$21,008	$22,220	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$45,331	$66,660	$71,660	$94,220	$121,593
COUNTY-OTHER	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$66,006	$101,680	$55,346	$29,334	$26,903
COUNTY-OTHER	SAN JACINTO	SAN JACINTO	$0	$10,908	$11,716	$12,322	$12,524	$12,726	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$51,135	$81,548	$75,185	$68,095	$65,978
COUNTY-OTHER	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,147	$13,286	$5,680	$3,517	$3,517
COUNTY-OTHER	TRINITY	WALKER	$0	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581	$305	$100	$100	$100
COUNTY-OTHER	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COUNTY-OTHER	SAN JACINTO	WALLER	$0	$11,312	$13,736	$16,160	$19,392	$23,230	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$76,559	$160,133	$206,120	$276,811	$363,287
COUNTY-OTHER	BRAZOS	WALLER	$0	$4,646	$8,484	$8,888	$9,696	$10,706	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,646	$19,113	$33,561	$55,566	$79,338
CROSBY MUD	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$3,421	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,314	$10,249	$7,373	$4,702	$8,123
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	HARRIS	$202	$404	$404	$404	$606	$606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,331	$12,904	$4,406	$3,811	$3,962	$4,258
CRYSTAL SPRNGS WATER COMPANY	SAN JACINTO	MONTGOMERY	$11,196	$13,062	$17,416	$22,392	$29,545	$37,631	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,285	$110,579	$162,811	$224,121	$328,653	$446,417
CUT AND SHOOT	SAN JACINTO	MONTGOMERY	$2,424	$2,626	$3,232	$3,838	$4,848	$5,858	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,089	$35,270	$82,622	$73,945	$43,869	$63,475
DAISETTA	NECHES	LIBERTY	$0	$202	$404	$606	$606	$808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581	$1,163	$1,539	$1,714	$2,849
DAISETTA	TRINITY	LIBERTY	$0	$404	$606	$808	$1,010	$1,212	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,163	$1,744	$1,916	$3,051	$4,565
DANBURY	SAN JACINTO-BRAZOS	BRAZORIA	$0	$2,222	$2,626	$2,626	$2,828	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,222	$5,283	$7,940	$10,880	$14,958
DAYTON	TRINITY	LIBERTY	$0	$40,119	$47,272	$54,114	$62,200	$71,530	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$200,406	$355,838	$416,298	$507,027	$629,074
DEER PARK	SAN JACINTO	HARRIS	$24,708	$43,878	$44,091	$44,304	$45,369	$46,647	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$24,708	$43,878	$44,850	$45,063	$45,717	$46,995
DEER PARK	SAN JACINTO-BRAZOS	HARRIS	$37,701	$67,308	$67,734	$68,160	$69,438	$71,355	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$37,701	$67,687	$68,493	$68,713	$69,786	$71,703
DICKINSON	SAN JACINTO-BRAZOS	GALVESTON	$41,748	$46,221	$48,351	$48,990	$49,416	$50,055	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$226,354	$355,518	$287,151	$173,030	$159,208	$162,953
EAST PLANTATION UD	SAN JACINTO	MONTGOMERY	$5,252	$6,262	$8,282	$10,706	$13,938	$17,776	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$36,375	$83,301	$193,365	$181,996	$134,351	$194,503
EL DORADO UD	SAN JACINTO	HARRIS	$2,799	$9,330	$9,952	$10,885	$11,507	$12,440	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,127	$132,617	$136,144	$111,092	$111,253	$121,667
EL LAGO	SAN JACINTO-BRAZOS	HARRIS	$6,060	$5,858	$5,656	$5,656	$5,656	$5,656	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$63,989	$68,135	$24,749	$23,659	$22,520	$23,061
FAIRCHILDS	BRAZOS	FORT BEND	$0	$5,858	$7,272	$8,888	$10,908	$13,332	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$179,771	$499,429	$561,067	$586,591	$742,411
FIRST COLONY MUD #9	BRAZOS	FORT BEND	$0	$26,435	$27,057	$27,990	$28,923	$29,856	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$155,909	$262,933	$229,173	$171,782	$146,350
FLO COMMUNITY WSC	TRINITY	LEON	$0	$9,641	$10,574	$10,574	$10,263	$10,574	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,247	$71,298	$49,026	$36,721	$37,621
FORT BEND COUNTY MUD #106	BRAZOS	FORT BEND	$0	$10,706	$10,706	$10,706	$10,706	$10,706	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$80,764	$173,620	$143,356	$97,175	$78,474
FORT BEND COUNTY MUD #108	BRAZOS	FORT BEND	$0	$6,464	$6,464	$6,464	$6,464	$6,464	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$43,407	$77,099	$47,087	$21,798	$21,798
FORT BEND COUNTY MUD #111	BRAZOS	FORT BEND	$0	$14,306	$14,306	$14,306	$14,306	$14,306	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$84,380	$146,161	$96,002	$49,295	$47,674
FORT BEND COUNTY MUD #23	SAN JACINTO-BRAZOS	FORT BEND	$15,123	$30,033	$30,033	$30,033	$30,033	$30,033	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,123	$205,297	$344,170	$288,093	$201,124	$159,006
FORT BEND COUNTY MUD #25	SAN JACINTO-BRAZOS	FORT BEND	$21,513	$30,033	$40,683	$51,333	$65,817	$82,431	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,513	$364,593	$1,758,049	$2,719,189	$3,155,970	$4,018,014
FORT BEND COUNTY MUD #67	BRAZOS	FORT BEND	$0	$15,239	$15,239	$14,928	$14,928	$14,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$89,368	$154,835	$101,572	$52,118	$50,424
FORT BEND COUNTY MUD #68	BRAZOS	FORT BEND	$0	$11,196	$11,196	$11,196	$11,196	$11,196	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,707	$112,277	$73,829	$39,336	$36,850
FORT BEND COUNTY MUD #69	BRAZOS	FORT BEND	$0	$5,454	$5,252	$5,252	$5,252	$5,252	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,860	$85,025	$54,892	$29,185	$25,689
FORT BEND COUNTY MUD #81	BRAZOS	FORT BEND	$8,686	$11,514	$15,150	$18,786	$23,634	$29,088	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,686	$362,986	$1,031,417	$1,221,285	$1,337,293	$1,695,172
FOUNTAINVIEW SUBDIVISION	SAN JACINTO	HARRIS	$3,838	$4,444	$4,848	$5,454	$6,060	$6,464	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,361	$62,874	$56,841	$41,832	$39,471	$43,125
FREEPORT	SAN JACINTO-BRAZOS	BRAZORIA	$0	$27,690	$31,950	$35,571	$39,618	$44,304	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$72,663	$149,875	$179,618	$199,031	$233,083
FREEPORT	BRAZOS	BRAZORIA	$0	$1,917	$1,704	$1,704	$1,704	$1,704	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,333	$10,434	$12,001	$12,542	$13,731
FRIENDSWOOD	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,629	$15,184	$9,283	$6,966	$6,966
FRIENDSWOOD	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FULSHEAR	SAN JACINTO-BRAZOS	FORT BEND	$0	$2,020	$2,424	$3,030	$3,636	$4,444	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,228	$100,122	$87,539	$99,607	$113,644
FULSHEAR	BRAZOS	FORT BEND	$2,424	$3,030	$3,838	$4,444	$5,656	$6,666	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,424	$100,842	$150,385	$131,208	$146,710	$167,846
GALENA PARK	SAN JACINTO	HARRIS	$16,614	$16,614	$16,827	$16,827	$17,253	$17,892	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$30,102	$30,695	$20,843	$21,781	$26,734	$35,026
GALVESTON	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,249,889	$1,249,889	$330,760	$330,760	$330,760
GALVESTON COUNTY MUD #1	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,897	$3,037	$2,009	$1,393	$1,393
GALVESTON COUNTY WCID #12	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,866,864	$2,867,244	$997,049	$996,844	$996,844
GREEN TRAILS MUD	SAN JACINTO	HARRIS	$10,302	$11,514	$12,928	$14,342	$15,554	$16,968	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$95,235	$264,227	$293,249	$245,959	$250,608	$273,622
GROVETON	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
H M W SUD	SAN JACINTO	MONTGOMERY	$23,004	$25,134	$30,885	$37,275	$46,434	$56,871	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$129,856	$279,515	$579,138	$511,003	$350,103	$505,096
HARDIN	TRINITY	LIBERTY	$0	$1,818	$2,020	$2,222	$2,424	$2,626	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,031	$15,685	$19,196	$23,498	$28,906
HARDIN WSC	TRINITY	LIBERTY	$0	$7,474	$8,686	$9,696	$10,908	$12,322	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$46,185	$84,589	$101,840	$123,908	$153,004
HARRIS COUNTY FWSD #47	SAN JACINTO	HARRIS	$7,775	$7,464	$7,153	$7,153	$5,287	$5,287	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,856	$21,275	$7,868	$7,844	$5,978	$5,978
HARRIS COUNTY FWSD #51	SAN JACINTO	HARRIS	$27,051	$36,849	$36,636	$35,997	$35,997	$35,997	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$107,439	$114,856	$51,662	$50,114	$50,065	$50,065
HARRIS COUNTY FWSD #6	SAN JACINTO	HARRIS	$6,531	$7,464	$8,086	$9,019	$9,952	$11,196	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,993	$47,120	$32,569	$36,515	$39,729	$43,729
HARRIS COUNTY MUD #11	SAN JACINTO	HARRIS	$4,646	$5,252	$5,858	$6,464	$7,070	$7,676	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$43,357	$120,191	$132,487	$110,052	$111,971	$123,971
HARRIS COUNTY MUD #119 INWOOD NORTH	SAN JACINTO	HARRIS	$16,172	$17,105	$16,794	$16,172	$16,172	$16,172	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$96,186	$239,762	$225,367	$146,573	$130,165	$130,165
HARRIS COUNTY MUD #132	SAN JACINTO	HARRIS	$32,655	$40,430	$47,894	$55,358	$62,822	$70,597	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$191,817	$560,749	$676,730	$633,438	$677,398	$754,641
HARRIS COUNTY MUD #151	SAN JACINTO	HARRIS	$23,636	$23,636	$23,325	$23,325	$23,325	$23,325	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$139,544	$330,120	$312,986	$209,296	$184,444	$184,444
HARRIS COUNTY MUD #152	SAN JACINTO	HARRIS	$14,617	$18,660	$22,703	$26,746	$31,100	$35,143	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$86,304	$264,488	$327,896	$314,652	$346,264	$389,030
HARRIS COUNTY MUD #153	SAN JACINTO	HARRIS	$22,703	$30,789	$39,186	$46,961	$55,047	$63,133	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$134,462	$432,320	$565,202	$568,080	$631,811	$712,258
HARRIS COUNTY MUD #154	SAN JACINTO	HARRIS	$12,440	$15,239	$18,038	$20,837	$23,325	$26,435	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$74,277	$216,711	$257,726	$237,681	$252,593	$282,551
HARRIS COUNTY MUD #158	SAN JACINTO	HARRIS	$0	$2,177	$10,885	$10,574	$10,574	$10,574	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,177	$24,970	$24,536	$11,658	$11,633
HARRIS COUNTY MUD #180	SAN JACINTO	HARRIS	$11,507	$13,684	$15,861	$18,349	$20,526	$23,014	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,660	$193,662	$228,041	$208,282	$220,598	$245,905
HARRIS COUNTY MUD #189	SAN JACINTO	HARRIS	$14,928	$18,038	$21,148	$23,947	$27,057	$30,478	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$88,129	$253,025	$298,798	$273,581	$290,200	$323,220
HARRIS COUNTY MUD #261	SAN JACINTO	HARRIS	$9,696	$9,696	$9,696	$9,696	$9,696	$9,696	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$46,438	$116,127	$103,240	$51,752	$38,860	$38,266
HARRIS COUNTY MUD #345	SAN JACINTO	HARRIS	$26,124	$26,124	$26,124	$25,813	$25,813	$25,813	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$102,224	$211,125	$179,353	$98,779	$77,813	$76,774
HARRIS COUNTY MUD #46	SAN JACINTO	HARRIS	$15,550	$15,239	$14,928	$14,928	$14,928	$14,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$91,780	$214,541	$200,298	$133,310	$118,519	$118,519
HARRIS COUNTY MUD #5	SAN JACINTO	HARRIS	$12,129	$11,818	$11,507	$11,507	$11,196	$11,196	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,212	$101,864	$79,851	$42,211	$33,622	$33,622
HARRIS COUNTY MUD #50	SAN JACINTO	HARRIS	$0	$0	$8,397	$13,684	$14,306	$15,239	$0	$0	$0	$0	$0	$0	$773,716	$773,716	$239,135	$239,135	$251,092	$269,881	$773,716	$773,716	$247,532	$252,819	$265,398	$285,120
HARRIS COUNTY MUD #53	SAN JACINTO	HARRIS	$26,199	$32,163	$37,914	$43,665	$49,416	$55,593	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$150,038	$255,559	$259,172	$279,907	$296,531	$324,116
HARRIS COUNTY MUD #55	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HARRIS COUNTY MUD #8	SAN JACINTO	HARRIS	$13,062	$13,995	$14,928	$16,172	$17,105	$18,660	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,146	$55,325	$44,775	$47,890	$52,231	$58,859
HARRIS COUNTY UD #14	SAN JACINTO	HARRIS	$6,464	$7,070	$7,676	$8,282	$8,888	$9,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$60,721	$162,138	$172,087	$136,347	$134,980	$145,462
HARRIS COUNTY UD #15	SAN JACINTO	HARRIS	$4,848	$5,454	$6,060	$6,666	$7,272	$8,080	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$44,316	$123,801	$137,583	$115,233	$117,642	$130,162
HARRIS COUNTY WCID #1	SAN JACINTO	HARRIS	$0	$15,975	$17,892	$19,809	$21,726	$23,643	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$30,257	$78,613	$94,343	$88,421	$101,151
HARRIS COUNTY WCID #133	SAN JACINTO	HARRIS	$13,995	$13,995	$13,995	$13,684	$13,684	$13,684	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$82,651	$195,920	$186,466	$124,329	$109,627	$109,627
HARRIS COUNTY WCID #21	SAN JACINTO	HARRIS	$19,170	$19,809	$20,448	$20,874	$21,726	$22,791	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$81,795	$92,431	$52,427	$53,646	$59,000	$67,952
HARRIS COUNTY WCID #36	SAN JACINTO	HARRIS	$18,105	$19,596	$20,874	$22,365	$23,856	$25,560	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$64,667	$91,805	$74,610	$78,725	$87,294	$97,852
HARRIS COUNTY WCID #50	SAN JACINTO	HARRIS	$11,196	$12,440	$13,373	$14,306	$15,239	$16,483	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$119,755	$132,575	$60,591	$64,882	$68,078	$73,014
HARRIS COUNTY WCID #76	SAN JACINTO	HARRIS	$3,232	$3,232	$3,232	$3,030	$3,030	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$26,784	$49,272	$34,053	$16,920	$13,236	$13,236
HARRIS COUNTY WCID #84	SAN JACINTO	HARRIS	$6,666	$6,868	$6,868	$6,868	$6,868	$6,868	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$54,993	$55,394	$17,419	$17,271	$17,905	$19,882
HEDWIG VILLAGE	SAN JACINTO	HARRIS	$9,292	$9,292	$9,090	$9,090	$9,090	$9,090	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$108,156	$108,354	$32,118	$33,156	$32,810	$32,759
HEMPSTEAD	BRAZOS	WALLER	$0	$37,942	$50,071	$63,444	$79,616	$98,587	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$216,572	$455,688	$631,418	$829,359	$1,064,206
HILLCREST	SAN JACINTO-BRAZOS	BRAZORIA	$0	$202	$202	$404	$1,010	$1,414	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$202	$202	$404	$1,010	$1,793
HILSHIRE VILLAGE	SAN JACINTO	HARRIS	$0	$2,020	$2,020	$2,020	$2,020	$2,020	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,153	$15,316	$5,380	$3,005	$3,005
HITCHCOCK	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$253,458	$253,384	$79,397	$79,397	$79,397
HOLIDAY LAKES	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$581
HOUSTON	SAN JACINTO	FORT BEND	$54,954	$63,048	$72,633	$82,857	$96,702	$113,316	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$54,954	$63,048	$72,633	$82,857	$96,702	$113,316
HOUSTON	SAN JACINTO-BRAZOS	FORT BEND	$38,553	$44,304	$51,120	$58,149	$67,947	$79,662	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$38,553	$44,304	$51,120	$58,149	$67,947	$79,662
HOUSTON	SAN JACINTO	HARRIS	$4,885,794	$5,385,492	$5,851,962	$6,332,703	$6,841,986	$7,391,952	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,885,794	$5,385,492	$5,851,962	$17,515,295	$25,719,743	$57,013,383
HOUSTON	SAN JACINTO-BRAZOS	HARRIS	$272,214	$300,117	$326,103	$352,941	$381,270	$411,942	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$272,214	$378,617	$454,690	$439,039	$440,258	$470,930
HOUSTON	SAN JACINTO	MONTGOMERY	$2,556	$2,769	$5,112	$7,029	$9,585	$12,567	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,556	$26,302	$70,769	$110,036	$156,556	$211,306
HUMBLE	SAN JACINTO	HARRIS	$49,416	$54,954	$60,279	$65,604	$71,142	$77,106	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$218,035	$551,736	$564,150	$405,108	$378,640	$405,184
HUNTERS CREEK VILLAGE	SAN JACINTO	HARRIS	$32,344	$34,521	$36,698	$38,875	$41,052	$43,229	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$226,717	$253,599	$131,860	$138,507	$143,096	$151,912

WUG Name	wug_basin	WUG County	WUG-County-Basin Identifier	Pump Stations		Connection Costs	Treatment Plants			Wells		Other Capital Costs						Total Capital Cost	Debt Service						Operations and Maintenance						Energy					
				Booster Pump Stations	Raw Water Pump Stations	Pipeline Connections	Surface Water Treatment Plants	Groundwater Treatment Plants	Direct Reuse Plants	Municipal Supply Wells	Agricultural Wells	Land and Easements	Mitigation	Capital Costs for Irrigation Conservation	Engineering, Contingencies, Financial and Legal Services	Interest During Construction	Project-Specific Capital Costs		2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
HUNTSVILLE	TRINITY	WALKER	08029200023608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HUNTSVILLE	SAN JACINTO	WALKER	08029200023610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IOWA COLONY	SAN JACINTO-BRAZOS	BRAZORIA	08088500002011	$0	$0	$0	$0	$30,096	$0	$32,843	$0	$0	$0	$0	$22,028	$6,939	$0	$91,906	$0	$616	$2,260	$3,493	$3,698	$3,904	$0	$301	$1,105	$2,010	$2,914	$3,919	$0	$221	$810	$1,473	$2,136	$2,873
IRRIGATION	BRAZOS	AUSTIN	08100400800812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS-COLORADO	AUSTIN	08100400800813	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	08100402002011	$0	$0	$0	$0	$0	$0	$0	$2,330,309	$0	$0	$183,981	$815,608	$131,090	$0	$3,460,989	$0	$0	$285,704	$285,704	$0	$0	$0	$0	$32,770	$32,770	$32,770	$32,770	$0	$0	$77,725	$34,459	$31,299	$4,387
IRRIGATION	BRAZOS	BRAZORIA	08100402002012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,140	$0	$0	$0	$6,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS-COLORADO	BRAZORIA	08100402002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,134	$0	$0	$0	$8,134	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	NECHES-TRINITY	CHAMBERS	08100403603607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$197,489	$0	$0	$0	$197,489	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	CHAMBERS	08100403603608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$77,654	$0	$0	$0	$77,654	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY-SAN JACINTO	CHAMBERS	08100403603609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,187	$0	$0	$0	$4,187	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	FORT BEND	08100407907910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	FORT BEND	08100407907911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$37,427	$0	$0	$0	$37,427	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS	FORT BEND	08100407907912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,116	$0	$0	$0	$19,116	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS-COLORADO	FORT BEND	08100407907913	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,168	$0	$0	$0	$5,168	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	08100408408411	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,422	$0	$0	$0	$29,422	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY-SAN JACINTO	HARRIS	08100410110109	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	HARRIS	08100410110110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	NECHES	LIBERTY	08100414614606	$0	$0	$0	$0	$0	$0	$0	$38,284	$0	$0	$7,548	$13,399	$2,154	$0	$61,385	$0	$722	$1,444	$1,384	$1,384	$2,588	$0	$83	$166	$242	$324	$538	$0	$196	$393	$573	$769	$1,277
IRRIGATION	NECHES-TRINITY	LIBERTY	08100414614607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,876	$0	$0	$0	$18,876	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	LIBERTY	08100414614608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$120,774	$0	$0	$0	$120,774	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	08100414614609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$39,631	$0	$0	$0	$39,631	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	LIBERTY	08100414614610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,889	$0	$0	$0	$1,889	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	MADISON	08100415715708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	MONTGOMERY	08100417017010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	TRINITY	08100422822808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	WALKER	08100423623608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	WALKER	08100423623610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	WALLER	08100423723710	$0	$0	$0	$0	$0	$0	$0	$232,638	$0	$0	$0	$81,423	$13,087	$0	$327,148	$0	$28,522	$28,522	$0	$0	$0	$0	$3,271	$3,271	$3,271	$3,271	$3,271	$0	$7,759	$0	$213	$0	$0
IRRIGATION	BRAZOS	WALLER	08100423723712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	LEON	08100414514508	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	SAN JACINTO	08100420420408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
JACINTO CITY	SAN JACINTO	HARRIS	08030100010110	$93,569	$0	$32,189	$0	$16,977	$0	$18,527	$0	$48,485	$48,485	$0	$56,442	$25,699	$0	$340,374	$0	$1,849	$4,520	$2,671	$13,151	$25,155	$0	$904	$2,211	$2,211	$2,876	$4,872	$0	$663	$1,621	$1,621	$2,284	$4,273
JAMAICA BEACH	SAN JACINTO-BRAZOS	GALVESTON	08088600008411	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$822	$1,438	$616	$0	$0	$0	$402	$703	$703	$703	$703	$0	$295	$516	$516	$516	$516
JERSEY VILLAGE	SAN JACINTO	HARRIS	08070900010110	$1,378,656	$0	$473,251	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$648,167	$212,101	$0	$2,809,145	$0	$62,739	$122,022	$100,003	$80,853	$82,172	$0	$8,911	$18,768	$25,538	$32,210	$39,199	$0	$8,938	$18,834	$25,611	$32,290	$39,288
JEWETT	TRINITY	LEON	08088700014508	$0	$0	$0	$0	$31,638	$0	$34,527	$0	$0	$0	$0	$23,158	$7,295	$0	$96,618	$0	$5,342	$8,424	$3,082	$0	$0	$0	$2,612	$4,120	$4,120	$4,120	$4,120	$0	$1,915	$3,020	$2,947	$2,726	$2,873
JEWETT	BRAZOS	LEON	08088700014512	$0	$0	$0	$0	$10,032	$0	$10,948	$0	$0	$0	$0	$7,343	$2,313	$0	$30,635	$0	$1,849	$2,671	$822	$0	$0	$0	$904	$1,306	$1,306	$1,306	$1,306	$0	$663	$958	$958	$884	$958
JONES CREEK	BRAZOS-COLORADO	BRAZORIA	08030800002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KATY	SAN JACINTO	FORT BEND	08031200007910	$0	$0	$0	$0	$589,031	$0	$643,386	$0	$0	$0	$0	$431,346	$135,879	$0	$1,799,642	$13,970	$48,875	$59,142	$46,010	$50,319	$62,016	$6,831	$23,892	$35,742	$46,388	$60,344	$76,704	$5,009	$17,532	$26,225	$34,033	$44,273	$56,280
KATY	SAN JACINTO	HARRIS	08031200010110	$0	$0	$0	$0	$3,867,194	$0	$4,443,067	$0	$0	$0	$0	$2,908,591	$916,244	$0	$12,135,094	$153,373	$486,547	$511,902	$309,435	$259,015	$262,011	$74,148	$229,447	$315,489	$378,885	$441,137	$505,961	$55,691	$181,363	$246,557	$293,850	$340,259	$388,657
KATY	SAN JACINTO	WALLER	08031200023710	$0	$0	$0	$0	$745,877	$0	$815,180	$0	$0	$0	$0	$546,370	$172,114	$0	$2,279,540	$13,353	$52,974	$70,629	$63,248	$70,220	$82,519	$6,530	$25,893	$41,051	$56,810	$75,372	$97,134	$4,788	$19,006	$30,129	$41,694	$55,322	$71,308
KEMAH	SAN JACINTO-BRAZOS	GALVESTON	08031600008411	$213,505	$0	$73,382	$0	$131,780	$0	$144,004	$0	$48,485	$48,485	$0	$196,935	$69,957	$0	$926,533	$35,111	$74,991	$43,145	$4,304	$1,633	$1,485	$17,161	$22,271	$22,813	$22,986	$23,085	$23,233	$12,597	$5,402	$6,164	$6,336	$6,434	$6,581
KENEFICK	TRINITY	LIBERTY	08103300014608	$0	$0	$0	$0	$68,679	$0	$74,949	$0	$0	$0	$0	$50,270	$15,836	$0	$209,734	$0	$3,698	$6,985	$6,575	$6,985	$8,013	$0	$1,809	$3,416	$5,024	$6,833	$8,943	$0	$1,326	$2,505	$3,683	$5,009	$6,556
LA MARQUE	SAN JACINTO-BRAZOS	GALVESTON	08034200008411	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LA PORTE	SAN JACINTO-BRAZOS	HARRIS	08034600010111	$0	$0	$0	$0	$54,786	$0	$59,791	$0	$0	$0	$0	$40,102	$12,633	$0	$167,312	$0	$6,780	$14,587	$7,807	$0	$0	$0	$3,316	$7,134	$7,134	$7,134	$7,134	$0	$2,431	$5,230	$5,230	$5,230	$5,230
LA PORTE	SAN JACINTO	HARRIS	08034600010110	$0	$0	$0	$0	$3,087	$0	$3,369	$0	$0	$0	$0	$2,259	$712	$0	$9,426	$0	$411	$822	$411	$0	$0	$0	$201	$402	$402	$402	$402	$0	$147	$295	$295	$295	$295
LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	08033800002011	$1,462,663	$0	$501,447	$0	$400,637	$0	$438,749	$0	$48,462	$48,462	$0	$981,224	$317,014	$0	$4,198,657	$117,728	$185,978	$109,746	$81,038	$85,218	$99,041	$18,062	$51,367	$67,541	$76,436	$84,494	$93,765	$18,269	$41,915	$55,225	$63,180	$71,062	$80,196
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	LIBERTY	08422600014608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$233,055	$233,055	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	POLK	08422600018708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,912,990	$1,912,990	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	SAN JACINTO	SAN JACINTO	08422600020410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$203,923	$203,923	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	SAN JACINTO	08422600020408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$443,451	$443,451	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	TRINITY	08422600022808	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$233,055	$237,768	$0	$411	$411	$0	$0	$0	$0	$201	$201	$201	$201	$201	$0	$147	$74	$0	$0	$0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	WALKER	08422600023608	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$61,501	$63,857	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$100	$100	$0	$0	$74	$0	$0	$0
LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	08035000008411	$3,334,197	$0	$1,119,700	$0	$1,762,216	$0	$2,387,433	$0	$48,485	$48,485	$0	$3,011,241	$956,499	$0	$12,668,256	$528,299	$1,014,701	$538,244	$62,514	$23,121	$27,261	$234,482	$314,109	$322,728	$324,502	$326,571	$329,033	$208,840	$91,246	$102,984	$104,751	$106,814	$109,270
LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	08035000010111	$13,878	$0	$4,776	$0	$11,575	$0	$12,632	$0	$48,485	$48,485	$0	$15,001	$12,645	$0	$167,477	$3,082	$14,453	$11,371	$0	$148	$148	$1,507	$1,877	$1,877	$1,877	$1,902	$1,902	$1,105	$368	$368	$368	$393	$393
LIBERTY	TRINITY	LIBERTY	08035600014608	$0	$0	$0	$0	$91,824	$0	$100,213	$0	$0	$0	$0	$67,213	$21,173	$0	$280,423	$0	$3,698	$4,725	$3,287	$9,451	$17,463	$0	$1,809	$2,311	$3,416	$6,933	$11,956	$0	$1,326	$1,694	$2,505	$5,083	$8,766
LIVESTOCK	BRAZOS	AUSTIN	08100500800812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	AUSTIN	08100500800813	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	COLORADO	AUSTIN	08100500800814	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	BRAZORIA	08100502002011	$0	$0	$0	$0	$0	$0	$0	$19,632	$0	$0	$0	$6,871	$1,104	$0	$27,608	$0	$2,407	$2,407	$0	$0	$0	$0	$276	$276	$276	$276	$276	$0	$655	$442	$442	$442	$442
LIVESTOCK	BRAZOS	BRAZORIA	08100502002012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	BRAZORIA	08100502002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	CHAMBERS	08100503603607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	CHAMBERS	08100503603608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY-SAN JACINTO	CHAMBERS	08100503603609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	FORT BEND	08100507907910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	FORT BEND	08100507907911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	FORT BEND	08100507907912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	FORT BEND	08100507907913	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	GALVESTON	08100508408407	$0	$0	$0	$0	$0	$0	$0	$6,871	$0	$0	$0	$2,405	$387	$0	$9,662	$842	$842	$0	$0	$0	$0	$97	$97	$97	$97	$97	$97	$229	$229	$229	$229	$229	$229
LIVESTOCK	SAN JACINTO-BRAZOS	GALVESTON	08100508408411	$0	$0	$0	$0	$0	$0	$0	$12,761	$0	$0	$0	$4,466	$718	$0	$17,945	$0	$602	$1,565	$963	$0	$0	$0	$69	$179	$179	$179	$179	$0	$164	$426	$426	$426	$426
LIVESTOCK	TRINITY-SAN JACINTO	HARRIS	08100510110109	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	HARRIS	08100510110110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	HARRIS	08100510110111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	LEON	08100514514508	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	LEON	08100514514512	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES	LIBERTY	08100514614606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	LIBERTY	08100514614607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	LIBERTY	08100514614608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY-SAN JACINTO	LIBERTY	08100514614609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	LIBERTY	08100514614610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	MADISON	08100515715708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	MADISON	08100515715712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	MONTGOMERY	08100517017010	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	POLK	08100518718708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	SAN JACINTO	08100520420408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	SAN JACINTO	08100520420410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	TRINITY	08100522822808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	WALKER	08100523623608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	WALKER	08100523623610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	WALLER	08100523723710	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	WALLER	08100523723712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVINGSTON	TRINITY	POLK	08036200018708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LONGHORN TOWN UD	SAN JACINTO	HARRIS	08423500010110	$0	$0	$0	$0	$1,227,416	$0	$1,344,878	$0	$0	$0	$0	$900,303	$283,607	$0	$3,756,204	$34,290	$117,607	$141,358	$108,926	$101,360	$100,950	$16,761	$57,373	$85,714	$110,569	$135,225	$159,881	$12,302	$42,284	$63,131	$81,400	$99,521	$117,643
MADISONVILLE	TRINITY	MADISON	08038200015708	$0	$0	$0	$0	$98,000	$0	$106,950	$0	$0	$0	$0	$71,733	$22,597	$0	$299,280	$0	$6,985	$11,505	$8,424	$9,040	$10,684	$0	$3,416	$5,627	$7,536	$10,048	$12,761	$0	$2,505	$4,125	$5,525	$7,367	$9,355
MAGNOLIA	SAN JACINTO	MONTGOMERY	08090700017010	$0	$0	$0	$0	$936,550	$0	$1,024,870	$0	$0	$0	$0	$686,497	$216,255	$0	$2,864,172	$15,818	$47,647	$70,220	$80,061	$97,463	$122,004	$7,735	$23,294	$42,056	$62,419	$89,665	$121,979	$5,672	$17,090	$30,866	$45,820	$65,857	$89,650
MANUFACTURING	BRAZOS	AUSTIN	08100100800812	$0	$0	$0	$0	$65,592	$0	$71,581	$0	$0	$0	$0	$48,011	$15,124	$0	$200,307	$0	$3,904	$7,396	$6,575	$5,753	$6,985	$0	$1,909	$3,617	$5,124	$6,431	$8,541	$0	$1,400	$2,652	$3,757	$4,715	$6,262
MANUFACTURING	BRAZOS-COLORADO	AUSTIN	08100100800813	$0	$0	$0	$0	$13,890	$0	$15,158	$0	$0	$0	$0	$10,167	$3,203	$0	$42,418	$0	$822	$1,438	$1,438	$1,438	$1,438	$0	$402	$703	$1,105	$1,407	$1,809	$0	$295	$516	$810	$1,031	$1,326
MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	08100102002011	$3,644,046	$2,731,697	$1,222,594	$49,439,558	$2,804,305	$0	$3,210,192	$0	$48,485	$48,485	$0	$22,068,337	$6,959,729	$0	$92,177,429	$0	$2,370,449	$4,028,246	$3,272,745	$2,210,556	$2,393,255	$0	$1,168,633	$1,937,869	$2,690,118	$2,821,157	$3,687,987	$0	$140,069	$276,072	$407,007	$499,744	$652,443
MANUFACTURING	BRAZOS	BRAZORIA	08100102002012	$13,538,046	$33,876,859	$4,027,921	$369,291,305	$7,361,085	$0	$20,982,461	$0	$48,462	$48,462	$0	$157,177,187	$49,520,751	$0	$655,872,540	$9,753,256	$33,858,812	$32,175,236	$16,149,095	$10,267,726	$7,174,049	$6,637,934	$34,156,066	$42,246,760	$50,349,995	$50,720,738	$54,855,510	$2,291,784	$2,633,278	$3,284,788	$3,940,161	$4,285,142	$4,987,382
MANUFACTURING	BRAZOS-COLORADO	BRAZORIA	08100102002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	08100103603609	$0	$4,491,370	$0	$66,751,089	$151,774	$0	$165,899	$0	$0	$0	$0	$25,046,046	$7,889,827	$0	$104,496,005	$4,345,056	$5,270,803	$1,860,744	$1,877,139	$1,820,188	$1,962,497	$3,333,154	$3,741,518	$4,153,880	$4,569,668	$4,954,841	$5,440,315	$270,563	$316,260	$350,162	$383,361	$412,082	$450,428
MANUFACTURING	SAN JACINTO	FORT BEND	08100107907910	$0	$482,441	$0	$9,822,969	$0	$0	$0	$0	$0	$0	$0	$3,606,894	$1,136,218	$0	$15,048,522	$0	$585,503	$1,212,559	$686,335	$99,440	$40,161	$0	$251,022	$520,577	$545,561	$562,485	$562,485	$0	$20,397	$42,300	$44,330	$45,705	$42,464
MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	08100107907911	$872,503	$0	$299,107	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$410,064	$137,095	$0	$1,815,738	$0	$31,044	$129,863	$115,995	$28,442	$11,264	$0	$3,640	$20,076	$22,931	$24,804	$24,804	$0	$3,634	$20,233	$23,082	$24,948	$24,948
MANUFACTURING	BRAZOS	FORT BEND	08100107907912	$0	$163,054	$0	$3,352,344	$0	$0	$0	$0	$0	$0	$0	$1,230,389	$387,588	$0	$5,133,375	$0	$0	$385,396	$422,688	$62,155	$24,863	$0	$0	$163,594	$179,309	$189,786	$189,786	$0	$0	$13,292	$14,569	$15,421	$13,816
MANUFACTURING	SAN JACINTO-BRAZOS	GALVESTON	08100108408411	$0	$0	$0	$0	$463,826	$0	$508,645	$0	$0	$0	$0	$340,365	$107,219	$0	$1,420,055	$0	$47,610	$123,807	$76,197	$0	$0	$0	$23,259	$60,422	$60,422	$60,422	$60,422	$0	$17,090	$44,494	$44,494	$44,494	$44,494
MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	08100110110109	$0	$12,086,880	$0	$145,435,293	$744,744	$0	$821,917	$0	$0	$0	$0	$55,681,092	$17,540,260	$0	$232,310,185	$9,019,139	$12,257,260	$6,154,961	$5,712,092	$5,079,760	$2,284,507	$9,308,600	$11,273,066	$12,943,953	$14,544,007	$15,741,585	$15,741,585	$753,282	$947,561	$1,112,734	$1,242,778	$1,340,114	$1,291,266
MANUFACTURING	SAN JACINTO	HARRIS	08100110110110	$0	$0	$0	$0	$4,038,752	$0	$5,805,630	$0	$0	$0	$0	$3,445,534	$1,085,387	$0	$14,375,304	$0	$670,718	$1,253,305	$582,586	$0	$0	$0	$286,203	$541,001	$541,001	$541,001	$541,001	$0	$274,476	$507,847	$507,847	$507,847	$507,847
MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	08100110110111	$0	$8,733,451	$0	$113,672,155	$687,166	$0	$757,073	$0	$0	$0	$0	$43,347,446	$13,655,003	$0	$180,852,293	$3,023,153	$6,097,834	$5,847,936	$8,593,334	$6,896,437	$1,076,359	$1,807,618	$3,618,441	$5,169,035	$10,362,873	$10,844,319	$10,844,319	$146,904	$325,943	$479,044	$899,785	$938,910	$893,270
MANUFACTURING	TRINITY	LEON	08100114514508	$0	$0	$0	$0	$461,928	$0	$504,435	$0	$0	$0	$0	$338,227	$106,546	$0	$1,411,136	$0	$26,289	$51,962	$51,552	$49,294	$45,188	$0	$12,853	$25,405	$38,057	$49,505	$60,151	$0	$9,429	$18,637	$27,919	$36,317	$44,125
MANUFACTURING	TRINITY	LIBERTY	08100114614608	$0	$0	$0	$0	$42,442	$0	$46,317	$0	$0	$0	$0	$31,066	$9,786	$0	$129,611	$0	$2,465	$4,725	$4,725	$4,725	$4,109	$0	$1,206	$2,311	$3,517	$4,622	$5,526	$0	$884	$1,694	$2,578	$3,389	$4,052
MANUFACTURING	SAN JACINTO	LIBERTY	08100114614610	$0	$0	$0	$0	$222,210	$0	$242,533	$0	$0	$0	$0	$162,660	$51,240	$0	$678,643	$0	$12,326	$24,858	$25,269	$24,242	$21,572	$0	$6,028	$12,156	$18,385	$24,011	$28,934	$0	$4,420	$8,913	$13,481	$17,606	$21,216
MANUFACTURING	TRINITY	MADISON	08100115715708	$0	$0	$0	$0	$106,488	$0	$116,214	$0	$0	$0	$0	$77,946	$24,554	$0	$325,202	$0	$5,958	$11,505	$11,095	$10,478	$11,300	$0	$2,914	$5,627	$8,340	$10,751	$13,866	$0	$2,136	$4,125	$6,114	$7,882	$10,166
MANUFACTURING	SAN JACINTO	MONTGOMERY	08100117017010	$0	$0	$0	$0	$1,915,921	$0	$2,108,689	$0	$0	$0	$0	$1,408,613	$443,731	$0	$5,876,954	$95,893	$201,893	$187,080	$157,278	$152,598	$153,209	$46,692	$98,254	$137,783	$174,946	$212,207	$249,666	$34,549	$72,781	$101,952	$129,356	$156,833	$184,457
MANUFACTURING	SAN JACINTO	SAN JACINTO	08100120420410	$0	$0	$0	$0	$15,434	$0	$16,843	$0	$0	$0	$0	$11,297	$3,559	$0	$47,131	$0	$822	$1,644	$1,644	$1,438	$1,644	$0	$402	$804	$1,206	$1,507	$2,010	$0	$295	$589	$884	$1,105	$1,473
MANUFACTURING	TRINITY	WALKER	08100123623608	$0	$0	$0	$0	$1,639,607	$0	$1,814,786	$0	$0	$0	$0	$1,209,037	$380,862	$0	$5,044,293	$0	$127,707	$269,380	$180,884	$101,134	$131,193	$0	$61,965	$130,577	$149,740	$179,969	$213,770	$0	$46,188	$97,532	$111,602	$133,849	$158,748
MANUFACTURING	SAN JACINTO	WALKER	08100123623610	$0	$0	$0	$0	$320,916	$0	$350,325	$0	$0	$0	$0	$234,935	$74,007	$0	$980,184	$0	$18,899	$36,154	$34,922	$33,074	$31,636	$0	$9,241	$17,679	$26,318	$33,852	$41,788	$0	$6,777	$12,965	$19,300	$24,825	$30,645
MANUFACTURING	SAN JACINTO	WALLER	08100123723710	$0	$0	$0	$0	$33,954	$0	$37,054	$0	$0	$0	$0	$24,853	$7,829	$0	$103,689	$0	$2,055	$3,904	$3,493	$3,493	$3,493	$0	$1,005	$1,909	$2,713	$3,617	$4,421	$0	$737	$1,400	$1,989	$2,652	$3,241
MANUFACTURING	BRAZOS	WALLER	08100123723712	$0	$0	$0	$0	$8,489	$0	$9,263	$0	$0	$0	$0	$6,213	$1,957	$0	$25,922	$0	$411	$822	$1,027	$822	$822	$0	$201	$402	$703	$804	$1,105	$0	$147	$295	$516	$589	$810
MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	08072100002011	$0	$17,693	$0	$365,346	$19,292	$0	$21,053	$0	$0	$0	$0	$148,184	$46,680	$0	$618,248	$0	$51,578	$51,989	$411	$0	$1,913	$0	$22,056	$22,257	$22,257	$22,257	$23,063	$0	$3,298	$3,283	$3,094	$2,898	$2,775
MASON CREEK UD	SAN JACINTO	HARRIS	08424700010110	$0	$0	$0	$0	$1,274,700	$0	$1,428,249	$0	$0	$0	$0	$946,032	$298,012	$0	$3,946,994	$115,469	$301,218	$228,648	$42,899	$0	$0	$56,110	$145,420	$166,382	$166,382	$166,382	$166,382	$41,694	$109,540	$124,936	$123,905	$123,315	$123,315
MEADOWS	SAN JACINTO	FORT BEND	08079200007910	$852,543	$0	$292,233	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$400,672	$134,136	$0	$1,776,554	$0	$74,834	$154,888	$80,054	$0	$0	$0	$10,923	$24,236	$24,236	$24,236	$24,236	$0	$10,976	$24,383	$24,383	$24,383	$24,383
MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	08079200007911	$85,803	$0	$29,522	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$40,364	$20,635	$0	$273,293	$0	$15,671	$23,827	$8,156	$0	$0	$0	$1,085	$2,440	$2,440	$2,440	$2,440	$0	$1,080	$2,431	$2,431	$2,431	$2,431
MERCY WSC	SAN JACINTO	LIBERTY	08425300014610	$0	$0	$0	$0	$51,702	$0	$56,423	$0	$0	$0	$0	$37,844	$11,921	$0	$157,890	$0	$2,671	$5,136	$5,136	$5,342	$5,958	$0	$1,306	$2,512	$3,818	$5,124	$6,732	$0	$958	$1,842	$2,799	$3,757	$4,936
MERCY WSC	SAN JACINTO	SAN JACINTO	08425300020410	$0	$0	$0	$0	$135,028	$0	$147,372	$0	$0	$0	$0	$98,840	$31,136	$0	$412,377	$0	$13,559	$24,037	$17,052	$10,067	$5,342	$0	$6,631	$11,755	$14,970	$16,678	$17,582	$0	$4,862	$8,619	$10,976	$12,228	$12,891
MINING	BRAZOS	AUSTIN	08100300800812	$0	$0	$0	$0	$10,032	$0	$10,948	$0	$0	$0	$0	$7,343	$2,313	$0	$30,635	$0	$822	$1,438	$1,027	$822	$822	$0	$402	$703	$904	$1,105	$1,306	$0	$295	$516	$663	$810	$958
MINING	BRAZOS-COLORADO	AUSTIN	08100300800813	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$0	$0	$0	$0	$74	$74
MINING	COLORADO	AUSTIN	08100300800814	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$0	$4,713	$0	$205	$205	$205	$205	$0	$0	$100	$100	$201	$201	$201	$0	$74	$74	$147	$147	$147
MINING	SAN JACINTO-BRAZOS	BRAZORIA	08100302002011	$0	$84,647	$0	$1,747,873	$57,874	$0	$63,160	$0	$0	$0	$0	$683,744	$215,388	$0	$2,852,685	$0	$76,982	$110,601	$76,995	$91,051	$94,732	$0	$32,933	$47,433	$65,866	$86,013	$105,859	$0	$4,968	$7,718	$9,937	$11,835	$13,514
MINING	BRAZOS	BRAZORIA	08100302002012	$0	$64,860	$0	$1,339,181	$0	$0	$0	$0	$0	$0	$0	$491,414	$154,802	$0	$2,050,257	$0	$113,724	$129,981	$33,470	$33,470	$31,557	$0	$47,952	$54,803	$62,056	$68,906	$75,354	$0	$3,896	$4,453	$5,042	$5,599	$6,122
MINING	BRAZOS-COLORADO	BRAZORIA	08100302002013	$0	$331,155	$0	$6,819,659	$189,743	$0	$207,163	$0	$0	$0	$0	$2,641,702	$832,170	$0	$11,021,594	$0	$436,060	$556,033	$239,873	$261,922	$284,979	$0	$187,021	$238,284	$289,448	$349,585	$409,927	$0	$23,908	$31,283	$38,322	$44,322	$49,421
MINING	NECHES-TRINITY	CHAMBERS	08100303603607	$0	$0	$0	$0	$216,793	$0	$236,638	$0	$0	$0	$0	$158,701	$49,993	$0	$662,125	$21,362	$32,251	$17,668	$13,149	$12,944	$12,327	$10,445	$15,770	$19,086	$22,201	$25,416	$28,229	$7,661	$11,565	$13,996	$16,280	$18,637	$20,700
MINING	TRINITY	CHAMBERS	08100303603608	$0	$3,936,682	$0	$68,854,605	$447,945	$0	$489,276	$0	$0	$0	$0	$25,804,978	$8,128,900	$0	$107,662,386	$2,961,951	$4,781,894	$3,020,048	$2,381,776	$2,357,938	$2,222,827	$1,749,977	$2,635,833	$3,179,281	$3,713,366	$4,244,734	$4,711,358	$142,223	$227,126	$278,364	$328,513	$377,983	$420,946
MINING	TRINITY-SAN JACINTO	CHAMBERS	08100303603609	$0	$1,269,222	$0	$25,543,602	$465,057	$0	$514,540	$0	$0	$0	$0	$9,727,348	$3,064,240	$0	$40,584,009	$1,101,771	$1,354,815	$767,338	$1,064,306	$1,108,233	$1,119,178	$494,023	$608,159	$827,757	$1,063,066	$1,302,002	$1,542,147	$43,094	$89,503	$99,022	$113,796	$131,001	$148,304
MINING	SAN JACINTO	FORT BEND	08100307907910	$0	$60,005	$0	$1,239,066	$0	$0	$0	$0	$0	$0	$0	$454,675	$143,228	$0	$1,896,974	$0	$73,614	$157,737	$86,992	$5,738	$4,781	$0	$31,028	$66,489	$67,698	$68,906	$69,712	$0	$2,521	$5,402	$5,500	$5,599	$5,664
MINING	SAN JACINTO-BRAZOS	FORT BEND	08100307907911	$0	$255,527	$0	$5,216,843	$0	$0	$0	$0	$0	$0	$0	$1,915,329	$603,353	$0	$7,991,053	$0	$82,212	$662,270	$593,446	$24,863	$21,038	$0	$34,655	$283,260	$288,901	$293,737	$297,767	$0	$2,816	$23,016	$23,475	$23,867	$24,195
MINING	BRAZOS	FORT BEND	08100307907912	$0	$138,986	$0	$2,868,291	$0	$0	$0	$0	$0	$0	$0	$1,052,547	$331,566	$0	$4,391,391	$0	$180,445	$365,648	$190,941	$12,432	$11,475	$0	$76,158	$154,332	$156,749	$159,570	$161,585	$0	$6,188	$12,539	$12,736	$12,965	$13,129
MINING	BRAZOS-COLORADO	FORT BEND	08100307907913	$0	$0	$0	$0	$6,945	$0	$7,579	$0	$0	$0	$0	$5,084	$1,601	$0	$21,209	$0	$822	$822	$411	$616	$616	$0	$402	$402	$603	$703	$904	$0	$295	$295	$442	$516	$663
MINING	NECHES-TRINITY	GALVESTON	08100308408407	$0	$12,840	$0	$265,081	$772	$0	$842	$0	$0	$0	$0	$97,837	$30,820	$0	$408,192	$15,300	$21,994	$9,768	$5,943	$6,694	$7,650	$6,447	$9,268	$10,578	$11,786	$13,398	$15,010	$524	$753	$925	$1,023	$1,154	$1,285
MINING	SAN JACINTO-BRAZOS	GALVESTON	08100308408411	$0	$11,798	$0	$243,586	$11,575	$0	$12,632	$0	$0	$0	$0	$97,857	$30,826	$0	$408,275	$3,082	$23,164	$22,951	$6,694	$6,694	$5,738	$1,507	$9,969	$11,178	$12,790	$13,999	$15,208	$1,105	$762	$860	$991	$1,089	$1,187
MINING	SAN JACINTO	HARRIS	08100310110110	$0	$218,122	$0	$4,503,776	$18,520	$0	$20,211	$0	$0	$0	$0	$1,666,220	$524,881	$0	$6,951,731	$133,760	$264,879	$213,270	$174,870	$179,708	$166,335	$56,414	$111,918	$146,671	$185,758	$222,427	$255,873	$4,584	$10,076	$13,489	$16,665	$19,644	$22,361
MINING	SAN JACINTO-BRAZOS	HARRIS	08100310110111	$0	$4,164	$0	$85,973	$772	$0	$842	$0	$0	$0	$0	$32,113	$10,116	$0	$133,980	$2,869	$4,986	$4,030	$3,825	$2,869	$2,869	$1,209	$2,115	$2,921	$3,727	$4,130	$4,936	$98	$238	$303	$369	$401	$467
MINING	TRINITY	LEON	08100314514508	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	LEON	08100314514512	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	NECHES	LIBERTY	08100314614606	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$0	$205	$0	$0	$0	$0	$0	$100	$0	$0	$0	$0	$0	$74
MINING	NECHES-TRINITY	LIBERTY	08100314614607	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$100	$0	$0	$0	$74	$0	$0
MINING	TRINITY	LIBERTY	08100314614608	$0	$0	$0	$0	$206,783	$0	$225,690	$0	$0	$0	$0	$151,366	$47,682	$0	$631,522	$0	$11,710	$22,393	$20,545	$20,955	$22,804	$0	$5,727	$10,951	$15,774	$21,199	$26,926	$0	$4,199	$8,029	$11,565	$15,543	$19,742
MINING	TRINITY-SAN JACINTO	LIBERTY	08100314614609	$0	$0	$0	$0	$23,150	$0	$25,264	$0	$0	$0	$0	$16,945	$5,338	$0	$70,697	$0	$2,055	$3,082	$2,055	$2,055	$2,055	$0	$1,005	$1,507	$2,010	$2,512	$3,014	$0	$737	$1,105	$1,473	$1,842	$2,210
MINING	SAN JACINTO	LIBERTY	08100314614610	$0	$0	$0	$0	$772	$0	$842	$0	$0	$0	$0	$565	$178	$0	$2,357	$0	$0	$0	$0	$205	$205	$0	$0	$0	$0	$100	$100	$0	$0	$0	$0	$74	$74
MINING	TRINITY	MADISON	08100315715708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	MADISON	08100315715712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	MONTGOMERY	08100317017010	$0	$0	$0	$0	$327,854	$0	$357,904	$0	$0	$0	$0	$240,016	$75,608	$0	$1,001,382	$22,594	$44,367	$34,716	$23,626	$21,161	$19,312	$11,047	$21,693	$28,023	$33,247	$38,371	$42,691	$8,103	$15,912	$20,553	$24,383	$28,140	$31,308
MINING	TRINITY	POLK	08100318718708	$0	$0	$0	$0	$4,630	$0	$5,053	$0	$0	$0	$0	$3,389	$1,068	$0	$14,139	$0	$411	$616	$411	$411	$411	$0	$201	$301	$402	$502	$603	$0	$147	$221	$295	$368	$442
MINING	TRINITY	SAN JACINTO	08100320420408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	SAN JACINTO	08100320420410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	TRINITY	TRINITY	08100322822808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	TRINITY	WALKER	08100323623608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	WALKER	08100323623610	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	WALLER	08100323723710	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	WALLER	08100323723712	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	SAN JACINTO	FORT BEND	08040900007910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	08040900007911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	SAN JACINTO	HARRIS	08040900010110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	BRAZOS	FORT BEND	08040900007912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MONT BELVIEU	TRINITY	CHAMBERS	08041300003608	$0	$425,571	$0	$8,706,412	$393,311	$0	$434,538	$0	$0	$0	$0	$3,485,941	$1,098,116	$0	$14,543,889	$105,395	$739,642	$774,682	$265,610	$254,166	$262,751	$51,271	$324,048	$383,283	$436,071	$490,470	$546,884	$38,011	$24,301	$31,103	$36,939	$42,980	$49,183
MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	08041300003609	$0	$184,411	$0	$3,804,733	$156,355	$0	$170,952	$0	$0	$0	$0	$1,510,758	$475,908	$0	$6,303,116	$41,670	$297,127	$319,514	$122,381	$121,425	$130,027	$20,362	$128,353	$155,351	$179,932	$206,528	$234,735	$14,954	$10,468	$13,767	$16,501	$19,251	$21,985
MONTGOMERY COUNTY MUD #18	SAN JACINTO	MONTGOMERY	08426100017010	$6,019,471	$0	$2,025,128	$0	$1,401,173	$0	$1,574,779	$0	$48,485	$48,485	$0	$3,857,193	$1,222,985	$0	$16,197,698	$65,190	$176,835	$313,683	$714,970	$754,247	$520,384	$31,818	$86,093	$182,942	$267,015	$307,197	$353,680	$23,425	$63,720	$137,754	$90,780	$132,278	$180,577

WUG Name	wug_basin	WUG County	Annual Costs for Municipal Conservation						Annual Costs for Irrigation Conservation						Project-Specific Annual Costs						Total Annual Cost					
			2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
HUNTSVILLE	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HUNTSVILLE	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IOWA COLONY	SAN JACINTO-BRAZOS	BRAZORIA	$0	$1,414	$1,414	$1,414	$1,616	$1,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,552	$5,589	$8,390	$10,364	$12,514
IRRIGATION	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	BRAZOS-COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$1,734,868	$1,734,868	$1,718,828	$1,718,828	$1,718,828	$1,718,828	$0	$0	$0	$0	$0	$0	$1,734,868	$1,734,868	$2,115,027	$2,071,761	$1,782,897	$1,755,985
IRRIGATION	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$57,898	$57,898	$57,363	$57,363	$57,363	$57,363	$0	$0	$0	$0	$0	$0	$57,898	$57,898	$57,363	$57,363	$57,363	$57,363
IRRIGATION	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$76,700	$76,700	$75,991	$75,991	$75,991	$75,991	$0	$0	$0	$0	$0	$0	$76,700	$76,700	$75,991	$75,991	$75,991	$75,991
IRRIGATION	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$1,670,977	$1,670,977	$1,653,759	$1,653,759	$1,653,759	$1,653,759	$0	$0	$0	$0	$0	$0	$1,670,977	$1,670,977	$1,653,759	$1,653,759	$1,653,759	$1,653,759
IRRIGATION	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$657,035	$657,035	$650,265	$650,265	$650,265	$650,265	$0	$0	$0	$0	$0	$0	$657,035	$657,035	$650,265	$650,265	$650,265	$650,265
IRRIGATION	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$35,425	$35,425	$35,060	$35,060	$35,060	$35,060	$0	$0	$0	$0	$0	$0	$35,425	$35,425	$35,060	$35,060	$35,060	$35,060
IRRIGATION	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$341,125	$341,125	$337,862	$337,862	$337,862	$337,862	$0	$0	$0	$0	$0	$0	$341,125	$341,125	$337,862	$337,862	$337,862	$337,862
IRRIGATION	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$174,232	$174,232	$172,565	$172,565	$162,166	$136,364	$0	$0	$0	$0	$0	$0	$174,232	$174,232	$172,565	$172,565	$162,166	$136,364
IRRIGATION	BRAZOS-COLORADO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,512	$36,704	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,512	$36,704
IRRIGATION	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$237,275	$237,275	$234,710	$234,710	$234,710	$234,710	$0	$0	$0	$0	$0	$0	$237,275	$237,275	$234,710	$234,710	$234,710	$234,710
IRRIGATION	TRINITY-SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	NECHES	LIBERTY	$0	$0	$0	$0	$0	$0	$84,316	$84,316	$83,658	$83,658	$83,658	$83,658	$0	$0	$0	$0	$0	$0	$84,316	$85,317	$85,661	$85,857	$86,135	$88,061
IRRIGATION	NECHES-TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$210,843	$210,843	$209,197	$209,197	$209,197	$209,197	$0	$0	$0	$0	$0	$0	$210,843	$210,843	$209,197	$209,197	$209,197	$209,197
IRRIGATION	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$1,349,069	$1,349,069	$1,338,539	$1,338,539	$1,338,539	$1,338,539	$0	$0	$0	$0	$0	$0	$1,349,069	$1,349,069	$1,338,539	$1,338,539	$1,338,539	$1,338,539
IRRIGATION	TRINITY-SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$442,688	$442,688	$439,233	$439,233	$439,233	$439,233	$0	$0	$0	$0	$0	$0	$442,688	$442,688	$439,233	$439,233	$439,233	$439,233
IRRIGATION	SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$21,105	$21,105	$20,940	$20,940	$20,940	$20,940	$0	$0	$0	$0	$0	$0	$21,105	$21,105	$20,940	$20,940	$20,940	$20,940
IRRIGATION	TRINITY	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	SAN JACINTO	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$574,090	$574,090	$0	$0	$0	$0	$0	$0	$0	$39,552	$31,793	$3,484	$577,361	$577,361
IRRIGATION	BRAZOS	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$152,570	$152,570	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$152,570	$152,570
IRRIGATION	TRINITY	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
IRRIGATION	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
JACINTO CITY	SAN JACINTO	HARRIS	$0	$0	$12,141	$19,596	$20,661	$21,726	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,416	$20,493	$26,099	$38,973	$56,026
JAMAICA BEACH	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$2,657	$1,835	$1,219	$1,219
JERSEY VILLAGE	SAN JACINTO	HARRIS	$0	$34,832	$40,119	$45,717	$51,004	$56,602	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$115,420	$199,743	$196,869	$196,357	$217,261
JEWETT	TRINITY	LEON	$0	$2,020	$2,222	$2,222	$2,020	$2,222	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,889	$17,786	$12,371	$8,866	$9,215
JEWETT	BRAZOS	LEON	$0	$606	$808	$808	$606	$808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,022	$5,743	$3,894	$2,796	$3,072
JONES CREEK	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KATY	SAN JACINTO	FORT BEND	$3,834	$5,112	$6,603	$8,094	$10,011	$12,354	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,644	$95,411	$127,712	$134,525	$164,947	$207,354
KATY	SAN JACINTO	HARRIS	$43,239	$52,185	$61,344	$70,716	$79,662	$89,247	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$326,451	$949,542	$1,135,292	$1,052,886	$1,120,073	$1,245,876
KATY	SAN JACINTO	WALLER	$3,621	$5,538	$7,455	$9,798	$12,354	$15,549	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$28,292	$103,411	$149,264	$171,550	$213,268	$266,510
KEMAH	SAN JACINTO-BRAZOS	GALVESTON	$3,030	$3,636	$3,838	$4,040	$4,040	$4,040	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,899	$106,300	$75,960	$37,666	$35,192	$35,338
KENEFICK	TRINITY	LIBERTY	$0	$1,212	$1,414	$1,616	$1,818	$2,020	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,045	$14,320	$16,898	$20,645	$25,532
LA MARQUE	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LA PORTE	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,527	$26,951	$20,171	$12,364	$12,364
LA PORTE	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$1,519	$1,108	$697	$697
LAKE JACKSON	SAN JACINTO-BRAZOS	BRAZORIA	$54,315	$58,575	$62,196	$66,030	$70,290	$75,615	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$208,374	$337,835	$294,708	$286,684	$311,064	$348,617
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	LIBERTY	$0	$1,491	$1,704	$1,704	$1,917	$2,130	$0	$0	$0	$0	$0	$0	$40,419	$39,858	$20,100	$20,379	$21,496	$22,333	$40,419	$41,349	$21,804	$22,083	$23,413	$24,463
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	POLK	$0	$11,502	$13,206	$13,632	$14,058	$14,910	$0	$0	$0	$0	$0	$0	$331,772	$323,913	$158,847	$158,568	$159,405	$161,080	$331,772	$335,415	$172,053	$172,200	$173,463	$175,990
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	SAN JACINTO	SAN JACINTO	$1,278	$1,491	$1,704	$1,704	$1,917	$1,917	$0	$0	$0	$0	$0	$0	$35,367	$39,296	$20,379	$20,938	$20,938	$20,658	$36,645	$40,787	$22,083	$22,642	$22,855	$22,575
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	SAN JACINTO	$2,769	$3,408	$3,621	$3,834	$4,047	$4,047	$0	$0	$0	$0	$0	$0	$76,908	$84,206	$44,388	$45,505	$45,225	$44,109	$79,677	$87,614	$48,009	$49,339	$49,272	$48,156
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	TRINITY	$0	$426	$213	$0	$0	$0	$0	$0	$0	$0	$0	$0	$40,419	$38,173	$17,867	$16,471	$15,075	$13,958	$40,419	$39,358	$18,766	$16,672	$15,276	$14,159
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPA	TRINITY	WALKER	$0	$0	$213	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,666	$10,105	$4,746	$4,467	$4,188	$4,188	$10,666	$10,105	$5,338	$4,772	$4,288	$4,288
LEAGUE CITY	SAN JACINTO-BRAZOS	GALVESTON	$100,962	$111,399	$117,150	$118,215	$119,280	$120,771	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,072,583	$1,531,455	$1,081,106	$609,982	$575,786	$586,336
LEAGUE CITY	SAN JACINTO-BRAZOS	HARRIS	$426	$426	$426	$426	$426	$426	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,120	$17,124	$14,042	$2,671	$2,869	$2,869
LIBERTY	TRINITY	LIBERTY	$0	$5,598	$7,153	$10,574	$21,459	$30,167	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,431	$15,883	$19,782	$42,926	$68,352
LIVESTOCK	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,338	$3,125	$718	$718	$718
LIVESTOCK	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS-COLORADO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,168	$1,168	$326	$326	$326	$326
LIVESTOCK	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$835	$2,170	$1,568	$605	$605
LIVESTOCK	TRINITY-SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	NECHES-TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY-SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	SAN JACINTO	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVESTOCK	BRAZOS	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIVINGSTON	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LONGHORN TOWN UD	SAN JACINTO	HARRIS	$2,556	$5,538	$7,029	$8,733	$10,437	$11,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$65,909	$222,802	$297,232	$309,628	$346,543	$390,402
MADISONVILLE	TRINITY	MADISON	$0	$10,574	$15,550	$15,861	$16,483	$16,794	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$23,480	$36,807	$37,346	$42,938	$49,594
MAGNOLIA	SAN JACINTO	MONTGOMERY	$4,848	$6,868	$8,888	$11,312	$14,544	$18,382	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,073	$94,899	$152,030	$199,612	$267,529	$352,015
MANUFACTURING	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,213	$13,665	$15,456	$16,899	$21,788
MANUFACTURING	BRAZOS-COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$2,657	$3,353	$3,876	$4,573
MANUFACTURING	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,679,151	$6,242,188	$6,369,870	$5,531,457	$6,733,685
MANUFACTURING	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,682,974	$70,648,156	$77,706,784	$70,439,251	$65,273,606	$67,016,941
MANUFACTURING	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MANUFACTURING	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,948,773	$9,328,581	$6,364,786	$6,830,168	$7,187,111	$7,853,240
MANUFACTURING	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$856,922	$1,775,436	$1,276,226	$707,630	$645,110
MANUFACTURING	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$38,319	$170,172	$162,009	$78,193	$61,016
MANUFACTURING	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$562,282	$616,566	$267,362	$228,465
MANUFACTURING	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$87,959	$228,723	$181,113	$104,916	$104,916
MANUFACTURING	TRINITY-SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,081,021	$24,477,887	$20,211,648	$21,498,877	$22,161,459	$19,317,358
MANUFACTURING	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,231,397	$2,302,153	$1,631,434	$1,048,848	$1,048,848
MANUFACTURING	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,977,675	$10,042,218	$11,496,015	$19,855,992	$18,679,666	$12,813,948
MANUFACTURING	TRINITY	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$48,571	$96,004	$117,528	$135,116	$149,464
MANUFACTURING	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,555	$8,730	$10,820	$12,736	$13,687
MANUFACTURING	SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,774	$45,927	$57,135	$65,859	$71,722
MANUFACTURING	TRINITY	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$11,008	$21,257	$25,549	$29,111	$35,332
MANUFACTURING	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$177,134	$372,928	$426,815	$461,580	$521,638	$587,332
MANUFACTURING	SAN JACINTO	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$3,037	$3,734	$4,050	$5,127
MANUFACTURING	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$235,860	$497,489	$442,226	$414,952	$503,711
MANUFACTURING	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,917	$66,798	$80,540	$91,751	$104,069
MANUFACTURING	SAN JACINTO	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,797	$7,213	$8,195	$9,762	$11,155
MANUFACTURING	BRAZOS	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$1,519	$2,246	$2,215	$2,737
MANVEL	SAN JACINTO-BRAZOS	BRAZORIA	$0	$6,390	$6,390	$6,177	$5,964	$5,964	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$83,322	$83,919	$31,939	$31,119	$33,715
MASON CREEK UD	SAN JACINTO	HARRIS	$43,540	$42,918	$42,607	$41,985	$41,985	$41,985	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$256,813	$599,096	$562,573	$375,171	$331,682	$331,682
MEADOWS	SAN JACINTO	FORT BEND	$34,832	$34,521	$34,210	$33,588	$33,588	$33,588	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$34,832	$131,254	$237,717	$162,261	$82,207	$82,207
MEADOWS	SAN JACINTO-BRAZOS	FORT BEND	$3,421	$3,421	$3,421	$3,421	$3,421	$3,421	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,421	$21,257	$32,119	$16,448	$8,292	$8,292
MERCY WSC	SAN JACINTO	LIBERTY	$0	$1,010	$1,212	$1,212	$1,414	$1,616	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,945	$10,702	$12,965	$15,637	$19,242
MERCY WSC	SAN JACINTO	SAN JACINTO	$0	$4,444	$5,050	$5,454	$5,656	$5,656	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,496	$49,461	$48,452	$44,629	$41,471
MINING	BRAZOS	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$2,657	$2,594	$2,737	$3,086
MINING	BRAZOS-COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$379
MINING	COLORADO	AUSTIN	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$379	$553	$553	$348
MINING	SAN JACINTO-BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$114,883	$165,752	$152,798	$188,899	$214,105
MINING	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$165,572	$189,237	$100,568	$107,975	$113,033
MINING	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$646,989	$825,600	$567,643	$655,829	$744,327
MINING	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$39,468	$59,586	$50,750	$51,630	$56,997	$61,256
MINING	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,854,151	$7,644,853	$6,477,693	$6,423,655	$6,980,655	$7,355,131
MINING	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,638,888	$2,052,477	$1,694,117	$2,241,168	$2,541,236	$2,809,629
MINING	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$107,163	$229,628	$160,190	$80,243	$80,157
MINING	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$119,683	$968,546	$905,822	$342,467	$343,000
MINING	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$262,791	$532,519	$360,426	$184,967	$186,189
MINING	BRAZOS-COLORADO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$1,519	$1,456	$1,835	$2,183
MINING	NECHES-TRINITY	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,271	$32,015	$21,271	$18,752	$21,246	$23,945
MINING	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,694	$33,895	$34,989	$20,475	$21,782	$22,133
MINING	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$194,758	$386,873	$373,430	$377,293	$421,779	$444,569
MINING	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,176	$7,339	$7,254	$7,921	$7,400	$8,272
MINING	TRINITY	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	LEON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	NECHES	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379
MINING	NECHES-TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$305	$100
MINING	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,636	$41,373	$47,884	$57,697	$69,472
MINING	TRINITY-SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,797	$5,694	$5,538	$6,409	$7,279
MINING	SAN JACINTO	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$379	$379
MINING	TRINITY	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	MADISON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,744	$81,972	$83,292	$81,256	$87,672	$93,311
MINING	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$1,138	$1,108	$1,281	$1,456
MINING	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	SAN JACINTO	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MINING	BRAZOS	WALLER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
MISSOURI CITY	SAN JACINTO	FORT BEND	$0	$43,239	$51,546	$60,279	$66,669	$81,153	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$43,239	$51,546	$60,279	$66,669	$81,153
MISSOURI CITY	SAN JACINTO-BRAZOS	FORT BEND	$0	$195,321	$233,448	$272,640	$301,821	$366,999	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$195,321	$233,448	$272,640	$301,821	$366,999
MISSOURI CITY	SAN JACINTO	HARRIS	$17,679	$20,874	$24,069	$27,477	$31,098	$34,506	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,679	$20,874	$24,069	$27,477	$31,098	$34,506
MISSOURI CITY	BRAZOS	FORT BEND	$0	$5,325	$6,390	$7,455	$8,094	$9,798	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,325	$6,390	$7,455	$8,094	$9,798
MONT BELVIEU	TRINITY	CHAMBERS	$7,474	$9,696	$11,918	$13,534	$15,554	$17,372	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$202,151	$1,097,687	$1,200,986	$752,154	$803,170	$876,190
MONT BELVIEU	TRINITY-SAN JACINTO	CHAMBERS	$3,434	$4,646	$5,454	$6,464	$7,272	$8,080	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$80,420	$440,594	$494,086	$325,278	$354,476	$394,827
MONTGOMERY COUNTY MUD #18	SAN JACINTO	MONTGOMERY	$34,832	$44,162	$65,310	$90,190	$123,467	$161,720	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$155,265	$370,810	$699,689	$1,162,955	$1,317,190	$1,216,361

Region H
Table 4C-2: WUG-Level Project Costs

				Pump Stations		Connection Costs	Treatment Plants			Wells		Other Capital Costs							Debt Service						Operations and Maintenance						Energy					
WUG Name	wug_basin	WUG County	WUG-County-Basin Identifier	Booster Pump Stations	Raw Water Pump Stations	Pipeline Connections	Surface Water Treatment Plants	Groundwater Treatment Plants	Direct Reuse Plants	Municipal Supply Wells	Agricultural Wells	Land and Easements	Mitigation	Capital Costs for Irrigation Conservation	Engineering, Contingencies, Financial and Legal Services	Interest During Construction	Project-Specific Capital Costs	Total Capital Cost	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	08426200017010	$352,681	$0	$120,983	$0	$128,830	$0	$140,635	$0	$48,485	$48,485	$0	$260,095	$89,853	$0	$1,190,048	$16,434	$34,306	$87,320	$69,448	$0	$0	$8,036	$16,775	$26,802	$26,802	$26,802	$26,802	$5,893	$12,302	$10,068	$8,300	$8,864	$9,208
MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	08426300017010	$675,523	$185,000	$231,418	$3,812,841	$123,365	$0	$134,740	$0	$48,485	$48,485	$0	$1,807,011	$577,151	$6,000,000	$13,644,019	$29,367	$361,995	$403,871	$296,137	$230,234	$8,309	$14,356	$149,391	$179,200	$249,062	$249,949	$250,443	$10,534	$13,301	$26,462	$35,457	$36,341	$36,832
MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	08426400017010	$765,049	$203,022	$262,022	$4,185,132	$155,777	$0	$170,110	$0	$48,485	$48,485	$0	$2,009,389	$640,903	$6,000,000	$14,488,374	$28,341	$354,371	$427,142	$370,854	$278,639	$14,830	$13,855	$146,070	$189,087	$275,696	$277,175	$278,161	$10,166	$13,735	$30,039	$38,658	$40,131	$41,114
MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	08426500017010	$0	$0	$0	$0	$284,665	$0	$310,745	$0	$0	$0	$0	$208,394	$65,647	$0	$869,450	$19,925	$41,698	$33,278	$19,517	$16,025	$14,587	$9,743	$20,389	$26,015	$29,933	$33,852	$37,067	$7,146	$14,954	$19,079	$21,952	$24,825	$27,182
MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	08426600017010	$615,702	$0	$211,300	$0	$203,649	$0	$222,322	$0	$48,485	$48,485	$0	$438,541	$146,065	$0	$1,934,549	$16,845	$37,797	$37,386	$95,773	$95,926	$35,093	$8,237	$18,482	$26,518	$38,190	$40,947	$44,024	$6,041	$13,554	$19,448	$11,737	$14,487	$17,557
MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	08426700017010	$683,815	$0	$234,104	$0	$348,373	$0	$380,642	$0	$48,485	$48,485	$0	$576,426	$189,501	$0	$2,509,830	$34,290	$72,476	$58,522	$134,624	$121,259	$11,719	$16,761	$35,423	$45,367	$62,855	$64,014	$64,803	$12,302	$26,004	$33,297	$17,680	$18,834	$19,619
MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	08426800017010	$0	$0	$0	$0	$462,777	$0	$505,277	$0	$0	$0	$0	$338,819	$106,732	$0	$1,413,605	$17,256	$38,823	$38,618	$34,717	$40,671	$49,704	$8,438	$18,984	$27,321	$35,960	$47,208	$60,261	$6,188	$13,923	$20,037	$26,372	$34,623	$44,199
NASSAU BAY	SAN JACINTO-BRAZOS	HARRIS	08042400010111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NEEDVILLE	BRAZOS	FORT BEND	08042800007912	$0	$0	$0	$0	$246,881	$0	$269,481	$0	$0	$0	$0	$180,727	$56,931	$0	$754,020	$0	$8,834	$19,928	$22,393	$27,118	$34,511	$0	$4,320	$9,746	$15,271	$23,007	$32,147	$0	$3,168	$7,146	$11,197	$16,869	$23,573
NEEDVILLE	BRAZOS-COLORADO	FORT BEND	08042800007913	$0	$0	$0	$0	$298,541	$0	$325,904	$0	$0	$0	$0	$218,556	$68,848	$0	$911,848	$0	$10,889	$24,242	$27,118	$32,663	$41,493	$0	$5,325	$11,855	$18,586	$27,827	$38,874	$0	$3,904	$8,692	$13,628	$20,405	$28,508
NEW CANEY MUD	SAN JACINTO	MONTGOMERY	08427200017010	$0	$0	$0	$0	$2,205,950	$0	$2,449,750	$0	$0	$0	$0	$1,629,495	$513,312	$0	$6,798,508	$54,566	$111,995	$138,916	$173,936	$228,148	$306,794	$26,649	$54,691	$94,418	$139,447	$205,220	$287,697	$19,595	$40,221	$69,540	$102,836	$151,971	$214,291
NEW WAVERLY	SAN JACINTO	WALKER	08092600023610	$0	$0	$0	$0	$19,292	$0	$21,053	$0	$0	$0	$0	$14,121	$4,448	$0	$58,914	$0	$3,493	$5,136	$1,644	$0	$0	$0	$1,708	$2,512	$2,512	$2,512	$2,512	$0	$1,252	$1,842	$1,326	$1,252	$1,252
NHCRWA	SAN JACINTO	HARRIS	08800000010110	$28,832,697	$14,018,318	$0	$132,435,377	$0	$2,954,458	$0	$0	$48,485	$48,485	$0	$62,384,297	$19,659,775	$0	$260,381,892	$0	$2,053,469	$3,863,126	$11,697,219	$18,793,578	$8,950,592	$0	$401,441	$1,404,384	$12,062,005	$21,342,561	$21,508,847	$0	$1,377,265	$2,059,403	$2,461,582	$2,747,418	$2,613,839
NORMANGEE	TRINITY	LEON	08092700014508	$0	$0	$0	$0	$12,347	$0	$13,474	$0	$0	$0	$0	$9,037	$2,847	$0	$37,705	$0	$2,260	$3,287	$1,027	$0	$0	$0	$1,105	$1,608	$1,608	$1,608	$1,608	$0	$810	$1,179	$1,031	$958	$1,031
NORMANGEE	BRAZOS	LEON	08092700014512	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$822	$1,438	$616	$0	$0	$0	$402	$703	$703	$703	$703	$0	$295	$516	$442	$368	$442
NORMANGEE	TRINITY	MADISON	08092700015708	$0	$0	$0	$0	$3,087	$0	$3,369	$0	$0	$0	$0	$2,259	$712	$0	$9,426	$0	$411	$616	$205	$205	$205	$0	$201	$301	$301	$402	$402	$0	$147	$221	$221	$295	$295
NORTH BELT UD	SAN JACINTO	HARRIS	08427500010110	$0	$0	$0	$0	$713,451	$0	$779,811	$0	$0	$0	$0	$522,642	$164,639	$0	$2,180,543	$23,005	$78,798	$88,033	$57,913	$52,373	$53,399	$11,248	$38,494	$54,253	$66,805	$79,859	$92,912	$8,250	$28,287	$39,853	$49,061	$58,637	$68,214
NORTH GREEN MUD	SAN JACINTO	HARRIS	08427900010110	$0	$0	$0	$0	$286,897	$0	$313,272	$0	$0	$0	$0	$210,059	$66,171	$0	$876,398	$17,256	$49,700	$44,360	$16,230	$9,245	$10,478	$8,438	$24,297	$30,124	$32,234	$34,646	$37,359	$6,188	$17,827	$22,100	$23,646	$25,414	$27,403
NORTHWEST HARRIS COUNTY MUD #23	SAN JACINTO	HARRIS	08428600010110	$0	$0	$0	$0	$805,393	$0	$880,866	$0	$0	$0	$0	$590,191	$185,918	$0	$2,462,367	$28,957	$95,779	$103,573	$62,219	$53,809	$56,682	$14,156	$46,767	$64,729	$77,181	$91,036	$104,891	$10,387	$34,402	$47,588	$56,722	$66,888	$77,054
NORTHWEST PARK MUD	SAN JACINTO	HARRIS	08428700010110	$0	$0	$0	$0	$1,834,269	$0	$2,126,373	$0	$0	$0	$0	$1,386,225	$436,679	$0	$5,783,545	$134,701	$433,335	$369,535	$70,901	$0	$0	$65,299	$205,598	$240,190	$240,190	$240,190	$240,190	$48,766	$160,516	$186,004	$182,247	$180,479	$180,479
OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	08072600017010	$1,135,228	$0	$388,815	$0	$209,706	$0	$229,059	$0	$48,485	$48,485	$0	$686,983	$224,328	$0	$2,971,090	$23,621	$55,860	$160,282	$128,043	$34,704	$75,130	$11,549	$27,308	$47,087	$47,087	$52,856	$59,577	$8,471	$20,037	$20,037	$19,890	$25,807	$32,535
OLD RIVER-WINFREE	TRINITY	CHAMBERS	08072700003608	$0	$78,007	$0	$1,610,128	$124,862	$0	$136,425	$0	$0	$0	$0	$682,297	$214,932	$0	$2,846,651	$33,265	$203,239	$180,493	$19,126	$21,038	$25,820	$16,260	$87,986	$92,419	$96,045	$101,284	$106,925	$11,934	$5,828	$6,188	$6,483	$6,982	$7,588
ONALASKA	TRINITY	POLK	08093300018708	$0	$0	$0	$0	$104,944	$0	$114,529	$0	$0	$0	$0	$76,816	$24,198	$0	$320,488	$0	$8,218	$14,587	$10,684	$8,629	$9,040	$0	$4,019	$7,134	$9,244	$11,354	$13,665	$0	$2,947	$5,230	$6,777	$8,324	$10,018
ONALASKA WSC	TRINITY	POLK	08429300018708	$0	$0	$0	$0	$11,575	$0	$12,632	$0	$0	$0	$0	$8,473	$2,669	$0	$35,349	$0	$822	$1,438	$616	$0	$1,644	$0	$402	$703	$703	$703	$1,507	$0	$295	$516	$147	$442	$1,105
ORBIT SYSTEMS INC	BRAZOS-COLORADO	BRAZORIA	08429400002013	$0	$0	$0	$0	$27,781	$0	$30,317	$0	$0	$0	$0	$20,334	$6,405	$0	$84,837	$0	$1,027	$2,465	$3,082	$3,082	$3,287	$0	$502	$1,206	$2,010	$2,713	$3,617	$0	$368	$884	$1,473	$1,989	$2,652
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	BRAZORIA	08429400002011	$0	$0	$0	$0	$247,662	$0	$270,323	$0	$0	$0	$0	$181,295	$57,110	$0	$756,391	$0	$12,737	$25,474	$25,269	$25,269	$27,939	$0	$6,229	$12,458	$18,586	$24,815	$32,249	$0	$4,567	$9,134	$13,628	$18,195	$23,646
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	08429400007911	$0	$5,900	$0	$121,795	$0	$0	$0	$0	$0	$0	$0	$44,693	$14,079	$0	$186,466	$0	$3,825	$9,563	$7,650	$3,825	$4,781	$0	$1,612	$4,030	$4,836	$5,642	$6,850	$0	$131	$327	$393	$458	$557
OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	08073000002011	$86,725	$0	$29,847	$0	$23,150	$0	$25,264	$0	$48,462	$48,462	$0	$57,745	$26,106	$0	$345,762	$12,850	$16,823	$7,455	$6,324	$6,073	$6,997	$617	$2,272	$3,448	$4,119	$4,789	$5,481	$614	$1,866	$2,799	$3,389	$4,002	$4,666
PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	08073200017010	$587,557	$0	$201,211	$0	$193,549	$0	$211,374	$0	$48,485	$48,485	$0	$417,792	$139,529	$0	$1,847,980	$23,415	$51,551	$132,211	$104,075	$0	$5,489	$11,449	$25,204	$40,992	$40,992	$40,992	$41,905	$8,398	$18,490	$15,936	$13,923	$15,494	$16,845
PARKWAY UD	SAN JACINTO	HARRIS	08429800010110	$194,295	$0	$66,753	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$91,367	$36,698	$0	$486,037	$42,375	$42,375	$0	$0	$0	$0	$5,525	$5,525	$5,525	$5,525	$5,525	$5,525	$5,525	$5,427	$5,255	$5,157	$5,034	$5,083
PASADENA	SAN JACINTO	HARRIS	08045600010110	$0	$0	$0	$0	$213,566	$0	$233,269	$0	$0	$0	$0	$156,393	$49,266	$0	$652,494	$0	$29,777	$56,887	$27,110	$0	$0	$0	$14,557	$27,811	$27,811	$27,811	$27,811	$0	$10,681	$20,405	$20,405	$20,405	$20,405
PASADENA	SAN JACINTO-BRAZOS	HARRIS	08045600010111	$0	$0	$0	$0	$59,416	$0	$64,844	$0	$0	$0	$0	$43,491	$13,700	$0	$181,450	$0	$8,218	$15,820	$7,602	$0	$0	$0	$4,019	$7,737	$7,737	$7,737	$7,737	$0	$2,947	$5,672	$5,672	$5,672	$5,672
PATTON VILLAGE	SAN JACINTO	MONTGOMERY	08073400017010	$0	$0	$0	$0	$87,198	$0	$95,160	$0	$0	$0	$0	$63,826	$20,106	$0	$266,290	$3,082	$6,575	$6,575	$6,575	$7,602	$10,067	$1,507	$3,215	$4,723	$6,431	$8,440	$11,354	$1,105	$2,357	$3,462	$4,715	$6,188	$8,324
PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	08045700002011	$0	$0	$0	$0	$1,576,628	$0	$1,746,573	$0	$0	$0	$0	$1,163,121	$366,398	$256,081,548	$260,934,268	$0	$0	$86,160	$232,600	$258,690	$190,482	$0	$0	$41,989	$112,860	$167,425	$205,575	$0	$0	$31,013	$84,125	$124,641	$152,781
PEARLAND	SAN JACINTO-BRAZOS	HARRIS	08045700010111	$0	$0	$0	$0	$20,835	$0	$22,737	$0	$0	$0	$0	$15,250	$4,804	$8,918,452	$8,982,080	$0	$2,876	$5,547	$2,671	$0	$0	$0	$1,407	$2,713	$2,713	$2,713	$2,713	$0	$1,031	$1,989	$1,989	$1,989	$1,989
PECAN GROVE MUD #1	BRAZOS	FORT BEND	08429900007912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,354,180	$3,354,180	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PECAN GROVE MUD #1	SAN JACINTO-BRAZOS	FORT BEND	08429900007911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,605,820	$12,605,820	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PINE ISLAND	BRAZOS	WALLER	08093800023712	$0	$0	$0	$0	$145,066	$0	$158,320	$0	$0	$0	$0	$106,185	$33,450	$0	$443,020	$0	$5,958	$12,327	$13,149	$15,820	$19,517	$0	$2,914	$6,029	$9,344	$13,765	$18,889	$0	$2,136	$4,420	$6,851	$10,092	$13,849
PINE TRAILS UTILITY	SAN JACINTO	HARRIS	08430200010110	$450,836	$0	$155,020	$0	$20,064	$0	$21,895	$0	$48,462	$48,462	$0	$226,735	$79,340	$0	$1,050,814	$40,905	$51,345	$19,728	$19,220	$19,569	$21,049	$5,281	$7,944	$10,284	$11,935	$13,537	$15,434	$5,279	$7,563	$9,576	$11,221	$12,817	$14,708
PINEY POINT VILLAGE	SAN JACINTO	HARRIS	08046800010110	$773,665	$0	$265,096	$0	$13,119	$0	$14,316	$0	$48,462	$48,462	$0	$373,169	$125,469	$0	$1,661,757	$110,979	$117,667	$13,285	$13,568	$12,904	$13,645	$16,939	$18,581	$20,274	$21,433	$22,419	$23,701	$17,115	$18,539	$19,987	$21,142	$22,124	$23,401
PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	08430300007911	$230,458	$0	$79,281	$0	$122,643	$0	$133,898	$0	$48,485	$48,485	$0	$198,198	$70,354	$0	$931,802	$0	$31,487	$61,816	$42,481	$17,196	$7,271	$0	$6,764	$19,296	$21,316	$22,154	$22,524	$0	$5,525	$15,028	$10,558	$8,741	$8,005
PLEAK	BRAZOS	FORT BEND	08105300007912	$0	$0	$0	$0	$492,625	$0	$538,120	$0	$0	$0	$0	$360,761	$113,644	$0	$1,505,149	$0	$12,943	$36,974	$48,268	$56,886	$70,015	$0	$6,329	$18,079	$29,929	$45,888	$64,150	$0	$4,641	$13,260	$21,952	$33,665	$47,072
PLUM GROVE	SAN JACINTO	LIBERTY	08105400014610	$0	$0	$0	$0	$137,351	$0	$149,899	$0	$0	$0	$0	$100,538	$31,671	$0	$419,458	$0	$7,191	$13,560	$13,149	$14,382	$16,231	$0	$3,517	$6,631	$9,947	$13,665	$17,885	$0	$2,578	$4,862	$7,293	$10,018	$13,112
POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	08430500017010	$0	$0	$0	$0	$1,789,544	$0	$1,977,317	$0	$0	$0	$0	$1,318,401	$415,313	$0	$5,500,575	$25,468	$67,957	$110,128	$156,031	$206,676	$255,576	$12,452	$33,214	$66,222	$109,290	$166,749	$233,281	$9,134	$24,383	$48,693	$80,516	$123,242	$172,965
POINT BLANK	TRINITY	SAN JACINTO	08105600020408	$0	$0	$0	$0	$20,835	$0	$22,737	$0	$0	$0	$0	$15,250	$4,804	$0	$63,627	$0	$2,260	$3,904	$2,465	$1,438	$822	$0	$1,105	$1,909	$2,311	$2,612	$2,713	$0	$810	$1,400	$1,694	$1,915	$1,989
PORTER WSC	SAN JACINTO	MONTGOMERY	08430700017010	$0	$0	$0	$0	$1,712,207	$0	$1,885,525	$0	$0	$0	$0	$1,259,206	$396,666	$0	$5,253,603	$66,210	$159,065	$191,581	$214,195	$160,826	$84,773	$32,314	$77,539	$125,597	$181,707	$203,868	$223,131	$23,794	$57,238	$92,818	$134,512	$150,792	$164,936
PRAIRIE VIEW	BRAZOS	WALLER	08048500023712	$0	$0	$0	$0	$460,330	$0	$502,750	$0	$0	$0	$0	$337,078	$106,184	$0	$1,406,342	$0	$16,845	$36,565	$42,519	$51,551	$63,247	$0	$8,237	$17,880	$29,027	$43,083	$59,944	$0	$6,041	$13,112	$21,289	$31,602	$43,978
PRAIRIE VIEW	SAN JACINTO	WALLER	08048500023710	$0	$0	$0	$0	$50,931	$0	$55,580	$0	$0	$0	$0	$37,279	$11,743	$0	$155,533	$0	$1,849	$4,109	$4,725	$5,547	$6,985	$0	$904	$2,010	$3,215	$4,723	$6,632	$0	$663	$1,473	$2,357	$3,462	$4,862
RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	08431200017010	$1,707,590	$0	$577,810	$0	$632,334	$0	$695,598	$0	$48,485	$48,485	$0	$1,264,666	$406,306	$0	$5,381,274	$78,640	$169,061	$390,525	$300,103	$0	$0	$38,347	$82,396	$130,864	$130,864	$130,864	$130,864	$28,287	$60,847	$50,461	$42,112	$44,911	$46,728
RICHMOND	BRAZOS	FORT BEND	08050000007912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	08050100002011	$65,903	$0	$22,680	$0	$17,749	$0	$19,369	$0	$48,462	$48,462	$0	$43,995	$21,775	$0	$288,394	$14,481	$17,563	$4,109	$2,124	$3,380	$5,457	$888	$2,395	$2,897	$3,146	$3,592	$4,185	$884	$1,915	$2,357	$2,578	$2,996	$3,560
RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	08432200017010	$344,220	$0	$118,335	$0	$108,708	$332,083	$118,740	$0	$48,485	$48,485	$0	$357,730	$120,609	$0	$1,597,395	$48,258	$71,235	$22,977	$20,409	$49,380	$47,624	$86,156	$171,871	$171,871	$173,743	$178,559	$181,660	$14,512	$9,036	$10,215	$10,902	$15,715	$18,809
RIVERSIDE WSC	TRINITY	SAN JACINTO	08432300020408	$0	$0	$0	$0	$144,293	$0	$157,478	$0	$0	$0	$0	$105,620	$33,272	$0	$440,663	$0	$5,958	$12,944	$18,696	$18,285	$13,765	$0	$2,914	$6,330	$12,057	$15,272	$18,789	$0	$2,136	$4,641	$8,840	$11,197	$13,775
RIVERSIDE WSC	TRINITY	WALKER	08432300023608	$0	$0	$0	$0	$84,108	$0	$91,792	$0	$0	$0	$0	$61,565	$19,394	$0	$256,859	$0	$0	$1,027	$10,067	$13,765	$12,327	$0	$0	$502	$4,923	$7,234	$10,952	$0	$0	$368	$3,610	$5,304	$8,029
ROLLING FORK PUD	SAN JACINTO	HARRIS	08441100010110	$553,811	$0	$190,310	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$260,443	$89,959	$0	$1,191,447	$34,725	$78,522	$57,132	$17,638	$7,419	$7,716	$4,253	$11,534	$13,751	$14,466	$14,984	$15,748	$4,248	$11,541	$13,751	$14,463	$14,979	$15,740
ROMAN FOREST	SAN JACINTO	MONTGOMERY	08080100017010	$0	$0	$0	$0	$1,608,053	$0	$1,770,153	$0	$0	$0	$0	$1,182,372	$372,462	$0	$4,933,041	$19,104	$76,124	$125,066	$140,781	$169,843	$213,180	$9,341	$37,185	$70,391	$105,873	$153,151	$209,551	$6,851	$27,330	$51,786	$77,938	$112,928	$154,844
ROSENBERG	BRAZOS	FORT BEND	08051800007912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SAN FELIPE	BRAZOS	AUSTIN	08095400000812	$0	$0	$0	$0	$40,127	$0	$43,791	$0	$0	$0	$0	$29,371	$9,252	$0	$122,541	$0	$4,315	$7,191	$4,520	$2,260	$1,849	$0	$2,110	$3,517	$4,321	$4,622	$5,225	$0	$1,547	$2,578	$3,168	$3,389	$3,831
SAN JACINTO WSC	TRINITY	SAN JACINTO	08432800020408	$0	$0	$0	$0	$139,656	$0	$152,425	$0	$0	$0	$0	$102,229	$32,203	$0	$426,513	$0	$13,970	$25,064	$17,874	$10,067	$5,342	$0	$6,831	$12,257	$15,572	$17,180	$18,185	$0	$5,009	$8,987	$11,418	$12,597	$13,333
SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	08432900008411	$1,064,686	$0	$362,656	$0	$3,858	$0	$4,211	$0	$48,485	$48,485	$0	$502,394	$166,180	$0	$2,200,954	$0	$191,684	$191,889	$205	$0	$0	$0	$30,646	$30,746	$30,746	$30,746	$30,746	$0	$31,234	$31,307	$31,307	$31,307	$31,307
SANTA FE	SAN JACINTO-BRAZOS	GALVESTON	08074300008411	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SEABROOK	SAN JACINTO-BRAZOS	HARRIS	08054500010111	$2,556,573	$0	$875,277	$0	$67,131	$0	$73,265	$0	$48,462	$48,462	$0	$1,250,286	$401,772	$0	$5,321,227	$169,640	$229,266	$117,027	$118,870	$116,230	$115,793	$26,708	$39,606	$51,934	$62,155	$71,260	$81,408	$27,231	$38,944	$50,166	$60,430	$69,564	$79,755
SEALY	BRAZOS	AUSTIN	08054900000812	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,450,000	$6,450,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SHENANDOAH	SAN JACINTO	MONTGOMERY	08074500017010	$2,680,728	$0	$910,535	$0	$564,776	$0	$620,648	$0	$48,485	$48,485	$0	$1,671,840	$534,571	$0	$7,080,068	$60,902	$150,918	$402,093	$312,077	$66,271	$154,277	$29,733	$73,586	$124,054	$124,054	$135,073	$149,710	$21,879	$54,291	$52,646	$50,731	$63,720	$78,478
SHEPHERD	TRINITY	SAN JACINTO	08074600020408	$0	$0	$0	$0	$100,311	$0	$109,477	$0	$0	$0	$0	$73,426	$23,130	$0	$306,343	$0	$11,094	$19,106	$11,505	$6,164	$4,109	$0	$5,425	$9,344	$11,052	$12,358	$13,062	$0	$3,978	$6,851	$8,103	$9,061	$9,576
SHOREACRES	SAN JACINTO-BRAZOS	HARRIS	08055800010111	$0	$0	$0	$0	$2,315	$0	$2,526	$0	$0	$0	$0	$1,695	$534	$0	$7,070	$0	$411	$616	$205	$0	$0	$0	$201	$301	$301	$301	$301	$0	$147	$221	$221	$221	$221
SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	08433400007911	$664,728	$0	$228,117	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$312,496	$106,360	$0	$1,408,669	$0	$56,016	$118,066	$66,799	$4,748	$0	$0	$7,793	$18,110	$18,899	$18,899	$18,899	$0	$7,808	$18,171	$18,956	$18,956	$18,956
SIMONTON	BRAZOS	FORT BEND	08106200007912	$0	$0	$0	$0	$380,994	$0	$416,011	$0	$0	$0	$0	$278,952	$87,873	$0	$1,163,830	$0	$16,023	$35,538	$31,636	$36,768	$53,809	$0	$7,836	$17,378	$23,305	$35,356	$49,612	$0	$5,746	$12,744	$17,090	$25,930	$36,391
SOUTH HOUSTON	SAN JACINTO	HARRIS	08056900010110	$0	$0	$0	$0	$36,268	$0	$39,580	$0	$0	$0	$0	$26,547	$8,363	$0	$110,758	$0	$4,315	$9,656	$5,342	$0	$0	$0	$2,110	$4,722	$4,722	$4,722	$4,722	$0	$1,547	$3,462	$3,462	$3,462	$3,462
SOUTHERN MONTGOMERY COUNTY MUD	SAN JACINTO	MONTGOMERY	08433900017010	$1,814,583	$0	$613,326	$0	$661,228	$0	$729,283	$0	$48,485	$48,485	$0	$1,336,447	$428,917	$0	$5,680,754	$64,578	$177,028	$430,697	$318,246	$0	$0	$31,520	$86,182	$137,680	$137,680	$137,680	$137,680	$23,204	$63,794	$53,775	$46,286	$49,969	$53,186
SOUTHSIDE PLACE	SAN JACINTO	HARRIS	08057200010110	$86,717	$0	$29,843	$0	$7,717	$0	$8,421	$0	$48,485	$48,485	$0	$46,444	$22,550	$0	$298,662	$0	$10,823	$14,613	$7,055	$7,271	$8,161	$0	$677	$1,572	$2,115	$2,781	$3,471	$0	$516	$1,302	$1,842	$2,505	$3,193
SOUTHWEST UTILITIES	SAN JACINTO-BRAZOS	BRAZORIA	08434300002011	$0	$0	$0	$0	$5,402	$0	$5,895	$0	$0	$0	$0	$3,954	$1,246	$0	$16,496	$0	$0	$0	$205	$616	$1,233	$0	$0	$0	$100	$301	$703	$0	$0	$0	$74	$221	$516
SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	08434300010110	$780,099	$0	$268,061	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$366,856	$123,480	$0	$1,635,419	$34,430	$84,226	$71,106	$33,610	$23,417	$24,747	$4,204	$12,483	$16,025	$18,070	$19,917	$22,183	$4,199	$12,498	$16,034	$18,072	$19,914	$22,173
SOUTHWEST UTILITIES	SAN JACINTO	LIBERTY	08434300014610	$0	$0	$0	$0	$9,260	$0	$10,106	$0	$0	$0	$0	$6,778	$2,135	$0	$28,279	$0	$411	$822	$822	$1,027	$1,233	$0	$201	$402	$603	$904	$1,206	$0	$147	$295	$442	$663	$884
SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	08434300017010	$0	$0	$0	$0	$352,530	$0	$384,852	$0	$0	$0	$0	$258,084	$81,300	$0	$1,076,766	$8,834	$20,955	$25,269	$27,734	$34,922	$45,188	$4,320	$10,248	$16,678	$23,810	$33,754	$45,904	$3,168	$7,514	$12,228	$17,459	$24,751	$33,665
SPLENDORA	SAN JACINTO	MONTGOMERY	08096200017010	$0	$0	$0	$0	$354,818	$0	$387,379	$0	$0	$0	$0	$259,769	$81,830	$0	$1,083,796	$6,780	$17,052	$22,188	$27,734	$38,823	$49,704	$3,316	$8,339	$14,166	$21,901	$33,149	$46,203	$2,431	$6,114	$10,387	$16,059	$24,309	$33,886
SPRING CREEK UD	SAN JACINTO	MONTGOMERY	08434400017010	$1,226,387	$0	$420,315	$0	$172,747	$0	$188,637	$0	$48,485	$48,485	$0	$702,830	$229,320	$0	$3,037,205	$18,693	$46,008	$142,608	$122,856	$52,239	$95,933	$9,141	$22,495	$40,151	$41,408	$48,835	$57,357	$6,704	$16,501	$17,851	$19,104	$26,544	$35,089
SPRING VALLEY	SAN JACINTO	HARRIS	08057500010110	$687,866	$0	$236,277	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$323,450	$109,807	$0	$1,454,324	$40,611	$95,373	$71,644	$21,778	$8,902	$9,644	$5,232	$14,337	$17,143	$17,957	$18,622	$19,559	$5,230	$14,365	$17,164	$17,974	$18,637	$19,570
STAFFORD	SAN JACINTO	FORT BEND	08057700007910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STAFFORD	SAN JACINTO-BRAZOS	FORT BEND	08057700007911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STAFFORD	SAN JACINTO	HARRIS	08057700010110	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	08434700017010	$644,122	$0	$220,587	$0	$326,024	$0	$356,220	$0	$48,485	$48,485	$0	$541,434	$178,478	$0	$2,363,836	$25,879	$67,549	$60,979	$127,416	$114,929	$11,126	$12,652	$33,015	$42,456	$58,916	$60,050	$60,765	$9,282	$24,236	$31,160	$16,624	$17,753	$18,465
STEAM ELECTRIC POWER	TRINITY-SAN JACINTO	CHAMBERS	08100203603609	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STEAM ELECTRIC POWER	BRAZOS	FORT BEND	08100207907912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	08100208408411	$0	$1,741,757	$0	$34,331,018	$1,747,622	$0	$2,360,485	$0	$0	$0	$0	$14,063,309	$4,430,123	$0	$58,674,314	$523,010	$1,747,234	$1,798,832	$1,341,608	$1,689,848	$2,026,652	$232,462	$788,828	$1,035,016	$1,368,222	$1,774,745	$2,269,887	$206,483	$74,754	$99,767	$126,843	$159,878	$200,115
STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	08100210110110	$0	$8,861,252	$0	$120,066,051	$1,776,055	$0	$2,224,060	$0	$0	$0	$0	$46,524,596	$14,655,846	$0	$194,107,860	$0	$4,012,392	$6,625,340	$7,214,532	$7,625,158	$5,696,285	$0	$2,596,754	$4,019,800	$7,672,525	$9,480,545	$10,976,641	$0	$361,441	$502,141	$798,537	$945,474	$1,067,070
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	08100210110111	$0	$1,022,056	$0	$20,320,908	$90,257	$0	$98,529	$0	$0	$0	$0	$7,536,112	$2,373,972	$0	$31,441,834	$379,782	$1,176,543	$1,001,906	$1,395,677	$1,359,554	$169,022	$161,176	$508,659	$595,590	$1,134,636	$1,205,959	$1,205,959	$13,096	$47,490	$56,059	$99,865	$105,660	$100,684
STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	08100217017010	$0	$0	$0	$0	$3,261,230	$0	$4,049,794	$0	$0	$0	$0	$2,558,858	$806,073	$0	$10,675,955	$0	$208,210	$208,210	$0	$228,714	$722,568	$0	$99,690	$99,690	$99,690	$208,755	$429,957	$0	$76,391	$59,742	$53,628	$160,663	$354,255
STEAM ELECTRIC POWER	TRINITY	LIBERTY	08100214614608	$0	$0	$0	$0	$3,824,806	$0	$4,406,856	$0	$0	$0	$0	$2,881,081	$907,578	$0	$12,020,321	$0	$254,108	$399,754	$322,225	$390,173	$471,654	$0	$120,542	$191,037	$276,076	$378,237	$500,551	$0	$94,144	$146,962	$211,345	$289,798	$385,489
SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	08058500007911	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUGAR LAND	BRAZOS	FORT BEND	08058500007912	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUGAR LAND	SAN JACINTO	FORT BEND	08058500007910	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUNBELT FWSD	SAN JACINTO	HARRIS	08435000010110	$2,368,294	$0	$802,334	$0	$4,121,696	$0	$5,024,978	$0	$48,462	$48,462	$0	$4,311,055	$1,365,954	$0	$18,091,234	$93,535	$412,798	$777,593	$772,204	$512,432	$392,274	$14,035	$67,231	$274,421	$421,374	$516,618	$609,622	$14,144	$69,785	$213,948	$309,565	$374,734	$439,559
SURFSIDE BEACH	BRAZOS	BRAZORIA	08096700002012	$0	$0	$0	$0	$67,907	$0	$74,107	$0	$0	$0	$0	$49,705	$15,658	$0	$207,377	$0	$2,260	$5,958	$7,396	$7,602	$8,424	$0	$1,105	$2,914	$4,723	$6,632	$8,842	$0	$810	$2,136	$3,462	$4,862	$6,483
SWEENY	BRAZOS-COLORADO	BRAZORIA	08059000002013	$0	$0	$0	$0	$81,795	$0	$89,266	$0	$0	$0	$0	$59,871	$18,860	$0	$249,792	$0	$0	$3,493	$7,602	$10,478	$14,176	$0	$0	$1,708	$3,718	$6,833	$10,651	$0	$0	$1,252	$2,726	$5,009	$7,808
TAYLOR LAKE VILLAGE	SAN JACINTO-BRAZOS	HARRIS	08075100010111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	08060200008411	$7,048,308	$0	$2,235,018	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$3,249,164	$1,031,448	$0	$13,660,908	$0	$1,191,020	$1,191,020	$0	$0	$0	$0	$198,558	$198,558	$198,558	$198,558	$198,558	$0	$247,637	$247,637	$247,637	$247,637	$247,637
THE WOODLANDS	SAN JACINTO	MONTGOMERY	08800100017010	$13,908,058	$0	$4,182,830	$0	$1,573,736	$0	$2,053,108	$0	$48,485	$48,485	$0	$7,601,206	$2,402,397	$0	$31,818,306	$461,739	$2,475,701	$2,312,325	$298,364	$0	$0	$208,549	$548,374	$598,079	$598,079	$598,079	$598,079	$179,595	$575,225	$627,036	$523,414	$555,729	$578,393
TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	08097300008411	$0	$217,679	$0	$4,431,137	$4,630	$0	$5,053	$0	$0	$0	$0	$1,630,474	$513,620	$0	$6,802,593	$0	$592,670	$593,081	$411	$0	$0	$0	$254,244	$254,445	$254,445	$254,445	$254,445	$0	$20,921	$21,068	$21,068	$21,068	$21,068
TOMBALL	SAN JACINTO	HARRIS	08060800010110	$0	$0	$0	$0	$4,006,788	$0	$4,582,861	$0	$0	$0	$0	$3,006,377	$947,047	$0	$12,543,073	$126,306	$418,479	$440,002	$335,329	$325,989	$339,754	$61,296	$198,758	$270,286	$360,410	$427,510	$524,002	$45,672	$154,844	$208,472	$276,980	$327,146	$400,885
TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	08435500010110	$0	$0	$0	$0	$768,489	$0	$846,339	$0	$0	$0	$0	$565,190	$178,042	$0	$2,358,060	$68,454	$179,092	$137,132	$26,494	$0	$0	$33,404	$87,195	$100,148	$100,148	$100,148	$100,148	$24,604	$64,531	$74,033	$72,634	$72,634	$72,634
TRINITY	TRINITY	TRINITY	08061000022808	$0	$0	$0	$0	$1,543	$0	$1,684	$0	$0	$0	$0	$1,130	$356	$0	$4,713	$0	$411	$411	$0	$0	$0	$0	$201	$201	$201	$201	$201	$0	$147	$0	$0	$0	$0
TRINITY BAY CONSERVATION DISTRICT	NECHES-TRINITY	CHAMBERS	08436200003607	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY BAY CONSERVATION DISTRICT	TRINITY	CHAMBERS	08436200003608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	POLK	08436300018708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	TRINITY	08436300022808	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	WALKER	08436300023608	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
VARNER CREEK UD	BRAZOS	BRAZORIA	08437000002012	$0	$0	$0	$0	$228,380	$0	$249,270	$0	$0	$0	$0	$167,177	$52,663	$0	$697,490	$0	$9,245	$22,188	$24,858	$24,653	$26,707	$0	$4,521	$10,851	$16,678	$22,906	$29,738	$0	$3,315	$7,956	$12,228	$16,796	$21,805
WALKER COUNTY RURAL WSC	TRINITY	WALKER	08437200023608	$0	$0	$0	$0	$112,646	$0	$122,951	$0	$0	$0	$0	$82,459	$25,976	$0	$344,032	$0	$16,023	$24,447	$8,423	$2,465	$5,547	$0	$7,836	$11,955	$11,955	$13,161	$14,668	$0	$5,746	$8,766	$8,766	$9,650	$10,755
WALLER	SAN JACINTO	HARRIS	08062900010110	$175,378	$0	$60,265	$0	$138,114	$0	$150,741	$0	$48,485	$48,485	$0	$183,574	$65,748	$0	$870,790	$0	$14,380	$23,009	$15,614	$13,765	$45,925	$0	$7,032	$11,252	$14,668	$17,984	$22,971	$0	$5,157	$8,250	$10,755	$13,186	$5,722
WALLER	SAN JACINTO	WALLER	08062900023710	$0	$0	$0	$0	$386,408	$0	$421,906	$0	$0	$0	$0	$282,910	$89,120	$0	$1,180,344	$0	$14,791	$32,047	$36,976	$43,135	$51,141	$0	$7,233	$15,671	$25,313	$36,762	$50,317	$0	$5,304	$11,492	$18,564	$26,961	$36,906
WALLIS	BRAZOS-COLORADO	AUSTIN	08063000000813	$0	$0	$0	$0	$27,780	$0	$30,317	$0	$0	$0	$0	$20,334	$6,405	$0	$84,836	$0	$3,287	$4,931	$2,671	$1,438	$1,438	$0	$1,608	$2,412	$2,914	$3,115	$3,617	$0	$1,179	$1,768	$2,136	$2,284	$2,652
WEBSTER	SAN JACINTO-BRAZOS	HARRIS	08063500010111	$0	$0	$0	$0	$104,155	$0	$113,687	$0	$0	$0	$0	$76,245	$24,018	$0	$318,106	$0	$13,970	$27,734	$13,764	$0	$0	$0	$6,831	$13,562	$13,562	$13,562	$13,562	$0	$5,009	$9,945	$9,945	$9,945	$9,945
WEST COLUMBIA	BRAZOS	BRAZORIA	08064000002012	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WEST COLUMBIA	BRAZOS-COLORADO	BRAZORIA	08064000002013	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WEST HARDIN WSC	NECHES	LIBERTY	08438300014606	$0	$0	$0	$0	$26,237	$0	$28,632	$0	$0	$0	$0	$19,204	$6,050	$0	$80,123	$0	$1,233	$2,671	$2,465	$2,465	$3,287	$0	$603	$1,306	$1,809	$2,512	$3,416	$0	$442	$958	$1,326	$1,842	$2,505
WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	08438700010110	$0	$0	$0	$0	$320,522	$0	$350,325	$0	$0	$0	$0	$234,797	$73,964	$0	$979,608	$27,726	$73,902	$57,681	$11,505	$0	$0	$13,555	$36,115	$41,741	$41,741	$41,741	$41,741	$9,945	$26,519	$30,645	$29,908	$29,540	$29,540
WEST UNIVERSITY PL	SAN JACINTO	HARRIS	08064300010110	$877,377	$0	$301,559	$0	$37,039	$0	$40,422	$0	$48,462	$48,462	$0	$439,739	$146,439	$0	$1,939,499	$43,256	$69,397	$49,531	$45,438	$47,337	$54,260	$5,672	$12,338	$17,088	$20,753	$24,957	$29,773	$5,672	$11,393	$15,789	$19,448	$23,647	$28,459
WHCRWA	SAN JACINTO	FORT BEND	08800200007910	$2,914,098	$0	$0	$0	$0	$288,768	$0	$0	$48,485	$48,485	$0	$1,121,003	$361,050	$0	$4,781,889	$0	$33,224	$203,051	$243,537	$141,805	$140,145	$0	$4,728	$66,092	$115,483	$163,366	$209,996	$0	$5,378	$44,223	$60,700	$75,899	$92,008
WHCRWA	SAN JACINTO	HARRIS	08800200010110	$31,298,266	$0	$0	$0	$0	$1,232,678	$0	$0	$48,462	$48,462	$0	$11,385,830	$3,594,599	$0	$47,608,297	$142,697	$1,862,524	$2,879,347	$1,784,245	$882,707	$503,940	$26,226	$363,946	$861,637	$1,175,139	$1,297,663	$1,367,886	$30,473	$776,380	$1,111,286	$1,266,473	$1,326,215	$1,383,453
WILLIS	SAN JACINTO	MONTGOMERY	08065500017010	$1,175,485	$0	$402,834	$0	$181,988	$0	$198,742	$0	$48,485	$48,485	$0	$685,667	$223,914	$0	$2,965,601	$19,720	$48,471	$146,197	$122,786	$45,474	$87,297	$9,642	$23,698	$41,713	$42,600	$49,272	$57,114	$7,072	$17,385	$18,220	$19,104	$25,783	$33,640
WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	08439800010110	$409,525	$0	$140,728	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$192,588	$68,584	$0	$908,348	$32,662	$70,742	$46,532	$8,452	$0	$0	$3,910	$10,241	$11,645	$11,645	$11,645	$11,645	$3,904	$10,239	$11,639	$11,541	$11,271	$11,271
WINDFERN FOREST UD	SAN JACINTO	HARRIS	08440100010110	$586,501	$0	$201,289	$0	$0	$0	$0	$0	$48,462	$48,462	$0	$275,726	$94,773	$0	$1,255,213	$27,794	$96,100	$81,641	$13,335	$0	$0	$3,101	$14,459	$16,675	$16,675	$16,675	$16,675	$3,094	$14,512	$16,722	$16,697	$16,526	$16,526
WOODBRANCH	SAN JACINTO	MONTGOMERY	08080700017010	$0	$0	$0	$0	$173,617	$0	$189,479	$0	$0	$0	$0	$127,083	$40,033	$0	$530,212	$6,575	$15,203	$15,409	$13,149	$14,382	$17,874	$3,215	$7,435	$10,751	$13,866	$17,784	$22,607	$2,357	$5,451	$7,882	$10,166	$13,039	$16,575
WOODCREEK MUD	SAN JACINTO	HARRIS	08440400010110	$0	$0	$0	$0	$977,914	$0	$1,070,345	$0	$0	$0	$0	$716,891	$225,830	$0	$2,990,979	$30,803	$106,797	$120,736	$80,468	$72,477	$73,502	$15,058	$52,122	$73,983	$91,445	$109,407	$127,369	$11,050	$38,379	$54,438	$67,256	$80,442	$93,628
NFBWA	BRAZOS	FORT BEND	NFBWA07912	$3,841,355	$0	$0	$0	$115,633	$506,246	$126,319	$0	$48,485	$48,485	$0	$1,606,344	$513,938	$0	$6,806,806	$0	$30,803	$137,398	$217,055	$263,151	$345,590	$0	$15,058	$70,735	$134,651	$230,409	$351,521	$0	$11,050	$21,903	$46,778	$81,351	$125,304
NFBWA	SAN JACINTO	FORT BEND	NFBWA07910	$10,059,699	$0	$0	$0	$0	$838,330	$0	$0	$48,485	$48,485	$0	$3,814,310	$1,209,476	$0	$16,018,784	$0	$0	$747,919	$1,168,220	$587,516	$228,370	$0	$0	$337,522	$557,288	$636,409	$649,636	$0	$0	$189,073	$289,135	$327,245	$340,996
NFBWA	SAN JACINTO-BRAZOS	FORT BEND	NFBWA07911	$23,188,613	$0	$0	$0	$2,912,605	$3,300,077	$5,334,039	$0	$48,485	$48,485	$0	$12,157,367	$3,837,646	$0	$50,827,317	$0	$1,049,894	$2,012,318	$1,847,346	$1,662,915	$1,534,118	$0	$402,465	$1,006,226	$1,562,053	$2,067,649	$2,549,464	$0	$466,594	$433,101	$660,186	$853,385	$1,040,273
NFBWA	SAN JACINTO	HARRIS	NFBWA10110	$799,728	$0	$0	$0	$0	$9,926	$0	$0	$48,485	$48,485	$0	$283,379	$97,188	$0	$1,287,191	$0	$57,734	$89,354	$46,306	$21,433	$8,184	$0	$9,541	$15,751	$21,476	$24,426	$24,708	$0	$10,902	$17,974	$21,240	$22,738	$23,057
CHCRWA	SAN JACINTO	HARRIS	CHCRWA10110	$2,045,610	$0	$695,659	$0	$0	$0	$0	$0	$48,485	$48,485	$0	$959,444	$310,157	$0	$4,107,839	$0	$261,551	$355,617	$96,589	$2,523	$0	$0	$42,033	$57,677	$58,097	$58,097	$58,097	$0	$43,487	$59,276	$59,693	$59,693	$59,693
KENDLETON	BRAZOS-COLORADO	FORT BEND	KENDLETON07913	$0	$0	$0	$0	$299,297	$0	$326,746	$0	$0	$0	$0	$219,115	$69,024	$0	$914,182	$0	$8,834	$20,545	$26,707	$34,306	$44,162	$0	$4,320	$10,047	$17,380	$26,822	$38,973	$0	$3,168	$7,367	$12,744	$19,669	$28,582
MONTGOMERY	SAN JACINTO	MONTGOMERY	MONTGOMERY17010	$2,075,154	$0	$704,377	$0	$1,268,595	$0	$1,406,354	$0	$48,485	$48,485	$0	$1,909,068	$609,300	$0	$8,069,817	$8,834	$156,465	$240,282	$184,087	$382,220	$363,011	$4,320	$75,755	$120,882	$165,422	$212,334	$224,344	$3,168	$56,722	$90,092	$123,021	$48,766	$60,847
STAGECOACH	SAN JACINTO	MONTGOMERY	STAGECOACH17010	$0	$0	$0	$0	$219,882	$0	$240,006	$0	$0	$0	$0	$160,961	$50,705	$0	$671,554	$2,876	$8,013	$12,533	$17,052	$23,420	$33,484	$1,407	$3,919	$7,536	$12,258	$18,989	$28,631	$1,031	$2,873	$5,525	$8,987	$13,923	$20,995

Region H

Table 4C-2: WUG-Level Project Costs

WUG Name	wug_basin	WUG County	Annual Costs for Municipal Conservation						Annual Costs for Irrigation Conservation						Project-Specific Annual Costs						Total Annual Cost					
			2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
MONTGOMERY COUNTY MUD #19	SAN JACINTO	MONTGOMERY	$5,050	$5,050	$5,050	$5,050	$5,050	$5,050	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,413	$68,433	$129,240	$109,600	$40,716	$41,060
MONTGOMERY COUNTY MUD #8	SAN JACINTO	MONTGOMERY	$15,550	$20,215	$24,569	$25,813	$25,502	$25,502	$0	$0	$0	$0	$0	$0	$1,004,776	$1,004,776	$481,669	$481,669	$481,669	$481,669	$1,074,584	$1,549,679	$1,115,771	$1,088,137	$1,023,695	$802,754
MONTGOMERY COUNTY MUD #9	SAN JACINTO	MONTGOMERY	$8,888	$12,120	$15,352	$16,766	$17,170	$17,372	$0	$0	$0	$0	$0	$0	$1,004,776	$1,004,776	$481,669	$481,669	$481,669	$481,669	$1,066,027	$1,531,072	$1,143,288	$1,183,643	$1,094,783	$833,145
MONTGOMERY COUNTY UD #2	SAN JACINTO	MONTGOMERY	$6,262	$6,262	$6,060	$6,060	$6,060	$6,060	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$43,076	$83,303	$84,432	$77,462	$80,762	$84,896
MONTGOMERY COUNTY UD #3	SAN JACINTO	MONTGOMERY	$9,019	$9,330	$10,263	$11,507	$13,373	$15,861	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$40,142	$79,163	$93,615	$157,208	$164,733	$112,534
MONTGOMERY COUNTY UD #4	SAN JACINTO	MONTGOMERY	$18,038	$18,038	$17,727	$17,416	$17,416	$17,416	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$81,391	$151,941	$154,913	$232,575	$221,523	$113,557
MONTGOMERY COUNTY WCID #1	SAN JACINTO	MONTGOMERY	$9,330	$9,641	$10,574	$12,129	$13,995	$16,483	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,212	$81,371	$96,550	$109,178	$136,497	$170,647
NASSAU BAY	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NEEDVILLE	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$16,322	$36,820	$48,861	$66,994	$90,231
NEEDVILLE	BRAZOS-COLORADO	FORT BEND	$0	$5,598	$6,842	$8,086	$9,641	$11,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,716	$51,631	$67,418	$90,536	$120,693
NEW CANEY MUD	SAN JACINTO	MONTGOMERY	$14,697	$32,589	$42,600	$53,676	$69,438	$87,756	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$115,507	$239,496	$345,474	$469,895	$654,777	$896,538
NEW WAVERLY	SAN JACINTO	WALKER	$0	$2,626	$2,626	$2,626	$2,626	$2,626	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,079	$12,116	$8,108	$6,390	$6,390
NHCRWA	SAN JACINTO	HARRIS	$1,301,082	$1,534,796	$1,712,960	$1,810,122	$1,849,512	$1,896,578	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,301,082	$5,366,971	$9,039,872	$28,030,928	$44,733,069	$34,969,856
NORMANGEE	TRINITY	LEON	$0	$1,212	$1,414	$1,414	$1,414	$1,414	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,387	$7,488	$5,080	$3,980	$4,053
NORMANGEE	BRAZOS	LEON	$0	$606	$606	$606	$606	$606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,125	$3,263	$2,367	$1,677	$1,751
NORMANGEE	TRINITY	MADISON	$202	$202	$202	$202	$202	$202	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$202	$961	$1,340	$929	$1,104	$1,104
NORTH BELT UD	SAN JACINTO	HARRIS	$8,397	$11,196	$13,684	$15,861	$18,660	$21,148	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,900	$156,775	$195,823	$189,640	$209,529	$235,673
NORTH GREEN MUD	SAN JACINTO	HARRIS	$6,531	$7,153	$7,464	$8,086	$8,708	$9,330	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$38,413	$98,977	$104,048	$80,196	$78,013	$84,570
NORTHWEST HARRIS COUNTY MUD #23	SAN JACINTO	HARRIS	$10,885	$13,373	$16,172	$18,660	$21,459	$23,947	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$64,385	$190,321	$232,062	$214,782	$233,192	$262,574
NORTHWEST PARK MUD	SAN JACINTO	HARRIS	$39,192	$46,221	$46,221	$45,369	$44,943	$44,943	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$287,958	$845,670	$841,950	$538,707	$465,612	$465,612
OAK RIDGE NORTH	SAN JACINTO	MONTGOMERY	$12,751	$13,995	$16,483	$19,904	$23,947	$29,234	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$56,392	$117,200	$243,889	$214,924	$137,314	$196,476
OLD RIVER-WINFREE	TRINITY	CHAMBERS	$3,732	$4,043	$4,354	$4,665	$4,976	$5,287	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$65,191	$301,096	$283,454	$126,319	$134,280	$145,620
ONALASKA	TRINITY	POLK	$0	$2,626	$2,828	$3,232	$3,434	$3,636	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,810	$29,779	$29,937	$31,741	$36,359
ONALASKA WSC	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,519	$2,657	$1,466	$1,145	$4,256
ORBIT SYSTEMS INC	BRAZOS-COLORADO	BRAZORIA	$0	$933	$1,244	$1,244	$1,555	$1,555	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,830	$5,799	$7,809	$9,339	$11,111
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	BRAZORIA	$0	$8,397	$9,641	$10,574	$11,818	$13,062	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,930	$56,707	$68,057	$80,097	$96,896
ORBIT SYSTEMS INC	SAN JACINTO-BRAZOS	FORT BEND	$311	$311	$311	$311	$311	$311	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$311	$5,879	$14,231	$13,190	$10,236	$12,499
OYSTER CREEK	SAN JACINTO-BRAZOS	BRAZORIA	$1,818	$2,020	$2,424	$2,626	$2,828	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,899	$22,981	$16,125	$16,458	$17,692	$20,174
PANORAMA VILLAGE	SAN JACINTO	MONTGOMERY	$7,272	$7,676	$7,878	$8,282	$8,686	$9,090	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,534	$102,921	$197,017	$167,272	$65,172	$73,329
PARKWAY UD	SAN JACINTO	HARRIS	$3,434	$3,232	$3,232	$3,232	$3,030	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$56,859	$56,559	$14,012	$13,914	$13,589	$13,638
PASADENA	SAN JACINTO	HARRIS	$215,982	$235,578	$253,257	$272,214	$292,662	$315,666	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$215,982	$290,593	$358,360	$347,540	$340,878	$363,882
PASADENA	SAN JACINTO-BRAZOS	HARRIS	$60,492	$65,817	$70,929	$76,254	$82,005	$88,395	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$60,492	$81,001	$100,158	$97,265	$95,414	$101,804
PATTON VILLAGE	SAN JACINTO	MONTGOMERY	$1,010	$1,010	$1,212	$1,212	$1,616	$1,818	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,704	$13,157	$15,972	$18,933	$23,846	$31,563
PEARLAND	SAN JACINTO-BRAZOS	BRAZORIA	$46,008	$114,594	$134,403	$153,147	$174,021	$195,960	$0	$0	$0	$0	$0	$0	$10,730,935	$10,760,748	$6,856,993	$7,093,688	$7,118,695	$7,142,614	$10,776,943	$10,875,342	$7,150,558	$7,676,420	$7,843,472	$7,887,412
PEARLAND	SAN JACINTO-BRAZOS	HARRIS	$1,704	$3,834	$4,473	$4,899	$5,538	$5,964	$0	$0	$0	$0	$0	$0	$399,160	$369,347	$219,019	$201,683	$176,676	$152,757	$400,864	$378,495	$233,741	$213,955	$186,916	$163,423
PECAN GROVE MUD #1	BRAZOS	FORT BEND	$24,495	$34,506	$34,932	$35,358	$36,423	$37,914	$0	$0	$0	$0	$0	$0	$391,302	$391,302	$197,303	$197,303	$197,303	$197,303	$415,797	$425,808	$232,235	$232,661	$233,726	$235,217
PECAN GROVE MUD #1	SAN JACINTO-BRAZOS	FORT BEND	$6,603	$9,159	$9,372	$9,372	$9,585	$10,011	$0	$0	$0	$0	$0	$0	$1,470,609	$1,470,609	$743,554	$743,554	$743,554	$743,554	$1,477,212	$1,479,768	$752,926	$752,926	$753,139	$753,565
PINE ISLAND	BRAZOS	WALLER	$0	$1,616	$2,020	$2,424	$2,828	$3,434	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$12,624	$24,796	$31,768	$42,505	$55,689
PINE TRAILS UTILITY	SAN JACINTO	HARRIS	$17,416	$18,660	$19,904	$21,148	$22,392	$23,947	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$68,881	$85,512	$59,492	$63,524	$68,315	$75,138
PINEY POINT VILLAGE	SAN JACINTO	HARRIS	$23,636	$24,258	$25,191	$26,124	$26,746	$27,990	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$168,668	$179,045	$78,737	$82,266	$84,193	$88,737
PLANTATION MUD	SAN JACINTO-BRAZOS	FORT BEND	$10,574	$10,263	$9,952	$9,952	$9,952	$9,952	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,574	$54,040	$106,092	$84,307	$58,044	$47,752
PLEAK	BRAZOS	FORT BEND	$0	$7,272	$8,686	$10,100	$11,918	$14,140	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,185	$76,999	$110,249	$148,357	$195,377
PLUM GROVE	SAN JACINTO	LIBERTY	$0	$2,020	$2,222	$2,626	$3,030	$3,636	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$15,306	$27,275	$33,015	$41,095	$50,864
POINT AQUARIUS MUD	SAN JACINTO	MONTGOMERY	$13,684	$16,794	$24,258	$32,655	$44,162	$57,224	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$60,738	$142,348	$249,301	$378,492	$540,829	$719,046
POINT BLANK	TRINITY	SAN JACINTO	$0	$1,010	$1,212	$1,212	$1,212	$1,212	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,185	$8,425	$7,682	$7,177	$6,736
PORTER WSC	SAN JACINTO	MONTGOMERY	$26,199	$29,181	$36,423	$45,156	$44,730	$44,730	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$148,517	$323,023	$446,419	$575,570	$560,216	$517,570
PRAIRIE VIEW	BRAZOS	WALLER	$0	$2,488	$2,799	$2,799	$3,110	$3,421	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$33,611	$70,356	$95,634	$129,346	$170,590
PRAIRIE VIEW	SAN JACINTO	WALLER	$0	$22,392	$24,258	$26,435	$28,923	$32,033	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,808	$31,850	$36,732	$42,655	$50,512
RAYFORD ROAD MUD	SAN JACINTO	MONTGOMERY	$31,098	$30,885	$30,672	$30,672	$30,672	$30,672	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$176,372	$343,189	$602,522	$503,751	$206,447	$208,264
RICHMOND	BRAZOS	FORT BEND	$0	$38,127	$45,369	$52,185	$64,113	$77,319	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$38,127	$45,369	$52,185	$64,113	$77,319
RICHWOOD	SAN JACINTO-BRAZOS	BRAZORIA	$6,220	$6,531	$6,842	$6,842	$7,153	$7,464	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,473	$28,404	$16,205	$14,690	$17,120	$20,667
RIVER PLANTATION MUD	SAN JACINTO	MONTGOMERY	$15,550	$15,239	$14,928	$14,928	$14,928	$14,928	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$164,476	$267,381	$219,991	$219,982	$258,581	$263,021
RIVERSIDE WSC	TRINITY	SAN JACINTO	$0	$3,421	$4,043	$4,976	$5,598	$6,220	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,429	$27,958	$44,569	$50,352	$52,549
RIVERSIDE WSC	TRINITY	WALKER	$0	$0	$1,555	$7,153	$7,464	$8,086	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,452	$25,753	$33,767	$39,394
ROLLING FORK PUD	SAN JACINTO	HARRIS	$7,878	$8,080	$8,484	$8,686	$9,090	$9,494	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$51,104	$109,677	$93,118	$55,253	$46,472	$48,698
ROMAN FOREST	SAN JACINTO	MONTGOMERY	$9,952	$15,550	$22,081	$28,923	$38,564	$49,760	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$45,248	$156,189	$269,324	$353,515	$474,486	$627,335
ROSENBERG	BRAZOS	FORT BEND	$31,950	$105,861	$131,208	$157,194	$192,552	$234,513	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,950	$105,861	$131,208	$157,194	$192,552	$234,513
SAN FELIPE	BRAZOS	AUSTIN	$0	$1,616	$1,818	$1,818	$1,818	$2,020	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,588	$15,104	$13,827	$12,089	$12,925
SAN JACINTO WSC	TRINITY	SAN JACINTO	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,810	$46,308	$44,864	$39,844	$36,860
SAN LEON MUD	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$253,564	$253,942	$62,258	$62,053	$62,053
SANTA FE	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SEABROOK	SAN JACINTO-BRAZOS	HARRIS	$32,589	$38,766	$44,304	$50,481	$56,232	$62,409	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$256,168	$346,581	$263,431	$291,936	$313,286	$339,366
SEALY	BRAZOS	AUSTIN	$0	$30,167	$34,832	$37,009	$38,253	$40,119	$0	$0	$0	$0	$0	$0	$0	$783,504	$783,504	$221,164	$221,164	$238,451	$0	$813,671	$818,336	$258,173	$259,417	$278,570
SHENANDOAH	SAN JACINTO	MONTGOMERY	$32,344	$37,631	$43,851	$50,382	$59,401	$70,286	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$144,858	$316,426	$622,644	$537,244	$324,465	$452,751
SHEPHERD	TRINITY	SAN JACINTO	$0	$4,040	$4,444	$4,646	$4,848	$4,848	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$24,537	$39,745	$35,306	$32,431	$31,595
SHOREACRES	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$1,138	$727	$522	$522
SIENNA PLANTATION MUD #2	SAN JACINTO-BRAZOS	FORT BEND	$19,593	$22,392	$22,392	$22,392	$22,392	$22,392	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,593	$94,008	$176,740	$127,046	$64,995	$60,247
SIMONTON	BRAZOS	FORT BEND	$0	$0	$0	$7,676	$9,090	$10,908	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,605	$65,660	$79,707	$107,144	$150,720
SOUTH HOUSTON	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$7,972	$17,840	$13,526	$8,184	$8,184
SOUTHERN MONTGOMERY COUNTY MUD	SAN JACINTO	MONTGOMERY	$25,773	$32,376	$32,589	$33,654	$34,080	$34,932	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$145,075	$359,380	$654,741	$535,866	$221,729	$225,798
SOUTHSIDE PLACE	SAN JACINTO	HARRIS	$1,212	$4,848	$5,050	$5,454	$5,656	$6,060	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,212	$16,864	$22,537	$16,466	$18,213	$20,885
SOUTHWEST UTILITIES	SAN JACINTO-BRAZOS	BRAZORIA	$0	$622	$1,244	$1,555	$1,555	$1,555	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$622	$1,244	$1,934	$2,693	$4,007
SOUTHWEST UTILITIES	SAN JACINTO	HARRIS	$8,946	$10,011	$11,289	$12,141	$13,419	$14,484	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$51,779	$119,218	$114,454	$81,893	$76,667	$83,588
SOUTHWEST UTILITIES	SAN JACINTO	LIBERTY	$0	$311	$311	$311	$311	$622	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,070	$1,830	$2,178	$2,905	$3,945
SOUTHWEST UTILITIES	SAN JACINTO	MONTGOMERY	$4,665	$5,287	$6,531	$8,086	$9,952	$12,440	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$20,987	$44,004	$60,706	$77,089	$103,379	$137,197
SPLENDORA	SAN JACINTO	MONTGOMERY	$2,020	$2,424	$3,232	$4,242	$5,656	$7,272	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,547	$33,929	$49,973	$69,936	$101,937	$137,065
SPRING CREEK UD	SAN JACINTO	MONTGOMERY	$9,952	$11,196	$14,928	$18,971	$24,880	$31,411	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$44,490	$96,200	$215,538	$202,339	$152,498	$219,790
SPRING VALLEY	SAN JACINTO	HARRIS	$16,483	$17,105	$17,416	$18,038	$18,660	$19,593	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$67,556	$141,180	$123,367	$75,747	$64,822	$68,366
STAFFORD	SAN JACINTO	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STAFFORD	SAN JACINTO-BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STAFFORD	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STANLEY LAKE MUD	SAN JACINTO	MONTGOMERY	$13,684	$16,794	$16,794	$16,483	$16,483	$16,483	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$61,497	$141,594	$151,389	$219,439	$209,215	$106,839
STEAM ELECTRIC POWER	TRINITY-SAN JACINTO	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STEAM ELECTRIC POWER	BRAZOS	FORT BEND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$961,955	$2,610,816	$2,933,615	$2,836,673	$3,624,471	$4,496,654
STEAM ELECTRIC POWER	SAN JACINTO	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,970,587	$11,147,281	$15,685,594	$18,051,177	$17,739,996
STEAM ELECTRIC POWER	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$554,054	$1,732,692	$1,653,555	$2,630,178	$2,671,173	$1,475,665
STEAM ELECTRIC POWER	SAN JACINTO	MONTGOMERY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$384,291	$367,642	$153,318	$598,132	$1,506,780
STEAM ELECTRIC POWER	TRINITY	LIBERTY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$468,794	$737,753	$809,646	$1,058,208	$1,357,694
SUGAR LAND	SAN JACINTO-BRAZOS	FORT BEND	$0	$181,902	$186,588	$185,736	$185,736	$185,736	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$181,902	$186,588	$185,736	$185,736	$185,736
SUGAR LAND	BRAZOS	FORT BEND	$0	$133,125	$136,533	$135,894	$135,894	$135,894	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$133,125	$136,533	$135,894	$135,894	$135,894
SUGAR LAND	SAN JACINTO	FORT BEND	$0	$13,419	$13,632	$13,632	$13,632	$13,632	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$13,419	$13,632	$13,632	$13,632	$13,632
SUNBELT FWSD	SAN JACINTO	HARRIS	$60,705	$70,503	$79,875	$89,886	$99,684	$110,121	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$182,419	$620,317	$1,345,838	$1,593,029	$1,503,468	$1,551,576
SURFSIDE BEACH	BRAZOS	BRAZORIA	$0	$2,020	$2,424	$2,626	$2,828	$3,030	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,195	$13,432	$18,207	$21,924	$26,779
SWEENY	BRAZOS-COLORADO	BRAZORIA	$0	$9,330	$12,440	$12,751	$13,373	$13,995	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,330	$18,893	$26,797	$35,693	$46,630
TAYLOR LAKE VILLAGE	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TEXAS CITY	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,637,215	$1,637,215	$446,195	$446,195	$446,195
THE WOODLANDS	SAN JACINTO	MONTGOMERY	$198,090	$359,118	$382,548	$380,844	$378,927	$378,927	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,047,973	$3,958,418	$3,919,988	$1,800,701	$1,532,735	$1,555,399
TIKI ISLAND	SAN JACINTO-BRAZOS	GALVESTON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$867,835	$868,594	$275,924	$275,513	$275,513
TOMBALL	SAN JACINTO	HARRIS	$35,358	$44,517	$51,972	$65,178	$75,189	$89,460	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$268,632	$816,598	$970,732	$1,037,897	$1,155,834	$1,354,101
TRAIL OF THE LAKES MUD	SAN JACINTO	HARRIS	$19,170	$18,531	$18,318	$18,105	$18,105	$18,105	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$145,632	$349,349	$329,631	$217,381	$190,887	$190,887
TRINITY	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$759	$612	$201	$201	$201
TRINITY BAY CONSERVATION DISTRICT	NECHES-TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY BAY CONSERVATION DISTRICT	TRINITY	CHAMBERS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	POLK	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	TRINITY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TRINITY RURAL WSC	TRINITY	WALKER	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
VARNER CREEK UD	BRAZOS	BRAZORIA	$0	$4,848	$5,454	$6,262	$7,070	$7,878	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$21,929	$46,449	$60,026	$71,425	$86,128
WALKER COUNTY RURAL WSC	TRINITY	WALKER	$0	$16,794	$17,105	$16,483	$16,483	$16,483	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$46,399	$62,273	$45,627	$41,759	$47,453
WALLER	SAN JACINTO	HARRIS	$1,414	$1,818	$2,222	$2,424	$2,828	$3,232	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,414	$28,387	$44,733	$43,461	$47,763	$77,850
WALLER	SAN JACINTO	WALLER	$0	$5,454	$6,464	$7,474	$8,686	$10,302	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$32,782	$65,674	$88,327	$115,544	$148,666
WALLIS	BRAZOS-COLORADO	AUSTIN	$0	$2,222	$2,222	$2,222	$2,424	$2,424	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,296	$11,333	$9,943	$9,261	$10,131
WEBSTER	SAN JACINTO-BRAZOS	HARRIS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$25,810	$51,241	$37,271	$23,507	$23,507
WEST COLUMBIA	BRAZOS	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WEST COLUMBIA	BRAZOS-COLORADO	BRAZORIA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WEST HARDIN WSC	NECHES	LIBERTY	$0	$404	$404	$606	$606	$606	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,682	$5,339	$6,206	$7,425	$9,814
WEST HARRIS COUNTY MUD #6	SAN JACINTO	HARRIS	$10,574	$10,263	$10,263	$10,263	$9,952	$9,952	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$61,800	$146,799	$140,330	$93,417	$81,233	$81,233
WEST UNIVERSITY PL.	SAN JACINTO	HARRIS	$41,961	$44,304	$46,434	$48,564	$51,120	$53,889	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$96,561	$137,431	$128,842	$134,203	$147,061	$166,381
WHCRWA	SAN JACINTO	FORT BEND	$35,956	$42,218	$48,682	$56,964	$65,246	$73,326	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,956	$85,549	$362,047	$476,685	$446,316	$515,475
WHCRWA	SAN JACINTO	HARRIS	$0	$759,520	$828,604	$878,296	$892,840	$899,304	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$199,396	$3,762,370	$5,680,874	$5,104,153	$4,399,425	$4,154,583
WILLIS	SAN JACINTO	MONTGOMERY	$10,574	$12,129	$15,239	$18,971	$23,947	$30,167	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$47,008	$101,683	$221,369	$203,461	$144,477	$208,218
WILLOW RUN SUBDIVISION	SAN JACINTO	HARRIS	$12,440	$12,129	$11,818	$11,507	$11,507	$11,507	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$52,916	$103,350	$81,634	$43,145	$34,423	$34,423
WINDFERN FOREST UD	SAN JACINTO	HARRIS	$14,928	$19,282	$18,660	$18,660	$18,660	$18,660	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$48,917	$144,353	$133,698	$65,368	$51,861	$51,861
WOODBRANCH	SAN JACINTO	MONTGOMERY	$2,020	$2,222	$2,424	$2,828	$3,232	$3,636	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14,167	$30,311	$36,466	$40,009	$48,437	$60,692
WOODCREEK MUD	SAN JACINTO	HARRIS	$11,507	$15,239	$18,660	$22,081	$25,502	$28,923	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$68,418	$212,537	$267,817	$261,250	$287,828	$323,422
NFBWA	BRAZOS	FORT BEND	$0	$23,230	$34,138	$47,066	$66,862	$91,708	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$80,141	$264,175	$445,550	$641,774	$914,123
NFBWA	SAN JACINTO	FORT BEND	$0	$0	$340,572	$380,164	$390,668	$388,244	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,615,085	$2,394,807	$1,941,838	$1,607,246
NFBWA	SAN JACINTO-BRAZOS	FORT BEND	$0	$307,242	$433,492	$548,026	$651,046	$748,410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,226,195	$3,885,137	$4,617,610	$5,234,995	$5,872,264
NFBWA	SAN JACINTO	HARRIS	$0	$11,514	$12,322	$13,130	$13,938	$14,948	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$89,691	$135,401	$102,152	$82,535	$70,896
CHCRWA	SAN JACINTO	HARRIS	$0	$72,114	$72,114	$72,114	$72,114	$72,114	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$419,185	$544,685	$286,493	$192,427	$189,904
KENDLETON	BRAZOS-COLORADO	FORT BEND	$0	$2,222	$2,828	$3,636	$4,646	$6,060	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$18,544	$40,787	$60,467	$85,443	$117,777
MONTGOMERY	SAN JACINTO	MONTGOMERY	$2,828	$11,514	$16,766	$22,018	$27,472	$32,724	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$19,150	$300,456	$468,022	$494,548	$670,792	$680,927
STAGECOACH	SAN JACINTO	MONTGOMERY	$808	$1,212	$1,616	$2,222	$3,030	$4,040	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,122	$16,017	$27,210	$40,519	$59,362	$87,150

Appendix 4D

Galveston Bay Inflows Study

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Section 1- Introduction

Environmental flow study efforts in the 1st biennium of the 2011 Regional Water Planning cycle for Region H focused on future 2060 conditions and the impacts of future management strategies on inflows to Galveston Bay. The *Environmental Flows Study* completed during the 1st biennium revealed substantial impacts to volume, timing, and location of bay and estuary inflows caused by water management strategy (WMS) implementation. Model results indicated that implementation of individual WMS would not have a substantial impact on net bay and estuary (B&E) inflow; however, the combined effect of multiple WMS resulted in some impacts to B&E flows in terms of volume.

The results of the *Environmental Flows Study* and further investigation indicate that the management strategies recommended in the 2006 RWP interact in a complex manner that may result in widely varied impacts on bay and estuary inflow throughout the planning horizon. This is especially the case as the timing of certain strategies such as reuse and the importation of water occur in different decades. Additionally, the application of reuse strategies by Region C in the upper Trinity River Basin is expected to significantly reduce inflows into the Region H portion of the basin. The Region C return flow volume will vary over the 2010 through 2060 planning window. The end result may be a worst-case scenario for inflows to Galveston occurring in a decade sooner than 2060. Identifying impacts of management strategies throughout the planning horizon will better prepare the RHWPG for selecting environmentally conscious solutions to water supply issues.

To address these concerns, six decadal simulations using water availability models (WAMs) were created to represent implementation and size of water management strategies as well as changes in demand for major supply rights and effects of sedimentation on reservoirs. Changes in the impacts of Region H WMS and other factors were then examined. Metrics of particular interest were median annual and monthly B&E inflows as well as flows viewed on an annual basis. As with the *Environmental Flows Study*, monthly inflows were compared to the State's B&E flow targets to determine if these targets were met at the frequencies recommended by the Galveston Bay Freshwater Inflows Group (GBFIG). The modeling methodology is included in *Section 2* of this memorandum, with a summary and discussion of results in *Section 3*.

Section 2- Model Development

In order to determine the effects of WMS implementation over time on B&E inflow, WAM models were developed for each basin to represent conditions for years 2010 through 2060. Strategies were modeled in a manner similar to that used in the *Environmental Flows Study*, However, there are some notable differences for the current round of models. Rather than focusing on Year 2060 six decadal models (2010-2060) were developed for each basin. Additionally, unlike the prior study, water management strategies are not modeled individually but rather are modeled as occurring simultaneously, similar to the old E model. Running decadal models rather than just 2060 also allows strategies to be implemented as they occur; for example, a strategy starting in the 2040s in the San Jacinto basin would not show up in the 2010, 2020, or 2030 model.

Another substantial change is the use of a TCEQ Run 8 WAM for the base model rather than the modified Run 3 as incorporated in the *Environmental Flows Study*. While the full diversion assumption of the Run 3 was deemed appropriate to represent 2060 conditions when existing water rights were assumed to be fully utilized, this same assumption is not appropriate for the decadal analysis conducted herein.

Models were based on TCEQ's Run 8 WAMs for the Neches Trinity, Trinity San-Jacinto, and San Jacinto Basins. Run 8 represents an approximation of current conditions. For the Trinity River Basin, decadal models were based on decadal models provided by TCEQ which were Run 8-based and included upstream Region C WMS. The Brazos and San Jacinto Brazos Basin models were built from a modified Run 8 that included Brazos River Authority system operations.

The general procedure for building the models incorporated:

1. Supply right demands
2. Implementation of strategy coding
3. Area-capacity curve codification

More specific information is provided below.

2.1 Supply Right Demands

Demands for major supply rights in Region H vary considerably over the period from 2010 to 2060. No adjustments to account for this were necessary for the 1st biennium *Environmental Flow Study* models, since those models represented expected 2060 conditions with full authorized diversions.

In DB07, supplies and WMS are allocated to WUGs in order to meet demands. However, in some decades, supplies in excess of actual demand are allocated. This is because many WUGs hold contracts well in excess of their current needs for various reasons. Therefore, care was taken to determine the amount of water used in each decade based on demands at the WUG level, rather than allocations.

DB07 further associates these sources with one or more supply rights. This procedure was applied to the data in DB07 to generate total decadal demand for supplies and associated rights. The decadal demand for each supply right was then applied to water right diversions in the models.

2.2 Strategy Coding

The 2006 Region H Regional Water Plan examined 32 potential WMS. Strategies were evaluated based on a number of parameters, including yield, cost, location, water quality, various environmental impacts, and several other factors. Of these, 23 were recommended by the RWP as recommended WMS, of which 17 were considered as potential candidates for modeling in the 2011 Planning cycle.

The 1st biennium Environmental Flows Study deemed 12 of the 17 suitable to be modeled. For the 2nd biennium Environmental Flows Investigation, the same 12 strategies are modeled. All 17 major WMS are described below as well as specifics on code development for those strategies that were modeled. Note that this phase of modeling was carried out prior to final WMS selection for the 2011 RWP. Thus, some of these strategies have not been selected for the 2011 RWP, while strategy definitions or total allocated volumes may have changed for other strategies. All strategies modeled reflect volumes, definitions, and recommendation status for the 2006 RWP.

1. Municipal Conservation: This WMS relies on demand reduction to allow existing supplies to meet demands for longer periods of time. This can also potentially delay the need to develop new municipal supplies. This WMS was not modeled as the conservation strategies do not involve the creation of new water supplies or their return flows.

2. Irrigation Conservation: The Irrigation Conservation strategy is similar in intent to the municipal conservation WMS. Potential conservation methods include irrigation scheduling, leveling and contour farming, ditch lining, and drip line installation, as well as other methods. This WMS was not modeled as any water conserved does not represent any additional water supply creation or return.

3. Freeport Desalination: The Freeport Desalination WMS involves the construction of a desalination facility in Freeport, Texas on the site of the Dow chemical plant. Water desalinated by the plant would be piped upstream for municipal use in demand centers in Fort Bend and Brazoria Counties. Freeport Desalination was modeled in the Brazos/San Jacinto-Brazos WAM and was active for all six decadal periods. The effects of added desalination supply were approximated by new return flows at points of use associated with the strategy. The added return flows were modeled with CI cards. This WMS is listed as an alternative for the 2011 RWP.

4. Expanded Use of Groundwater: This WMS relies on sustainable expansion of existing groundwater supplies, with limits on increases to correspond with groundwater reduction plans and conservation district rules. Increases are within the limits of sustainable yield and subject to groundwater conservation district and subsidence district rules. The WMS associated with expanded use of groundwater supplies was modeled in all of the study basins. Because additional groundwater will be utilized near the point of production before entering the stream network, effects of expanded groundwater use were approximated as new return flows. Return flows were modeled with CI cards for each point-of-use WUG.

5. Expand/Increase Current Contracts: This WMS includes allocation of currently permitted water supplies for use by current contract participants. This includes the extension of current contracts with terms ending before the year 2060, as well as the increase of current contracts to meet future demands. This growth in contracts was incorporated as part of the supply diversion adjustment above.

6. New Contracts from Existing Supply: New contracts would be created from existing supply sources. Again, this increase in allocation was handled as part of the supply diversion adjustment above.

7. BRA System Operations Permit: The Brazos River Authority (BRA) System Operations WMS aims to increase the yield of BRA reservoirs by coordinating operation of reservoirs as a system and the permitting of a portion of the return flows in the Brazos River basin. This would allow for additional yield without the need for construction of new infrastructure. The code necessary for this strategy was already incorporated into the Brazos/San Jacinto-Brazos base model and thus no changes to simulate system operations were necessary. CI cards were added to reflect return flows at the WUG level from this diversion. CI cards were also added to the San Jacinto and Trinity models to represent an interbasin transfer (IBT) from the Brazos Basin. This WMS was active for all decades. No modifications were necessary in the Brazos portion of the WAM as the Brazos River Basin does not contribute directly to B&E inflows to Galveston Bay.

8. Allens Creek Reservoir: The Allens Creek Reservoir WMS is a proposed off-channel reservoir in Austin County. The reservoir would hold peak flows diverted from the Brazos River, with diversions to the reservoir indexed to streamflow. Water from the reservoir would be used to supply municipal, industrial, and irrigation needs in several counties. The code necessary for this strategy was already incorporated into the Brazos/San Jacinto-Brazos base model and thus no changes to represent the reservoir were necessary. CI cards were used to represent return flows at the WUG level as well as the IBT of water to the San Jacinto-Brazos Basin. The Allens Creek WMS is expected to be active for the 2030 model onward.

9. Little-River Off-Channel Reservoir: This WMS would be an off-channel reservoir in Milam County intended to divert and store excess flows for producing firm capacity. The WMS was originally assessed by the Brazos G region but has been investigated by Region H. The code necessary for this strategy was already incorporated into the Brazos/San Jacinto-Brazos base model and thus no changes were necessary. CI cards representing return flows from point-of-use WUGs were only inserted for the 2050 and 2060 models. This WMS is listed as an alternative for the 2011 RWP.

10. Non-Municipal Contractual Transfers: The Non-Municipal Contractual Transfer WMS involves transferring surplus water supply to neighboring counties and basins with projected shortages. These transfers would make use of existing conveyances where possible. This strategy was not modeled as the WRAP program allocates water for water right diversions, not contracts. This WMS is not recommended in the 2011 RWP.

11. Wastewater Reuse for Industry: Water for this WMS would come from treated effluent from three City of Houston (COH) Waste Water Treatment Plants (WWTPs). After treatment, water would be piped to industrial users along the south side of the Houston Ship Channel corridor. Wastewater reuse for industry was modeled through the alteration and addition of CI cards in the San Jacinto Basin WAM. Two CI cards representing the three source WWTPs were reduced by the WMS amount. The specific reduction for each plant was assumed proportional to total plant output. Return flows from the strategy were assumed to occur along the Houston Ship Channel. New CI cards, representing return flows from industrial users, were added to the model after existing CI cards. This WMS was active for 2020 through 2060.

12. TRA to Houston Contract: This is a surface water agreement between the COH and TRA to allow COH to acquire a portion of uncommitted TRA water supplies from the Lake Livingston-Wallisville Saltwater Barrier system. The Trinity Basin is the source of WMS water for this scenario. While the relevant diversions in the Trinity WAM had been adjusted according to the procedure discussed in *Section 2.1*, the location of diversion for a substantial portion of the demand was located at the Lake Livingston outlet in the base model. The diversions were relocated to model control points representing the existing Trinity River Pump Station or the Capers Ridge Pump Station (for the Luce Bayou IBT) as appropriate. For the receiving basins, changes were made to the San Jacinto and Brazos/San Jacinto-Brazos models. CI cards were added in the San Jacinto and Brazos/San Jacinto-Brazos models to reflect return flows from points of use. This WMS was incorporated into the 2020 through 2060 models.

13. TRA to SJRA Contract: This strategy proposes the transfer of some SJRA supply in the Trinity River and some TRA supply in Lake Livingston to Montgomery County via Lake Houston. While the relevant diversions in the Trinity WAM had been adjusted according to the procedure discussed in *Section 2.1*, the location of diversion for a substantial portion of the demand was located at the Lake Livingston outlet in the base model. The diversions were relocated to model control points representing the existing Trinity River Pump Station or the Capers Ridge Pump Station (for the Luce Bayou IBT) as appropriate. CI cards were added in the San Jacinto WAM for the southern part of Montgomery County near Conroe, Texas to reflect return flows from points of use. This WMS was active for the 2030 through 2060 models. The updated strategy definition for the 2011 RWP indicates that water for this transfer will not be conveyed via Luce Bayou, but will rely on another conveyance.

14. Houston to Gulf Coast Water Authority (GCWA) Transfer: The Houston to GCWA WMS involves the transfer of water from the Coastal Water Authority (CWA) system to GCWA's Texas City Reservoir by way of the CWA Bayport facility. Shortages would be met in Galveston County and possibly Fort Bend County. While the relevant diversions in the Trinity WAM had been adjusted according to the procedure discussed in *Section 2.1*, the location of diversion for a substantial portion of the demand was located at the Lake Livingston outlet in the base model. The diversions were relocated to model control points representing the existing Trinity River Pump Station or the Capers Ridge Pump Station (for the Luce Bayou IBT) as appropriate. CI cards were added in the Brazos, San Jacinto-Brazos, and San Jacinto WAMs to reflect return flows from this WMS. This WMS was active for the 2050 and 2060 models. This WMS is not recommended in the 2011 RWP.

15. Houston Indirect Wastewater Reuse: Water for this WMS would be reclaimed from effluent from City of Houston WWTPs in seven small basins. Water would receive additional treatment and be transferred by bed and banks permits to diversion locations for municipal and industrial users. This scenario involves reclaiming effluent from WWTPs in seven sub-basins in the San Jacinto WAM for municipal and industrial uses. Diversions associated with the strategy were represented by eight WR cards (including an IBT to the San Jacinto-Brazos Basin from Sims Bayou) with annual diversion targets proportional to the WWTP flow in each sub-basin. For the Brazos/San Jacinto-Brazos model, the IBT to the San Jacinto-Brazos Basin was modeled using two CI cards representing the Harris Manufacturing and Harris Steam Electric WUGs. This WMS was active for the 2050 and 2060 models.

16. NHCRWA Indirect Wastewater Reuse: The NHCRWA Indirect Reuse strategy includes reclamation of water from up to 163 WWTPs in the NHCRWA service area discharging to tributaries of the San Jacinto River and Lake Houston. Water would be transferred via bed and banks permits to diversion locations to serve industrial reuse and municipal and commercial irrigation reuse. The WMS was modeled in the San Jacinto WAM with three new water right diversion WR cards. This WMS was active for the 2050 and 2060 models.

17. Lake Houston Additional Yield: Based on WRAP modeling for the last RWP, additional unappropriated volume was identified in Lake Houston. This strategy reflects the permitting of this storage. For the scenario utilizing additional unappropriated flow from Lake Houston, the WMS was represented as a new water right. A WR card with an annual diversion total of 32,500 acre-feet from Lake Houston was added to the San Jacinto WAM. A WS card at Lake Houston associated with the right was added, with the storage volume for the right located at the top of the conservation pool. This WMS was active for all decades. This is not considered as a WMS in the 2011 RWP, as the permit has been granted. Volumes associated with the permit are shown as a non-WMS supply right.

2.3 Area-Capacity Curve Modification

The spatial characteristics of the modeled reservoirs (area, volume, depth) are expected to change over time, due primarily to the effects of sedimentation. Depending on reservoir properties and sedimentation rates, under Year 2060 conditions a reservoir may have far less storage than it did in 2010. For this reason, reservoir area-capacity data was adjusted by decade when possible to more accurately reflect expected conditions.

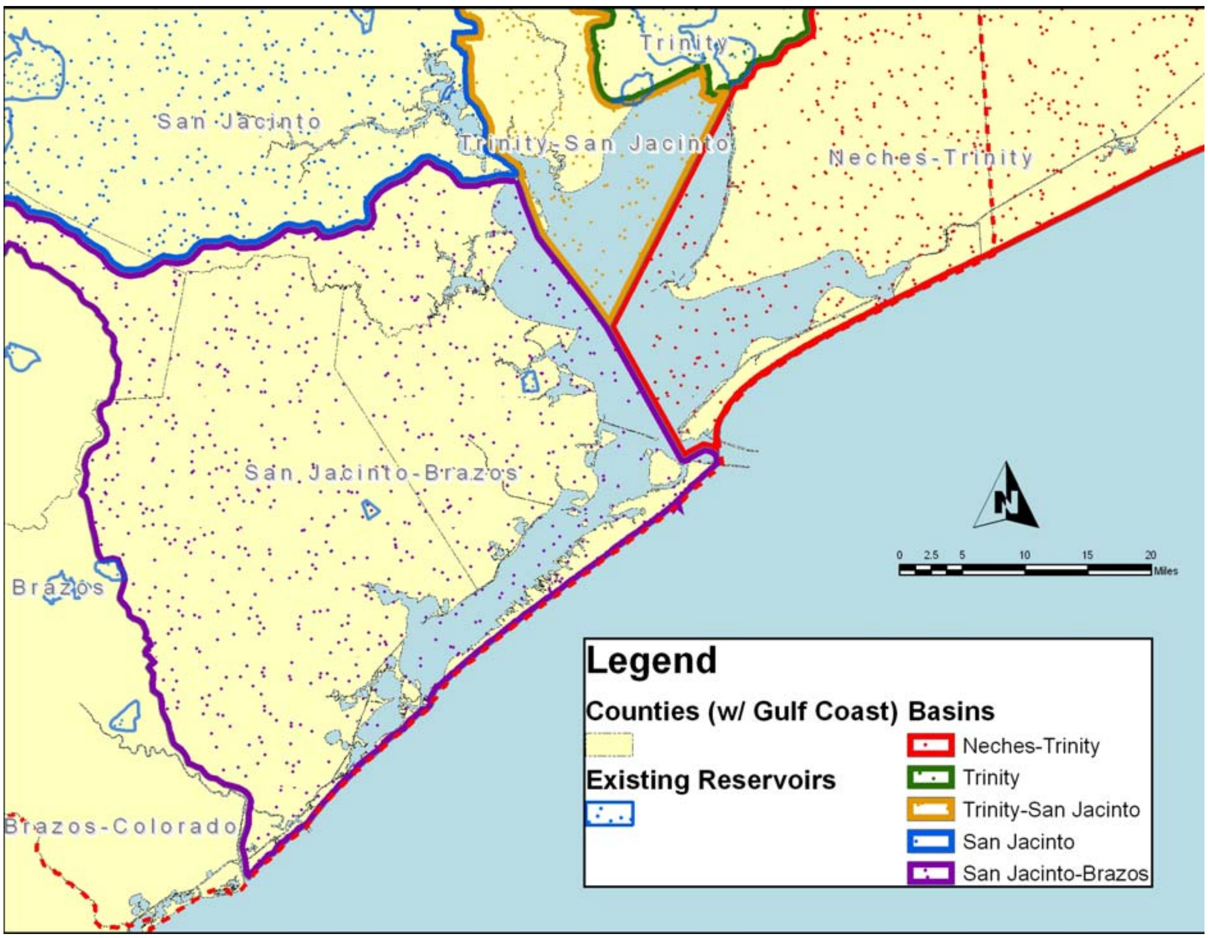
These changes are not implemented in all of the WAM basins. The Neches-Trinity has only one small reservoir and the Trinity-San Jacinto WAM has no reservoirs represented with SV/SA cards. Reservoir parameters were not adjusted in the Brazos/San-Jacinto Brazos due to a lack of sedimentation data. Data was available to generate for the majority of reservoirs in the Trinity River Basin. However, since the area-capacity data had already been modified for a number of reservoirs in the base model itself (in comparison to Run 8), no additional changes were made to SV/SA cards.

For the San Jacinto models, however, SV/SA cards were updated using a baseline reservoir configuration and a sedimentation rate obtained from a sedimentation survey. Beginning with the baseline reservoir configuration for Year 2000, the sedimentation rate and elapsed time since survey data collection were used in an iterative application of the trapezoid method to yield a new set of shape parameters for each decade. These parameter sets were then reduced to twelve data points each to serve as SV/SA cards for the models.

Section 3- Model Results

As indicated earlier, decadal WAM models were executed for six basins (the San Jacinto, Trinity, and Brazos Basins and the San Jacinto-Brazos, Neches-Trinity, and Trinity-San Jacinto Coastal Basins). Results were then extracted from the WAM output file using the TABLES program included as part of the WRAP modeling package. For each month of the 57-year simulation period, modeled flow volumes were extracted for the eight model control points contributing to B&E inflows. B&E flows were primarily driven by the Trinity and San Jacinto Rivers, which for the six decadal models contributed approximately 78 percent of B&E inflows. The remaining 22 percent of inflow was contributed by the three coastal basins. Annual and monthly median B&E inflows were determined for each model and compared to reveal trends in B&E flow with time as WMS are implemented. Flows were also examined to determine frequency of attaining B&E flow targets as established by TWDB and TPWD. The relevant river and coastal basins are shown along with the Galveston Bay System in *Figure 1*.

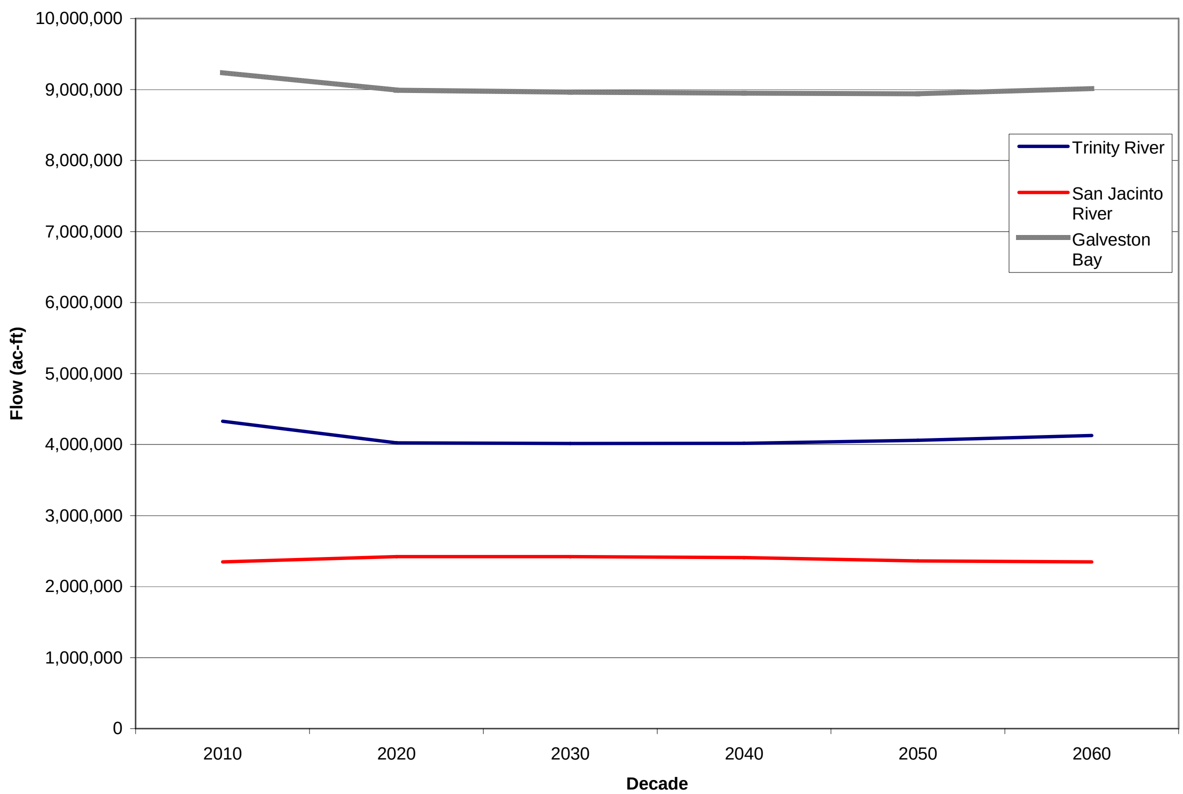
Figure 1
Galveston Bay System



3.1 Annual B&E Inflows

Annual median B&E inflows are given for the total Galveston Bay System as well as the Trinity and San Jacinto Rivers in *Figure 2* below.

Figure 2
Median Annual B&E Flow by Decade for Galveston Bay



Median annual inflows from the San Jacinto River vary across the six decades, with a difference of approximately 75,000 acre-feet per year between the highest and lowest median annual flow. After 2010, median flows increased by approximately 60,000 to 75,000 acre-feet per year for the period from 2020 through 2040, after which flows declined to levels near those in 2010. For the Year 2010 model, only a few WMS have been implemented, adding only a small volume of water to the San Jacinto River Basin in the form of return flows from points of use. Although demand for water from major supply rights increases with time, additional WMS return flows over the period of 2020 through 2040 result in increased annual median B&E discharge. The sudden decline in median flows after 2040 is due to implementation of two reuse-type WMS beginning in the Year 2050 model. The City of Houston Indirect Reuse and NHCRWA Indirect Reuse strategies are intended to divert approximately 75,000 to 90,000 acre-feet per year of wastewater effluent from the San Jacinto River Basin for municipal and industrial users. Additionally, reservoir volumes in the basin gradually decrease over the planning window due to the effects of sedimentation.

The Trinity River is the largest single contributor to median annual inflow volume in the Galveston Bay System. As shown in *Figure 2*, median annual inflow from the Trinity River drops sharply between the 2010 and 2020 models, reaching its lowest level in 2030. Median annual flows for Trinity Bay are, by this point, reduced by more than 300,000 acre-feet per year. From 2030 through 2060, median annual flows gradually increase by over 100,000 acre-feet per year, but do not return to 2010 levels during the planning period.

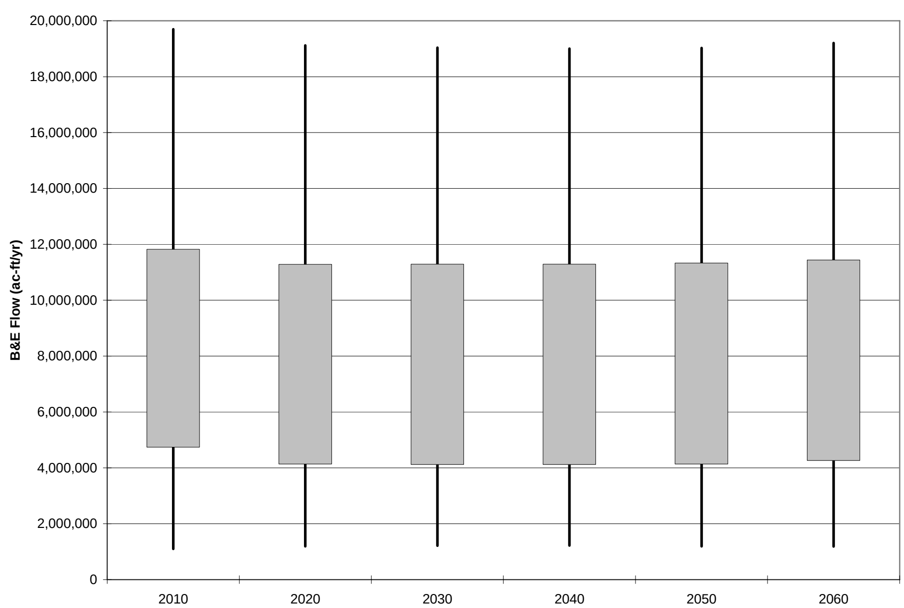
The pattern of B&E flows for the Trinity River is due to the combined effects of Region H WMS implementation and the upstream implementation of conservation strategies by Region C. The Region C Water Planning Group investigated the impacts of proposed reuse on return flows to Region H (for the Trinity River near Oakwood) in the *Region C Water Conservation and Reuse Study*. The Region C report demonstrated a sharp decline in flows to Region H beginning after 2010 due to the implementation of reuse; this decline continued through 2030 (reduction of 162,000 acre-feet per year) after which return flows increased through the end of the planning window, eventually exceeding 2010 levels. This increase subsequent to 2030 is due to increased demand in the Region C portion of the basin, resulting in return flows that increasingly exceed reuse volumes. General similarities between the patterns of Region C return flow and Trinity Bay inflow indicate that upstream reuse will have a substantial impact on Galveston Bay inflow.

However, Region H WMS also appear to play a role in determining Trinity Bay flows. The reduction in Trinity Bay inflow subsequent to 2010 is greater than the reduction in return flows from Region C. Additionally, while Region C return flows are higher in 2060 than in 2010, Trinity Bay inflows do not fully return to 2010 levels by the end of the planning period. The likely cause of this is increasing demand on interbasin transfers the Trinity River to the San Jacinto River Basin, including the TRA to Houston and TRA to SJRA management strategies. Demand for these two strategies alone increases by 200,000 acre-feet across the planning window.

The pattern of median annual B&E inflow for the complete Galveston Bay System reflects the patterns of the component bays, particularly the pattern of inflow for the Trinity River attenuated by the nearly-opposite but lower-magnitude pattern of the San Jacinto River. As shown in *Figure 2,* the median B&E inflow falls considerably after 2010, reflecting the impact of reduced upstream return flows and implementation of Region H WMS. For subsequent decadal models the median inflows vary little, suggesting that while flows in the Trinity and San Jacinto Rivers may change over time, the additional net effect of Region H WMS on total B&E flow after 2010 will be minor; changes appear to involve relocation of inflow to a greater extent than an alteration in total volume.

This is not, however, an indication that B&E inflows will not vary from year to year. It is important to remember that each decadal model includes a 57-year simulation period under a certain set of conditions; the median values reported in the preceding sections represent a statistical summary of this simulation period. For example, for the Year 2060 model total annual flow varied from 1.2 to 19.2 million acre-feet per year. The range of annual B&E flows for the six decadal simulations are shown in *Figure 3*.

Figure 3
Inter-Annual Variability in B&E Flows



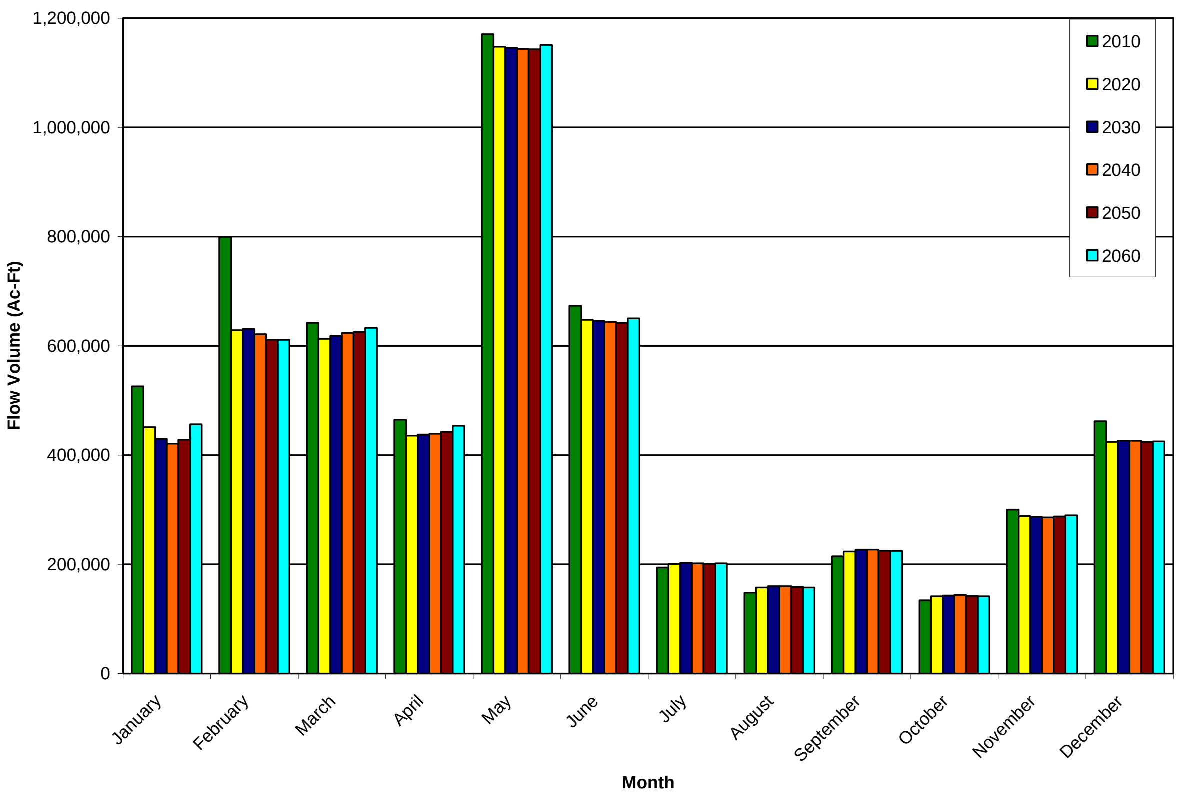
3.2 Monthly Medians

Median B&E flows were also calculated on a monthly basis for the six sets of decadal models. The results of the monthly analysis show similar patterns to those revealed in the analysis of median annual B&E flows.

For the San Jacinto River, monthly medians were at a minimum for either the beginning or end of the planning window, with most months reaching their highest median flows in 2030. This peaked flow distribution is similar to the pattern of annual medians for the bay which, as noted earlier, is attributable to an initial increase in flow caused by WMS return flows followed by a later decline due to diversions for reuse WMS. For Trinity Bay, monthly medians were primarily highest for 2010 prior to implementation of the upstream Region C reuse strategy and reached minimum values mainly between 2020 and 2040.

The monthly median flows for the complete Galveston Bay system represent the aggregated effects of increasing demand, WMS for Region H and Region C, and changing reservoir storage volumes across the planning window. As such, the individual monthly median values show less of a clear behavior than the annual medians for the bay system as a whole. Eight of the monthly medians were highest in 2010, with the other four medians highest in the middle of the planning period; the lowest monthly median B&E inflows vary considerably across the year.

Figure 4
Median Monthly B&E Flows



3.3 GBFIG Frequency of Target Attainment

In addition to examining median B&E flows into the Galveston Bay System, the *Environmental Flows Study* carried out by Region H during the 1st biennium of the 2011 planning round examined the frequency of meeting inflow targets established by Texas Water Development Board (TWDB) and Texas Parks and Wildlife Department (TPWD). The three target conditions as established by TWDB and TPWD are:

- Max H – sequence of monthly inflows for maximum B&E fisheries harvest
- Min Q – sequence of monthly inflows that minimizes the annual volume needed to maintain the B&E fisheries harvest
- Min Q-Sal – sequence of monthly inflows that maintains B&E salinity constraint

Monthly values for all three annual targets for the Galveston Bay System are given in *Table 1*.

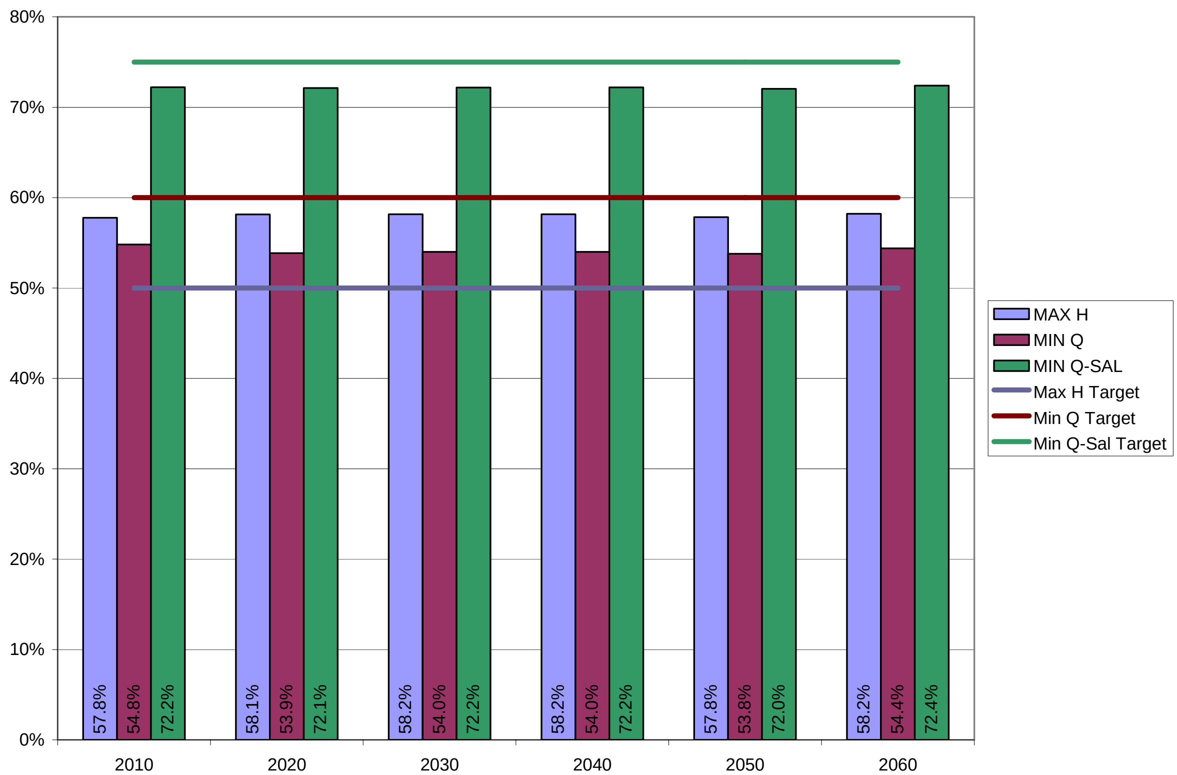
Table 1
Monthly Galveston Bay Inflow Targets

	Target Flow (ac-ft)		
Month	**Max H**	**Min Q**	**Min Q-Sal**
1	150,500	150,500	150,490
2	155,200	216,700	216,700
3	652,800	363,900	363,900
4	632,500	352,600	267,270
5	1,273,700	679,700	309,970
6	839,700	448,100	413,560
7	211,500	232,700	211,500
8	140,000	154,000	140,000
9	103,000	330,200	102,960
10	78,600	251,900	78,600
11	351,500	351,500	164,390
12	626,800	626,800	93,870
TOTAL	**5,215,800**	**4,158,600**	**2,513,210**

During the 2001 Regional Water Planning Cycle, Region H formally adopted targets for frequency of meeting these target flows (frequency of target attainment, or FTA) as proposed by the Galveston Bay Freshwater Inflows Group (GBFIG). Adopted GBFIG frequencies of attainment are 50 percent for Max H, 60 percent for Min Q, and 75 percent for Min Q-Sal.

As in the *Environmental Flows Study,* FTA was assumed to reach its goal for a month if the count of that month during the period of record exceeded the frequency goal. For example, if 75 percent or more of the Januarys in the period of record reached the Min Q-Sal flow target, the desired Min Q-Sal FTA for January was considered to be met. For annual FTA, a year was considered to meet its flow target if the total flow for that year was equal to or greater than the sum of the twelve monthly targets. Note that this is a simplified representation of FTA. It is important to remember that the State's Max H, Min Q, and Min Q-Sal flow regimes are not made up of individual flow targets but rather represent optimal harvest when all 12 months in a year are at or near the monthly target. Annual FTA for the six decadal simulations is given in *Figure 5.*

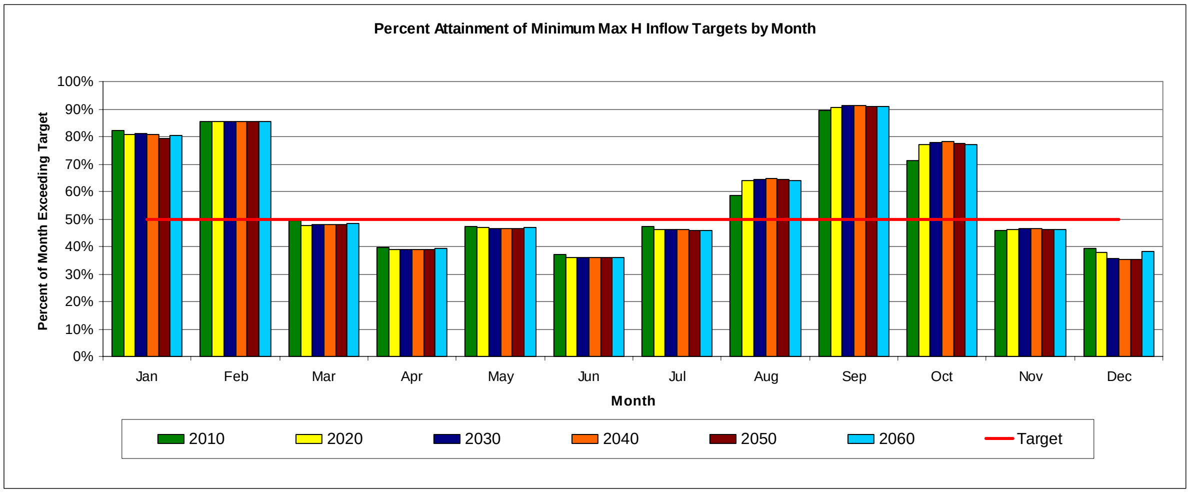
Figure 5
Annual Frequency of Target Attainment

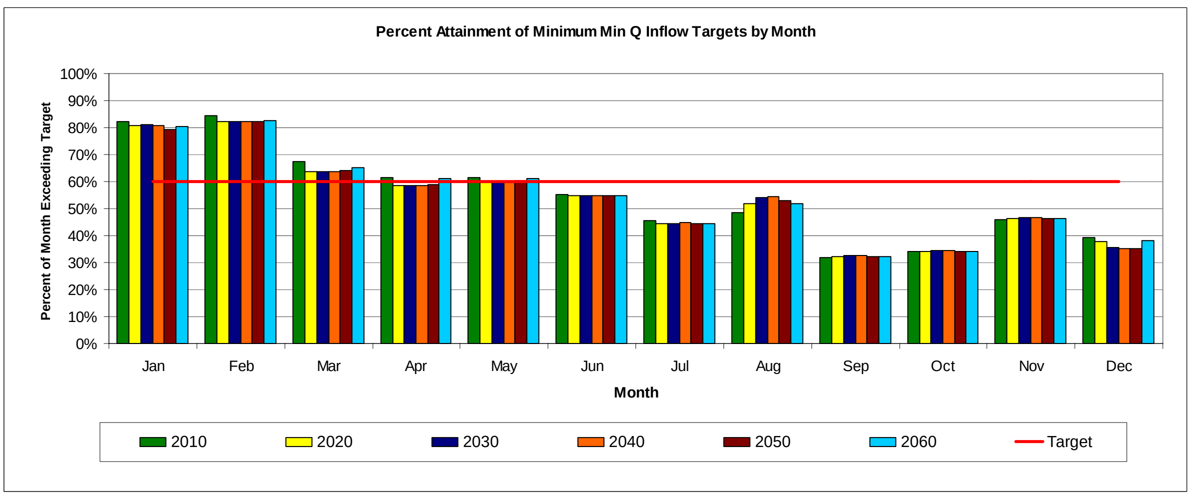


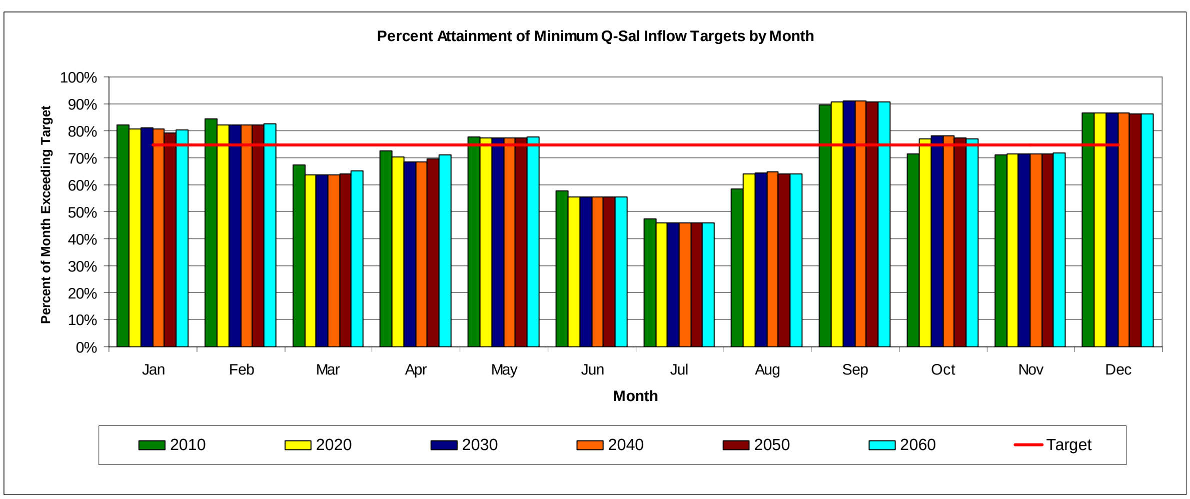
The *Environmental Flows Study* demonstrated that, while the three targets are met on an annual basis under naturalized conditions, the results to TCEQ's Current Conditions (Run 8) model do not achieve the desired FTA for Min Q. For the decadal strategy models executed for this study, annual FTA was only achieved for the Max H flow target. In spite of clear changes in median and tenth percentile flow across the planning window as described in *Sections 3.1* through *3.3*, annual FTA varied only slightly among the six decadal models. The greatest variability was found for Min Q, which nonetheless only varied by 1.04 percentage points across the six decadal models. Results for monthly FTA are shown in *Figure 6* on the following page.

For Max H, FTA is only met for five months of the year for all six decadal models. For Min Q, the desired FTA is not achieved for any model for June through December. Target FTA for April is not met for the 2020 through 2050 models and the target FTA for May is not met for the 2020 through 2040 models. For both April and May, the models which reach the desired FTA for Min Q barely reach the necessary number of months meeting the flow target. For Min Q-Sal, all six models meet the desired FTA for six months of the year. Given the differences in median annual and monthly bay and estuary inflows for the six models and the inter-annual variability for each simulation, one might expect greater variability in FTA for the State's B&E targets. In particular, it would seem likely that due to the change in flow between the 2010 and 2020 models that the FTA values would change drastically after 2010. However, as shown above on both an annual and monthly basis, this is not the case. While there is some change between the 2010 model and subsequent simulations, the range of variation among the models is typically less than 4 percentage points and never more than 7 percentage points.

Figure 6
Monthly Frequency of Target Attainment







As noted earlier, FTA is considered to be the proportion of a particular month for the model simulation period meeting the State's monthly flow target. For example, if 29 of the 57 Mays in the Year 2010 model meet or exceed May's Max H Target, the 2010 Max H FTA for May is 50.9 percent. This means that while the flow for individual monthly timesteps may vary from one decadal model to another, the total number of months not meeting the flow changes very little. An alternate approach to viewing meeting TWDB targets at GBFIG-recommended FTA is to look at the number of months missing the flow targets and the magnitude of shortages. This methodology is illustrated below for Max H, but the trends described are also true of Min Q and Min Q-Sal. The number of missed Max H targets by simulation for each month is included in *Table 2* below, confirming that the total number of monthly shortages varies only slightly.

Table 2
Number of Months Not Meeting Galveston Bay Max H Inflow Targets

Month	2010	2020	2030	2040	2050	2060
1	11	11	11	11	12	12
2	9	9	9	9	9	9
3	29	30	30	30	30	30
4	34	35	35	35	35	35
5	30	30	30	30	30	30
6	36	36	36	36	36	36
7	30	31	31	31	31	31
8	24	21	20	20	21	21
9	6	6	6	5	6	6
10	17	13	13	13	13	13
11	31	31	30	30	31	31
12	34	35	37	37	37	35

Table 3 shows the median shortage by month for each of the six decadal simulations.

Table 3
Median Shortages to Galveston Bay Max H Inflow Targets

Month	2010	2020	2030	2040	2050	2060
1	37,706	31,458	27,330	27,407	28,834	29,092
2	69,082	64,124	63,410	62,754	65,155	65,650
3	422,684	460,004	458,968	468,659	460,640	448,161
4	334,262	360,777	375,135	386,756	366,453	342,892
5	877,285	899,932	902,319	904,366	903,447	897,072
6	520,946	541,163	540,644	541,609	543,520	540,189
7	61,526	56,411	54,915	54,113	55,037	55,462
8	32,726	32,570	31,358	30,920	32,060	32,517
9	28,077	22,988	21,427	25,804	22,110	22,509
10	12,525	9,268	7,876	7,155	9,034	9,517
11	210,679	204,758	203,411	203,784	204,757	205,358
12	396,981	410,246	361,952	362,002	364,492	411,200

The median shortages listed in *Table 3* are substantial for most months; even for October, which has the lowest median shortages, the median shortage is in excess of 7,000 acre-feet. This suggests that months that fail to meet the target B&E inflow tend to do so by a wide margin. The median shortage alone cannot prove that this is the case. While much of the preceding study has relied heavily on median flows, in this case the median monthly shortage may not be the best indicator of shortage behavior as it is not the mid-sized shortages but rather the smallest shortages which are most likely to change from one decadal model to another. For this reason, examining the lower range of shortage values in conjunction provides a more reliable basis for determining why FTA has minimal variability. The 10th percentile B&E shortages are shown in *Table 4*.

Table 4
10th Percentile of Shortages to Galveston Bay Max H Inflow Targets

Month	2010	2020	2030	2040	2050	2060
1	3,799	12,564	10,976	11,049	5,048	3,347
2	28,807	23,869	21,580	21,680	24,498	25,091
3	215,801	217,138	221,079	221,206	219,255	210,977
4	74,232	104,461	101,539	98,175	97,380	87,360
5	347,062	381,333	382,117	382,016	379,083	368,224
6	123,010	157,100	160,498	162,211	161,302	148,379
7	23,437	18,234	15,239	15,170	16,481	16,934
8	4,034	5,210	7,296	6,494	4,282	4,746
9	12,772	7,171	4,884	11,839	6,141	6,625
10	4,255	5,227	3,865	3,171	4,952	5,412
11	69,365	69,092	69,583	70,221	68,502	64,296
12	81,968	126,710	65,286	67,043	62,670	114,660

As with the median, the 10th percentile shortages are large, strengthening the assertion that the number of months missing flow targets is fairly consistent due to shortages being large. For example, the monthly Max H target for May is not met for 30 out of 57 years for all six decadal simulations. The 10th percentile shortage for May is in excess of 300,000, meaning that almost all of the Mays that miss the TWDB/TPWD target do so by a large amount. Thus, it is unlikely that the management strategies implemented in the decadal models would alter B&E inflow by this degree for any particular month, thereby eliminating a shortage and increasing FTA. An examination of shortage volumes by model for all months of the simulation period reveals that, although a few large shortages are create or eliminated with changing model conditions, very few shortages greater than a few thousand acre-feet per month or created or eliminated among the decadal models. Thus, the majority of modeled monthly shortages are large and implementation of WMS in decades subsequent to 2010 are unlikely to have a substantial impact on FTA for B&E inflow targets.

Appendix 4E

Environmental Flows Modeling for New WMS

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Section 1- Introduction

The *Environmental Flows Study* completed during the 1st biennium of the 2011 Regional Water plan (RWP) planning process revealed impacts to volume, timing, and location of bay and estuary inflows caused by water management strategy (WMS) implementation. Model results indicated that implementation of individual WMS would not have a substantial impact on net bay and estuary (B&E) inflow; however, the combined effect of multiple WMS resulted in some impacts to B&E flows in terms of volume.

The 1st biennium study examined strategies recommended by the 2006 Region H RWP and the 2007 State water Plan (SWP); the 2011 RWP contains 36 WMS strategies which were not included in the 2006 RWP. As such, the Region H Regional Planning Group elected to re-run the water availability models from the 1st biennium *Environmental Flows Study* to test the environmental impacts of new WMS on environmental flows. In order to determine the effects of WMS implementation, WAM models were developed for each WMS for any basin in which the WMS was active. Strategies were modeled in a manner similar to that used in the *Environmental Flows Study*, with WMS simulated using the Water Rights Analysis Package (WRAP) software package. Strategies were modeled on an individual basis and results were examined to determine attainment of B&E inflow targets and impacts of individual WMS to instream flows.

Section 2- Model Development

The Water Rights Analysis Package (WRAP [Wurbs 2007]) was developed as a tool for modeling water rights allocations and river and reservoir operations on a monthly time-step. In addition to this basic objective, the nature of the application allows for the modeling of various environmental conditions, especially the determination of instream flows and bay and estuary (B&E) flows as a result of operations within the basin. This process is made simpler by the constant maintenance of Water Availability Models (WAMs) for each basin in the State of Texas by the Texas Commission on Environmental Quality (TCEQ). These WAMs can then be modified as necessary and executed by WRAP to determine impacts from various changes. Currently, TCEQ maintains two versions of the WAMs for permitting purposes: 1) a full-diversion model with no return flows, known as the WAM Run 3, and 2) a current conditions model based on historical water use, known as the WAM Run 8. The period of record for both models contains the critical drought period for each basin.

2.1 Base Model

Models carried out for this study were based on the Scenario D model from the first biennium *Environmental Flows Study*. In order to develop the original D_0 base model in the 1st biennium study, changes were made to the TCEQ Run 3 model. Because the Run 3 model includes almost no return flows, Constant Inflow (CI) and Return Flow (RF) cards for each basin were imported from the Run 8 model if present in the Run 8. CI cards imported from Run 8 reflect flows from a current conditions diversion level. However, since the majority of CI cards represent groundwater inputs to the system, no adjustment was required. The exception was the San Jacinto Basin, which includes considerable surface water inflows. For the San Jacinto model, CI cards were scaled up to represent Full Authorized Diversion conditions.

In order to create a Full Authorized Diversions With Return Flows model, a program was developed to extract Run 8 return flows and insert them into the Run 3 model. The program scanned the Run 8 and Run 3 models and, for each model, developed a table of several parameters included on the WR (Water Right) cards. These included the control point, use, priority number, return flow parameters (Run 8 only), and water right identifier. The two tables were then compared and, for diversions with matching parameters, the Run 8 return flow data was copied into the corresponding Run 3 diversion. Non-matching records, or records for which no change was necessary, were not altered.

Year 2060 SV/SA (Storage Volume/Surface Area) records (if available) giving surface area and volume relationships for reservoirs replaced the existing Year 2000 SV/SA records to account for the loss of reservoir storage volume from the effects of sedimentation over time. For the Neches Trinity, Trinity-San Jacinto, and San Jacinto models, no other changes required consideration. Two of the basins, the Trinity and the Brazos/San Jacinto-Brazos, required modification due to the presence of WMS in portions of the basins located in areas outside of Region H.

For the Trinity model, upstream strategies from Region C were included. Sections of code related to these strategies were copied from a file representing Region C's WMS for the TWDB Streamflow Assessment Study found in the 2007 SWP. This file was provided by TWDB. In addition to altering the Strategy D DAT file, changes were also made to the DIS file due to the addition of several control points. For the Brazos/San Jacinto-Brazos model, changes were made based on Region G's 2001 WMS (Brazos G Regional Water Planning Group 2001) as modeled in the same TWDB study. As with the Trinity model, changes for Strategy D were made to both the DAT and DIS files. The resultant models, identified as D_0 models, represent Year 2060 conditions with Full Authorized Diversions and expected return flows, upstream WMS, and no term water rights. However, the D_0 model contained no Region H strategies.

2.2 2011 RWP WMS Models

Eighteen of the new WMS for the 2011 RWP were deemed suitable for modeling. The primary reason for a majority of unmodeled strategies was that the WMS generated no new yield but rather simply facilitated implementation of another strategy (either from the 2006 or 2011 RWP). Examples of this situation include major WWP treatment and transmission projects. The 18 strategies which were modeled are listed in Table 2-1 below, which describes the modeling methodology used for each WMS.

Table 1-1.

WMS Methodology

Model ID	WMS Name	Modeling Methodology
IGW	Interim Strategies	Add CI cards to reflect return flows from points of use.
NWL	New Groundwater Wells for Livestock	Add CI cards to reflect return flows from points of use.
FRU	Fulshear Reuse	Reduce return flows (CI cards) at participating WUGs.
COH	COH GRP	Return flows from WUGs getting more groundwater. No change at converting WUGs (change return flow source from GW to SW only)
CMC	City of Missouri City GRP	Return flows from WUGs getting more groundwater or ASR. For reuse divert WWTP discharge with appropriate return flow.
M25	Fort Bend MUD 25 GRP	For direct reuse reduce CI card for WWTP discharge.
NFB	NFBWA GRP	Return flows from WUGs getting more groundwater. No change at converting WUGs (change return flow source from GW to SW only)
NHC	NHCRWA GRP	Return flows from WUGs getting more groundwater. No change at converting WUGs (change return flow source from GW to SW only)
SJW	SJRA WRAP	Return flows from WUGs getting more groundwater or Lake Conroe water.
SLG	Sugar Land GRP	Return flows from WUGs getting more groundwater. For reuse divert WWTP discharge with appropriate return flow.
WHC	WHCRWA GRP	Return flows from WUGs getting more groundwater. No change at converting WUGs (change return flow source from GW to SW only)
WCS	CLCND West Chambers System	Reflect return flows from points of use.
GOC	GCWA Off-channel Reservoir	Add off-channel diversion and reservoir
MCR	Montgomery MUD 8/9 Indirect Reuse	Reuse diversion with appropriate return flows.
RMI	Wastewater Reclamation for Mun. Irrigation	Reduce return flows (CI cards) at participating WUGs.
FBO	Fort Bend County Off-Channel Reservoir	Add off-channel diversion and reservoir.
BCO	Brazoria County Off-Channel Reservoir	Add off-channel diversion and reservoir.
BII	Brazoria Co Interruptible Supplies for Irrigation	Add interruptible diversions

Section 3 – WMS Impacts to Environmental Flows

3.1 B&E Inflows

WRAP strategy model output was used to determine effects of WMS implementation on B&E flows into Galveston Bay for the Year 2060 condition. Targets were examined primarily in terms of frequency of target attainment (FTA) for B&E inflow targets recommended by the TWDB and Texas Parks and Wildlife Department. There are three sets of targets designed for maintaining fisheries. These are:

- Max H – sequence of monthly inflows for maximum B&E fisheries harvest
- Min Q – sequence of monthly inflows that minimizes the annual volume needed to maintain the B&E fisheries harvest
- Min Q-Sal – sequence of monthly inflows that maintains B&E salinity constraint

Monthly values for all three annual targets for the Galveston Bay system are given in *Table ES-2* below. In general, Max H represents a target condition for ultimate production while Min Q-Sal represents a base condition that must be maintained on a more reliable basis.

Table 3-1

Monthly Galveston Bay Inflow Targets

Month	Max H	Min Q	Min Q-Sal
1	150,500	150,500	150,490
2	155,200	216,700	216,700
3	652,800	363,900	363,900
4	632,500	352,600	267,270
5	1,273,700	679,700	309,970
6	839,700	448,100	413,560
7	211,500	232,700	211,500
8	140,000	154,000	140,000
9	103,000	330,200	102,960
10	78,600	251,900	78,600
11	351,500	351,500	164,390
12	626,800	626,800	93,870
TOTAL	**5,215,800**	**4,158,600**	**2,513,210**

Region H formally adopted GBFIG-proposed frequencies for meeting TWDB flow targets during the 2001 cycle of Regional Water Planning. GBFIG proposed a 50 percent frequency of attainment for Max H, 60 percent for Min Q, and 75 percent for Min Q-Sal (2006 Region H RWP). GBFIG-proposed frequencies were presented to the Region H Planning Group during the 2001 Regional Water Planning cycle and were adopted by the Region H Planning Group for the 2001 RWP. For additional information and documentation, please see the 2001 and 2006 Region H RWPs. However, the

GBFIG recommendations do not explicitly address how to measure frequency of attaining these targets, nor do they define a desired frequency for the seasonality (i.e., monthly distribution) of freshwater inflows. For this study, the recommended annual frequency was used as a placeholder for the evaluation of seasonal variations (i.e., monthly distribution). Targets were assumed to be attained for a time period in which the flow met or exceeded the target.

There are several considerations that should be taken into account when interpreting the FTA results. A concern with the approach taken is the validity of assuming that annual GBFIG targets are applicable on a seasonal or monthly basis. Sub-annual time scales are clearly of importance; it is mathematically possible to meet an annual flow target while flows for one or more months could be low enough to be ecologically inadequate. Whether FTA is more critical for some seasons or months than others has not yet been established. The application of the annual GBFIG FTA to monthly targets was made due to a lack of a more reasonable alternative and should be studied further.

While the purpose of this study is not to evaluate B&E needs or develop new flow targets or FTA, the underlying assumption that B&E flow needs are met if the desired FTA is achieved must be considered critically. One potential concern is that this approach does not consider a bracket of flows, but only if the flow equals or exceeds the desired B&E flow. This does not account for the possibility that, in some circumstances, excessive flows may also result in less than optimum conditions. It is important to remember that the State's Max H, Min Q, and Min Q-Sal flow regimes are not made up of individual flow targets but rather represent optimal harvest when all 12 months in a year are at or near the monthly target. However, Espey Consultants (2008) has noted that the pattern of flows defined by Max H does not occur historically; in order to meet the 50% frequency on Max H, the monthly Max H targets would have to be bracketed by ±1,045 percent.

Seasonal FTA is shown in *Table 3-2* below, with monthly FTA shown in *Table 3-3.* Changes from the base model are shown in bold text.

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Table 3-2

Seasonal Frequency of Target Attainment for B&E Flow Targets

Max H

Season	Base	BCO	BII	CMC	COH	FBO	FRU	GOC	IGW	M25	MCR	NFB	NHC	NWL	RMI	SJW	SLG	WCS	WHC
Spring	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%
Summer	70%	70%	70%	70%	71%	70%	70%	70%	70%	70%	71%	70%	70%	70%	71%	70%	70%	71%	70%
Winter	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%

Min Q

Season	Base	BCO	BII	CMC	COH	FBO	FRU	GOC	IGW	M25	MCR	NFB	NHC	NWL	RMI	SJW	SLG	WCS	WHC
Spring	64%	64%	64%	64%	65%	64%	64%	65%	64%	64%	65%	65%	64%	64%	65%	64%	64%	65%	64%
Summer	40%	40%	40%	40%	41%	40%	40%	40%	40%	40%	41%	40%	40%	40%	41%	40%	40%	41%	40%
Winter	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%

Min Q-Sal

Season	Base	BCO	BII	CMC	COH	FBO	FRU	GOC	IGW	M25	MCR	NFB	NHC	NWL	RMI	SJW	SLG	WCS	WHC
Spring	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%
Summer	70%	70%	70%	70%	71%	70%	70%	70%	70%	70%	71%	70%	70%	70%	71%	70%	70%	71%	70%
Winter	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%

Table 3-3a

Monthly Frequency of Target Attainment for B&E Flow Targets – Max H

Max H																			
Month	**Base**	**BCO**	**BII**	**CMC**	**COH**	**FBO**	**FRU**	**GOC**	**IGW**	**M25**	**MCR**	**NFB**	**NHC**	**NWL**	**RMI**	**SJW**	**SLG**	**WCS**	**WHC**
Jan	84%	84%	84%	84%	**85%**	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	**85%**	84%	84%	84%
Feb	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%
Mar	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Apr	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%
May	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
Jun	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%	37%
Jul	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%
Aug	65%	65%	65%	65%	**66%**	65%	65%	65%	65%	65%	65%	65%	65%	65%	64%	65%	65%	65%	65%
Sep	91%	91%	91%	91%	**92%**	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	**92%**
Oct	78%	78%	78%	78%	**80%**	**79%**	78%	78%	78%	78%	78%	78%	78%	78%	78%	**80%**	78%	78%	**79%**
Nov	47%	47%	47%	47%	**48%**	**48%**	47%	47%	**48%**	47%	47%	47%	**48%**	47%	47%	**48%**	47%	47%	**48%**
Dec	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	**46%**	47%	47%	47%	47%

Table 3-3b

Monthly Frequency of Target Attainment for B&E Flow Targets – Min Q

BCO																			
Month	**Base**	**BCO**	**BII**	**CMC**	**COH**	**FBO**	**FRU**	**GOC**	**IGW**	**M25**	**MCR**	**NFB**	**NHC**	**NWL**	**RMI**	**SJW**	**SLG**	**WCS**	**WHC**
Jan	84%	84%	84%	84%	**85%**	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	**85%**	84%	84%	84%
Feb	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Mar	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%
Apr	69%	69%	69%	69%	**70%**	69%	69%	69%	**70%**	69%	69%	69%	69%	69%	69%	**70%**	69%	69%	**70%**
May	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%	64%
Jun	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	55%	56%	56%	56%	56%
Jul	44%	44%	44%	44%	45%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%
Aug	51%	51%	51%	51%	**53%**	51%	51%	51%	51%	51%	51%	51%	51%	51%	**50%**	**53%**	51%	51%	51%
Sep	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%
Oct	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Nov	47%	47%	47%	47%	**48%**	**48%**	47%	47%	**48%**	47%	47%	47%	**48%**	47%	47%	**48%**	47%	47%	**48%**
Dec	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	**46%**	47%	47%	47%	47%

Table 3-3c

Monthly Frequency of Target Attainment for B&E Flow Targets – Min Q-Sal

Min Q-Sal																			
Month	**Base**	**BCO**	**BII**	**CMC**	**COH**	**FBO**	**FRU**	**GOC**	**IGW**	**M25**	**MCR**	**NFB**	**NHC**	**NWL**	**RMI**	**SJW**	**SLG**	**WCS**	**WHC**
Jan	84%	84%	84%	84%	**85%**	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	**85%**	84%	84%	84%
Feb	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Mar	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%
Apr	75%	75%	75%	75%	**76%**	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	**76%**	75%	75%	75%
May	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Jun	58%	58%	58%	58%	**59%**	58%	58%	58%	58%	58%	58%	58%	58%	58%	58%	**59%**	58%	58%	58%
Jul	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%	47%
Aug	65%	65%	65%	65%	**66%**	65%	65%	65%	65%	65%	65%	65%	65%	65%	**64%**	65%	65%	65%	65%
Sep	91%	91%	91%	91%	**92%**	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	**92%**
Oct	78%	78%	78%	78%	**80%**	**79%**	78%	78%	78%	78%	78%	78%	78%	78%	78%	80%	78%	78%	**79%**
Nov	73%	73%	73%	73%	**74%**	74%	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	**74%**
Dec	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%	89%

As can be seen from the tables above, the WMS modeled have very little impact on frequency of target attainment. For the adopted goal frequencies of attainment (50 percent for Max H, 60 percent for Min Q, and 75 percent for Min Q-sal), the base model itself fails to reach the desired FTA for a number of months and seasons. At a seasonal level, none of the new WMS examined alters FTA more than 0.5 percent, At the monthly level, changes were noted in greatest amounts for COH GRP, Wastewater Reuse for Municipal Irrigation, SJRA WRAP, and WHCRWA GRP; these changes were shown to occur primarily between August and October. However, FTA changes by less than two percent from the base model (typically no change). This indicates that on an individual basis the WMS have little impact on B&E flows. A similar conclusion was drawn from the results of the first biennium *Environmental Flows Study.*

3.2 Instream Flows

A list of 26 segments with the potential to be impacted by Region H WMS was developed from a compilation of segments studied in the TWDB Streamflow Assessment found in the 2002 SWP. Regulated flows at the 26 segments were determined for the base (D_0) models as well as for all WMS models. Based on monthly results for the model simulation period, 10th percentile flows were calculated to investigate low flow conditions. For each WMS, 10th percentile flows at each of the 26 segments were compared to the D_0 models. For each WMS, the stream segment with the greatest (absolute) percentage difference from the base model was considered to be the most critical segment for that strategy (see *Exhibit 2*). For the 18 strategy models, six segments were identified in the Brazos, San Jacinto-Brazos and San Jacinto Basins as being particularly influenced by Region H WMS. A summary of the most impacted segments is presented in *Table 4-1.*

Table 4-1

Impacts of WMS Implementation on Critical Stream Segments

WRAP Identifier	Basin	Strategy	10th Percentile Flows		
			D_0 (ac-ft)	Strategy (ac-ft)	Change (%)
CON111	Brazos	Braz. Int. Irrigation	47,571	44,972	-5.5
		GCWA Off-Channel		44,972	-5.5
		Sugar Land GRP		44,623	-6.2
BRBR59	Brazos	Brazoria OCR	49,304	47,695	-3.3
		Missouri City GRP		46,698	-5.3
		Fulshear Reuse		47,854	-2.9
		FBC MUD 25 Reuse		48,063	-2.5
		NFBWA GRP		47,213	-4.2
		New Wells for Livestock		46,424	-5.8
		Reclamation Mun. Irr.		47,248	-4.2
532801	Brazos	Fort Bend OCR	41,101	40,513	-1.4
SJGBC3	San Jacinto-Brazos	Interim Strategies	1,955	2,113	8.0
A5191P	San Jacinto	WHCRWA GRP	59,845	60,532	1.2
SPSP	San Jacinto	NHCRWA GRP	1,460	1,727	18.2
		SJRA WRAP		3,311	126.3
1009	San Jacinto	COH GRP	1,996	2,116	6.1

In the San Jacinto and San Jacinto-Brazos basins, the WMS showed increases in 10^{th} percentile flow at critical segments, primarily due to increased return flows from points of use from WUGs increasing their usage of groundwater over time. Note that at the same time that these WUGs are increasing their groundwater use, other WUGs participating in the same GRPs will be converting to surface water, so that the total percentage of water usage in the GRP group will be within subsidence district limits. Increased return flows from WUGs converting from groundwater to surface water were not modeled as return flows would for those WUGs would simply shift from groundwater-based to surface water-based. Ultimately, the changes in 10^{th} percentile flow caused by GRPs is largely an artifact of increasing demand. The increase in 10^{th} percentile flows for Interim Strategies is also caused by increased groundwater-based return flows from point-of-use WUGs.

The most highly impacted segments in the Brazos basin all showed decreases in 10^{th} percentile flows, although changes tended to be relatively small (6.2 percent or less). This reduction in flows is not surprising for reclamation / reuse strategies, as flows that would formerly move downstream are reduced. The reduction in flow caused by Brazoria County Interruptible Supplies for Irrigation is also reasonable, as a greater volume of water is being diverted beyond the firm yield of existing permits (possibly during lower-flow periods). Similarly, the GCWA Off-Channel Reservoir, Fort Bend OCR, and Brazoria County OCR would firm up interruptible portions of flow, resulting in greater total diversions from the stream system. The reduction in flow caused by the Missouri City and Sugar Land GRPs may initially seem counterintuitive, as the remaining GRPs listed resulted in positive increases in streamflow. However, please note that these two GRPs also include a reuse component which could lower 10^{th} percentile flows at some locations.

Section 4 - Conclusions

As shown in the sections above, the impacts of new individual WMS as detailed in the 2011 Region H RWP are not anticipated to create major impacts to B&E flows, nor to substantially reduce low (10^{th} percentile) flows at critical stream segments. Frequencies of attaining B&E flow targets at GBFIG-established frequencies was almost unchanged, with changes noted for only a few strategies; even for those strategies, changes were within two percentage points of the base model. Both positive and negative changes to 10th percentile flows at critical segments were found, with positive changes occurring in the San Jacinto and San Jacinto-Brazos basins and negative changes in the Brazos basin. Overall, the negative changes were relatively small, ranging from 2.5 to 6.2 percent reduction in 10^{th} percentile flow at the critical segments. The impact to critical stream segment low flows should be considered when evaluating WMS, particularly for projects consisting wholly or partly of reuse. Overall, however, the small magnitude of change for critical segments and the limited impacts on B&E inflow suggests that the seventeen WMS are not likely to individually create substantial alterations to B&E inflows or critical stream segment low flows.

Whether these strategies will have an additive effect when implemented together is unknown; based on the results of the 1^{st} biennium *Environmental Flows Study*, it is possible that greater impacts would be realized with when the projects are operating simultaneously. More study would be required to determine if this is the case for new WMS.

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Appendix 4F

TWDB Report: Socioeconomic Impacts of Unmet Water Demands in the Region H Water Planning Area

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Socioeconomic Impacts of Projected Water Shortages for the Region H Regional Water Planning Area

Prepared in Support of the 2011 Region H Regional Water Plan

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May 2010

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Introduction

Water shortages during drought would likely curtail or eliminate economic activity in business and industries reliant on water. For example, without water farmers cannot irrigate; refineries cannot produce gasoline, and paper mills cannot make paper. Unreliable water supplies would not only have an immediate and real impact on existing businesses and industry, but they could also adversely affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages would disrupt activity in homes, schools and government and could adversely affect public health and safety. For all of the above reasons, it is important to analyze and understand how restricted water supplies during drought could affect communities throughout the state.

Administrative rules require that regional water planning groups evaluate the impacts of not meeting water needs as part of the regional water planning process, and rules direct TWDB staff to provide technical assistance: "*The executive administrator shall provide available technical assistance to the regional water planning groups, upon request, on water supply and demand analysis, including methods to evaluate the social and economic impacts of not meeting needs*" [(§357.7 (4)(A)]. Staff of the TWDB's Water Resources Planning Division designed and conducted this report in support of the Region H Regional Water Planning Group (Region H).

This document summarizes the results of our analysis and discusses the methodology used to generate the results. Section 1 outlines the overall methodology and discusses approaches and assumptions specific to each water use category (i.e., irrigation, livestock, mining, steam-electric, municipal and manufacturing). Section 2 presents the results for each category where shortages are reported at the regional planning area level and river basin level. Results for individual water user groups are not presented, but are available upon request.

1. Methodology

Section 1 provides a general overview of how economic and social impacts were measured. In addition, it summarizes important clarifications, assumptions and limitations of the study.

1.1 Economic Impacts of Water Shortages

1.1.1 General Approach

Economic analysis as it relates to water resources planning generally falls into two broad areas. Supply side analysis focuses on costs and alternatives of developing new water supplies or implementing programs that provide additional water from current supplies. Demand side analysis concentrates on impacts or benefits of providing water to people, businesses and the environment. Analysis in this report focuses strictly on demand side impacts. When analyzing the economic impacts of water shortages as defined in Texas water planning, three potential scenarios are possible:

1) Scenario 1 involves situations where there are physical shortages of raw surface or groundwater due to drought of record conditions. For example, City A relies on a reservoir with average conservation storage of 500 acre-feet per year and a firm yield of 100 acre feet. In 2010, the city uses about 50 acre-feet per year, but by 2030 their demands are expected to increase to 200

acre-feet. Thus, in 2030 the reservoir would not have enough water to meet the city's demands, and people would experience a shortage of 100 acre-feet assuming drought of record conditions. Under normal or average climatic conditions, the reservoir would likely be able to provide reliable water supplies well beyond 2030.

2) Scenario 2 is a situation where despite drought of record conditions, water supply sources can meet existing use requirements; however, limitations in water infrastructure would preclude future water user groups from accessing these water supplies. For example, City B relies on a river that can provide 500 acre-feet per year during drought of record conditions and other constraints as dictated by planning assumptions. In 2010, the city is expected to use an estimated 100 acre-feet per year and by 2060 it would require no more than 400 acre-feet. But the intake and pipeline that currently transfers water from the river to the city's treatment plant has a capacity of only 200 acre-feet of water per year. Thus, the city's water supplies are adequate even under the most restrictive planning assumptions, but their conveyance system is too small. This implies that at some point – perhaps around 2030 - infrastructure limitations would constrain future population growth and any associated economic activity or impacts.

3) Scenario 3 involves water user groups that rely primarily on aquifers that are being depleted. In this scenario, projected and in some cases existing demands may be unsustainable as groundwater levels decline. Areas that rely on the Ogallala aquifer are a good example. In some communities in the region, irrigated agriculture forms a major base of the regional economy. With less irrigation water from the Ogallala, population and economic activity in the region could decline significantly assuming there are no offsetting developments.

Assessing the social and economic effects of each of the above scenarios requires various levels and methods of analysis and would generate substantially different results for a number of reasons; the most important of which has to do with the time frame of each scenario. Scenario 1 falls into the general category of static analysis. This means that models would measure impacts for a small interval of time such as a drought. Scenarios 2 and 3, on the other hand imply a dynamic analysis meaning that models are concerned with changes over a much longer time period.

Since administrative rules specify that planning analysis be evaluated under drought of record conditions (a static and random event), socioeconomic impact analysis developed by the TWDB for the state water plan is based on assumptions of Scenario 1. Estimated impacts under scenario 1 are point estimates for years in which needs are reported (2010, 2020, 2030, 2040, 2050 and 2060). They are independent and distinct "what if" scenarios for a particular year and shortages are assumed to be temporary events resulting from drought of record conditions. Estimated impacts measure what would happen if water user groups experience water shortages for a period of one year.

The TWDB recognize that dynamic models may be more appropriate for some water user groups; however, combining approaches on a statewide basis poses several problems. For one, it would require a complex array of analyses and models, and might require developing supply and demand forecasts under "normal" climatic conditions as opposed to drought of record conditions. Equally important is the notion that combining the approaches would produce inconsistent results across regions resulting in a so-called "apples to oranges" comparison.

A variety tools are available to estimate economic impacts, but by far, the most widely used today are input-output models (IO models) combined with social accounting matrices (SAMs). Referred to as IO/SAM models, these tools formed the basis for estimating economic impacts for agriculture (irrigation and livestock water uses) and industry (manufacturing, mining, steam-electric and commercial business activity for municipal water uses).

Since the planning horizon extends through 2060, economic variables in the baseline are adjusted in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Future values for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category.

The following steps outline the overall process.

Step 1*: Generate IO/SAM Models and Develop Economic Baseline*

IO/SAM models were estimated using propriety software known as IMPLAN PRO™ (Impact for Planning Analysis). IMPLAN is a modeling system originally developed by the U.S. Forestry Service in the late 1970s. Today, the Minnesota IMPLAN Group (MIG Inc.) owns the copyright and distributes data and software. It is probably the most widely used economic impact model in existence. IMPLAN comes with databases containing the most recently available economic data from a variety of sources.[1] Using IMPLAN software and data, transaction tables conceptually similar to the one discussed previously were estimated for each county in the region and for the region as a whole. Each transaction table contains 528 economic sectors and allows one to estimate a variety of economic statistics including:

- **total sales -** total production measured by sales revenues;
- **intermediate sales -** sales to other businesses and industries within a given region;
- **final sales –** sales to end users in a region and exports out of a region**;**
- **employment -** number of full and part-time jobs (annual average) required by a given industry including self-employment;
- **regional income -** total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income and interest payments; and
- **business taxes -** sales, excise, fees, licenses and other taxes paid during normal operation of an industry (does not include income taxes).

TWDB analysts developed an economic baseline containing each of the above variables using year 2000 data. Since the planning horizon extends through 2060, economic variables in the baseline were allowed to change in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Projections for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category. Monetary impacts in future years are reported in constant year 2006 dollars.

It is important to stress that employment, income and business taxes are the most useful variables when comparing the relative contribution of an economic sector to a regional economy. Total sales as reported in IO/SAM models are less desirable and can be misleading because they include sales to other industries in the region for use in the production of other goods. For example, if a mill buys grain from local farmers and uses it to produce feed, sales of both the processed feed and raw corn are counted

[1]The IMPLAN database consists of national level technology matrices based on benchmark input-output accounts generated by the U.S. Bureau of Economic Analysis and estimates of final demand, final payments, industry output and employment for various economic sectors. IMPLAN regional data (i.e. states, a counties or groups of counties within a state) are divided into two basic categories: 1) data on an industry basis including value-added, output and employment, and 2) data on a commodity basis including final demands and institutional sales. State-level data are balanced to national totals using a matrix ratio allocation system and county data are balanced to state totals.

as "output" in an IO model. Thus, total sales double-count or overstate the true economic value of goods and services produced in an economy. They are not consistent with commonly used measures of output such as Gross National Product (GNP), which counts only final sales.

Another important distinction relates to terminology. Throughout this report, the term *sector* refers to economic subdivisions used in the IMPLAN database and resultant input-output models (528 individual sectors based on Standard Industrial Classification Codes). In contrast, the phrase *water use category* refers to water user groups employed in state and regional water planning including irrigation, livestock, mining, municipal, manufacturing and steam electric. Each IMPLAN sector was assigned to a specific water use category.

Step 2: *Estimate Direct and Indirect Economic Impacts of Water Needs*

Direct impacts are reductions in output by sectors experiencing water shortages. For example, without adequate cooling and process water a refinery would have to curtail or cease operation, car washes may close, or farmers may not be able to irrigate and sales revenues fall. Indirect impacts involve changes in inter-industry transactions as supplying industries respond to decreased demands for their services, and how seemingly non-related businesses are affected by decreased incomes and spending due to direct impacts. For example, if a farmer ceases operations due to a lack of irrigation water, they would likely reduce expenditures on supplies such as fertilizer, labor and equipment, and businesses that provide these goods would suffer as well.

Direct impacts accrue to immediate businesses and industries that rely on water and without water industrial processes could suffer. However, output responses may vary depending upon the severity of shortages. A small shortage relative to total water use would likely have a minimal impact, but large shortages could be critical. For example, farmers facing small shortages might fallow marginally productive acreage to save water for more valuable crops. Livestock producers might employ emergency culling strategies, or they may consider hauling water by truck to fill stock tanks. In the case of manufacturing, a good example occurred in the summer of 1999 when Toyota Motor Manufacturing experienced water shortages at a facility near Georgetown, Kentucky.[2] As water levels in the Kentucky River fell to historic lows due to drought, plant managers sought ways to curtail water use such as reducing rinse operations to a bare minimum and recycling water by funneling it from paint shops to boilers. They even considered trucking in water at a cost of 10 times what they were paying. Fortunately, rains at the end of the summer restored river levels, and Toyota managed to implement cutbacks without affecting production, but it was a close call. If rains had not replenished the river, shortages could have severely reduced output.[3]

To account for uncertainty regarding the relative magnitude of impacts to farm and business operations, the following analysis employs the concept of elasticity. Elasticity is a number that shows how a change in one variable will affect another. In this case, it measures the relationship between a percentage reduction in water availability and a percentage reduction in output. For example, an elasticity of 1.0 indicates that a 1.0 percent reduction in water availability would result in a 1.0 percent reduction in

[2] Royal, W. "*High And Dry - Industrial Centers Face Water Shortages*." in Industry Week, Sept, 2000.

[3] The efforts described above are not planned programmatic or long-term operational changes. They are emergency measures that individuals might pursue to alleviate what they consider a temporary condition. Thus, they are not characteristic of long-term management strategies designed to ensure more dependable water supplies such as capital investments in conservation technology or development of new water supplies.

economic output. An elasticity of 0.50 would indicate that for every 1.0 percent of unavailable water, output is reduced by 0.50 percent and so on. Output elasticities used in this study are:[4]

- if water needs are 0 to 5 percent of total water demand, no corresponding reduction in output is assumed;

- if water needs are 5 to 30 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 0.50 percent reduction in output;

- if water needs are 30 to 50 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 0.75 percent reduction in output; and

- if water needs are greater than 50 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 1.0 percent (i.e., a proportional reduction).

In some cases, elasticities are adjusted depending upon conditions specific to a given water user group.

Once output responses to water shortages were estimated, direct impacts to total sales, employment, regional income and business taxes were derived using regional level economic multipliers estimating using IO/SAM models. The formula for a given IMPLAN sector is:

$$D_{i,t} = Q_{i,t} *_{,} S_{i,t} * E_Q * RFD_i * DM_{i(Q, L, I, T)}$$

where:

$D_{i,t}$ = direct economic impact to sector *i* in period *t*

$Q_{i,t}$ = total sales for sector *i* in period *t* in an affected county

$RFD_{i,}$ = ratio of final demand to total sales for sector *i* for a given region

$S_{i,t}$ = water shortage as percentage of total water use in period *t*

E_Q = elasticity of output and water use

$DM_{i(L, I, T)}$ = direct output multiplier coefficients for labor (L), income (I) and taxes (T) for sector *i*.

Secondary impacts were derived using the same formula used to estimate direct impacts; however, indirect multiplier coefficients are used. Methods and assumptions specific to each water use sector are discussed in Sections 1.1.2 through 1.1.4.

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[4] Elasticities are based on one of the few empirical studies that analyze potential relationships between economic output and water shortages in the United States. The study, conducted in California, showed that a significant number of industries would suffer reduced output during water shortages. Using a survey based approach researchers posed two scenarios to different industries. In the first scenario, they asked how a 15 percent cutback in water supply lasting one year would affect operations. In the second scenario, they asked how a 30 percent reduction lasting one year would affect plant operations. In the case of a 15 percent shortage, reported output elasticities ranged from 0.00 to 0.76 with an average value of 0.25. For a 30 percent shortage, elasticities ranged from 0.00 to 1.39 with average of 0.47. For further information, see, California Urban Water Agencies, "*Cost of Industrial Water Shortages,*" Spectrum Economics, Inc. November, 1991.

General Assumptions and Clarification of the Methodology

As with any attempt to measure and quantify human activities at a societal level, assumptions are necessary and every model has limitations. Assumptions are needed to maintain a level of generality and simplicity such that models can be applied on several geographic levels and across different economic sectors. In terms of the general approach used here several clarifications and cautions are warranted:

1. Shortages as reported by regional planning groups are the starting point for socioeconomic analyses.

2. Estimated impacts are point estimates for years in which needs are reported (i.e., 2010, 2020, 2030, 2040, 2050 and 2060).They are independent and distinct "what if" scenarios for each particular year and water shortages are assumed to be temporary events resulting from severe drought conditions combined with infrastructure limitations. In other words, growth occurs and future shocks are imposed on an economy at 10-year intervals and resultant impacts are measured. Given, that reported figures are not cumulative in nature, it is inappropriate to sum impacts over the entire planning horizon. Doing so, would imply that the analysis predicts that drought of record conditions will occur every ten years in the future, which is not the case. Similarly, authors of this report recognize that in many communities needs are driven by population growth, and in the future total population will exceed the amount of water available due to infrastructure limitations, regardless of whether or not there is a drought. This implies that infrastructure limitations would constrain economic growth. However, since needs as defined by planning rules are based upon water supply and demand under the assumption of drought of record conditions, it improper to conduct economic analysis that focuses on growth related impacts over the planning horizon. Figures generated from such an analysis would presume a 50-year drought of record, which is unrealistic. Estimating lost economic activity related to constraints on population and commercial growth due to lack of water would require developing water supply and demand forecasts under "normal" or "most likely" future climatic conditions.

3. While useful for planning purposes, this study is not a benefit-cost analysis. Benefit cost analysis is a tool widely used to evaluate the economic feasibility of specific policies or projects as opposed to estimating economic impacts of unmet water needs. Nevertheless, one could include some impacts measured in this study as part of a benefit cost study if done so properly. Since this is not a benefit cost analysis, future impacts are not weighted differently. In other words, estimates are not discounted. If used as a measure of economic benefits, one should incorporate a measure of uncertainty into the analysis. In this type of analysis, a typical method of discounting future values is to assign probabilities of the drought of record recurring again in a given year, and weight monetary impacts accordingly. This analysis assumes a probability of one.

4. IO multipliers measure the strength of backward linkages to supporting industries (i.e., those who sell inputs to an affected sector). However, multipliers say nothing about forward linkages consisting of businesses that purchase goods from an affected sector for further processing. For example, ranchers in many areas sell most of their animals to local meat packers who process animals into a form that consumers ultimately see in grocery stores and restaurants. Multipliers do not capture forward linkages to meat packers, and since meat packers sell livestock purchased from ranchers as "final sales," multipliers for the ranching sector do fully account for all losses to a region's economy. Thus, as mentioned previously, in some cases closely linked sectors were moved from one water use category to another.

5. Cautions regarding interpretations of direct and secondary impacts are warranted. IO/SAM multipliers are based on "fixed-proportion production functions," which basically means that input use - including labor - moves in lockstep fashion with changes in levels of output. In a

scenario where output (i.e., sales) declines, losses in the immediate sector or supporting sectors could be much less than predicted by an IO/SAM model for several reasons. For one, businesses will likely expect to continue operating so they might maintain spending on inputs for future use; or they may be under contractual obligations to purchase inputs for an extended period regardless of external conditions. Also, employers may not lay-off workers given that experienced labor is sometimes scarce and skilled personnel may not be readily available when water shortages subside. Lastly people who lose jobs might find other employment in the region. As a result, direct losses for employment and secondary losses in sales and employment should be considered an upper bound. Similarly, since projected population losses are based on reduced employment in the region, they should be considered an upper bound as well.

6. IO models are static. Models and resultant multipliers are based upon the structure of the U.S. and regional economies in 2006. In contrast, water shortages are projected to occur well into the future. Thus, the analysis assumes that the general structure of the economy remains the same over the planning horizon, and the farther out into the future we go, this assumption becomes less reliable.

7. Impacts are annual estimates. If one were to assume that conditions persisted for more than one year, figures should be adjusted to reflect the extended duration. The drought of record in most regions of Texas lasted several years.

8. Monetary figures are reported in constant year 2006 dollars.

1.1.2 Impacts to Agriculture

Irrigated Crop Production

The first step in estimating impacts to irrigation required calculating gross sales for IMPLAN crop sectors. Default IMPLAN data do not distinguish irrigated production from dry-land production. Once gross sales were known other statistics such as employment and income were derived using IMPLAN direct multiplier coefficients. Gross sales for a given crop are based on two data sources:

1) county-level statistics collected and maintained by the TWDB and the USDA Farm Services Agency (FSA) including the number of irrigated acres by crop type and water application per acre, and

2) regional-level data published by the Texas Agricultural Statistics Service (TASS) including prices received for crops (marketing year averages), crop yields and crop acreages.

Crop categories used by the TWDB differ from those used in IMPLAN datasets. To maintain consistency, sales and other statistics are reported using IMPLAN crop classifications. Table 1 shows the TWDB crops included in corresponding IMPLAN sectors, and Table 2 summarizes acreage and estimated annual water use for each crop classification (five-year average from 2003-2007). As shown in Table 2, the overwhelming majority of irrigation in Region H is for rice. Thus, in our analysis we disregard other crop types. Table 3 displays average (2003-2007) gross revenues per acre for rice production applied in the analysis.

Table 1: Crop Classifications Used in TWDB Water Use Survey and Corresponding IMPLAN Crop Sectors	
IMPLAN Category	**TWDB Category**
Oilseeds	Soybeans and “other oil crops”
Grains	Grain sorghum, corn, wheat and “other grain crops”
Vegetable and melons	“Vegetables” and potatoes
Tree nuts	Pecans
Fruits	Citrus, vineyard and other orchard
Cotton	Cotton
Sugarcane and sugar beets	Sugarcane and sugar beets
All “other” crops	“Forage crops”, peanuts, alfalfa, hay and pasture, rice and “all other crops”

Table 2: Summary of Irrigated Crop Acreage and Water Demand for the Region H Regional Water Planning Area (average 2003-2007)

Sector	Acres (1000s)	Distribution of Acres	Water Use (1000s of AF)	Distribution of Water Use
Oilseeds	1.0	2%	<1	<1%
Grains	<1	<1%	<1	<1%
Vegetable and melons	<1	<1%	<1	<1%
Tree nuts	<1	<1%	<1	<1%
Fruits	<1	<1%	<1	<1%
Cotton	0	0%	0	0%
Sugarcane and sugar beets	0	0%	0	0%
Rice	53	97%	291	99%
Total	55	100%	292	100%

Source: Water demand figures are a 5- year average (2003-2007) of the TWDB’s annual Irrigation Water Use Estimates. Statistics for irrigated crop acreage are based upon annual survey data collected by the TWDB and the Farm Service Agency. Values do not include acreage or water use for the TWDB categories classified by the Farm Services Agency as “failed acres,” “golf course” or “waste water.”

Table 3: Average Gross Sales Revenues per Acre for Irrigated Crops for the Region H Regional Water Planning Area (2003-2007)		
IMPLAN Sector	**Gross Revenues per Acre**	**Crops Included in Estimates**
All Other Crops	$570	Based on five-year (2003-2007) average weighted by acreage for "rice."
*Figures are rounded. Source: Based on data from the Texas Agricultural Statistics Service, Texas Water Development Board, and Texas A&M University.		

The following steps outline the overall process used to estimate direct impacts to irrigated agriculture:

1. *Distribute shortages across predominant crop types in the region*. Again, unmet water needs were distributed equally across crop sectors that constitute one percent or more of irrigated acreage.

2. *Estimate associated reductions in output for affected crop sectors*. Output reductions are based on elasticities discussed previously and on estimated values per acre for different crops. Values per acre stem from the same data used to estimate output for the year 2006 baseline. Using multipliers, we then generate estimates of forgone income, jobs, and tax revenues based on reductions in gross sales and final demand.

3. *Reduce sales revenues for forward processers in proportion to lost rice production*. As discussed in Section 1.1, input output models capture indirect losses to suppliers and other businesses that depend upon rice farming, but only those providing inputs to rice production. Multipliers do not capture potential impacts to forward processors, in this case rice mills, which add considerable value to the product and hence income and jobs to the state. For example, Texas rice farming directly generates about $60 to $80 in gross state product. Once the rice harvested it is sold to rice mills that process and resell the crop. This added value generates an additional $60 to $80 million in direct gross state product. Impacts measured in the study capture this additional value added.

Livestock

The approach used for the livestock sector is basically the same as that used for crop production. As is the case with crops, livestock categorizations used by the TWDB differ from those used in IMPLAN datasets, and TWDB groupings were assigned to a given IMPLAN sector (Table 4). Then we:

1) *Distribute projected water needs equally among predominant livestock sectors and estimate lost output*: As is the case with irrigation, shortages are assumed to affect all livestock sectors equally; however, the category of "other" is not included given its small size. If water needs were

small relative to total demands, we assume that producers would haul in water by truck to fill stock tanks. The cost per acre-foot ($24,000) is based on 2008 rates charged by various water haulers in Texas, and assumes that the average truck load is 6,500 gallons at a hauling distance of 60 miles.

3) *Estimate reduced output in forward processors for livestock sectors*. Reductions in output for livestock sectors are assumed to have a proportional impact on forward processors in the region such as meat packers. In other words, if the cows were gone, meat-packing plants or fluid milk manufacturers) would likely have little to process. This is not an unreasonable premise. Since the 1950s, there has been a major trend towards specialized cattle feedlots, which in turn has decentralized cattle purchasing from livestock terminal markets to direct sales between producers and slaughterhouses. Today, the meat packing industry often operates large processing facilities near high concentrations of feedlots to increase capacity utilization.[5] As a result, packers are heavily dependent upon nearby feedlots. For example, a recent study by the USDA shows that on average meat packers obtain 64 percent of cattle from within 75 miles of their plant, 82 percent from within 150 miles and 92 percent from within 250 miles.[6]

Table 4: Description of Livestock Sectors

IMPLAN Category	TWDB Category
Cattle ranching	Cattle, cow calf, feedlots and dairies
Poultry and egg production	Poultry production.
Other livestock	Livestock other than cattle and poultry (i.e., horses, goats, sheep, hogs)
Milk manufacturing	Fluid milk manufacturing, cheese manufacturing, ice cream manufacturing etc.
Meat packing	Meat processing present in the region from slaughter to final processing

1.1.3 Impacts to Municipal Water User Groups

Disaggregation of Municipal Water Demands

Estimating the economic impacts for the municipal water user groups is complicated for a number of reasons. For one, municipal use comprises a range of consumers including commercial businesses, institutions such as schools and government and households. However, reported water needs are not distributed among different municipal water users. In other words, how much of a municipal need is commercial and how much is residential (domestic)?

[5] Ferreira, W.N. "*Analysis of the Meat Processing Industry in the United States*." Clemson University Extension Economics Report ER211, January 2003.

[6] Ward, C.E. "*Summary of Results from USDA's Meatpacking Concentration Study*." Oklahoma Cooperative Extension Service, OSU Extension Facts WF-562.

The amount of commercial water use as a percentage of total municipal demand was estimated based on "GED" coefficients (gallons per employee per day) published in secondary sources.[7] For example, if year 2006 baseline data for a given economic sector (e.g., amusement and recreation services) shows employment at 30 jobs and the GED coefficient is 200, then average daily water use by that sector is (30 x 200 = 6,000 gallons) or 6.7 acre-feet per year. Water not attributed to commercial use is considered domestic, which includes single and multi-family residential consumption, institutional uses and all use designated as "county-other." Based on our analysis, commercial water use is about 5 to 35 percent of municipal demand. Less populated rural counties occupy the lower end of the spectrum, while larger metropolitan counties are at the higher end.

After determining the distribution of domestic versus commercial water use, we developed methods for estimating impacts to the two groups.

Domestic Water Uses

Input output models are not well suited for measuring impacts of shortages for domestic water uses, which make up the majority of the municipal water use category. To estimate impacts associated with domestic water uses, municipal water demand and needs are subdivided into residential, and commercial and institutional use. Shortages associated with residential water uses are valued by estimating proxy demand functions for different water user groups allowing us to estimate the marginal value of water, which would vary depending upon the level of water shortages. The more severe the water shortage, the more costly it becomes. For instance, a 2 acre-foot shortage for a group of households that use 10 acre-feet per year would not be as severe as a shortage that amounted to 8 acre-feet. In the case of a 2 acre-foot shortage, households would probably have to eliminate some or all outdoor water use, which could have implicit and explicit economic costs including losses to the horticultural and landscaping industry. In the case of an 8 acre-foot shortage, people would have to forgo all outdoor water use and most indoor water consumption. Economic impacts would be much higher in the latter case because people, and would be forced to find emergency alternatives assuming alternatives were available.

To estimate the value of domestic water uses, TWDB staff developed marginal loss functions based on constant elasticity demand curves. This is a standard and well-established method used by economists to value resources such as water that have an explicit monetary cost.

A constant price elasticity of demand is estimated using a standard equation:

$$w = kc^{(-\varepsilon)}$$

where:

- w is equal to average monthly residential water use for a given water user group measured in thousands of gallons;
- k is a constant intercept;

[7] Sources for GED coefficients include: Gleick, P.H., Haasz, D., Henges-Jeck, C., Srinivasan, V., Wolff, G. Cushing, K.K., and Mann, A. "*Waste Not, Want Not*: *The Potential for Urban Water Conservation in California*." Pacific Institute. November 2003. U.S. Bureau of the Census. 1982 Census of Manufacturers: Water Use in Manufacturing. USGPO, Washington D.C. See also: "*U.S. Army Engineer Institute for Water Resources, IWR Report 88-R-6.*," Fort Belvoir, VA. See also, Joseph, E. S., 1982, "*Municipal and Industrial Water Demands of the Western United States*." Journal of the Water Resources Planning and Management Division, Proceedings of the American Society of Civil Engineers, v. 108, no. WR2, p. 204-216. See also, Baumann, D. D., Boland, J. J., and Sims, J. H., 1981, "*Evaluation of Water Conservation for Municipal and Industrial Water Supply*." U.S. Army Corps of Engineers, Institute for Water Resources, Contract no. 82-C1.

- c is the average cost of water per 1,000 gallons; and
- ε is the price elasticity of demand.

Price elasticities (-0.30 for indoor water use and -0.50 for outdoor use) are based on a study by Bell et al.[8] that surveyed 1,400 water utilities in Texas that serve at least 1,000 people to estimate demand elasticity for several variables including price, income, weather etc. Costs of water and average use per month per household are based on data from the Texas Municipal League's annual water and wastewater rate surveys - specifically average monthly household expenditures on water and wastewater in different communities across the state. After examining variance in costs and usage, three different categories of water user groups based on population (population less than 5,000, cities with populations ranging from 5,000 to 99,999 and cities with populations exceeding 100,000) were selected to serve as proxy values for municipal water groups that meet the criteria (Table 5).[9]

Table 5: Water Use and Costs Parameters Used to Estimated Water Demand Functions
(average monthly costs per acre-foot for delivered water and average monthly use per household)

Community Population	Water	Wastewater	Total Monthly Cost	Avg. Monthly Use (gallons)
Less than or equal to 5,000	$1,335	$1,228	$2,563	6,204
5,000 to 100,000	$1,047	$1,162	$2,209	7,950
Great than or equal to 100,000	$718	$457	$1,190	8,409

Source: Based on annual water and wastewater rate surveys published by the Texas Municipal League.

As an example, Table 6 shows the economic impact per acre-foot of domestic water needs for municipal water user groups with population exceeding 100,000 people. There are several important assumptions incorporated in the calculations:

1) Reported values are net of the variable costs of treatment and distribution such as expenses for chemicals and electricity since using less water involves some savings to consumers and utilities alike; and for outdoor uses we do not include any value for wastewater.

2) Outdoor and “non-essential” water uses would be eliminated before indoor water consumption was affected, which is logical because most water utilities in Texas have drought contingency plans that generally specify curtailment or elimination of outdoor water use during droughts.[10] Determining how much water is used for outdoor purposes

[8] Bell, D.R. and Griffin, R.C. “*Community Water Demand in Texas as a Century is Turned*.” Research contract report prepared for the Texas Water Development Board. May 2006.

[9] Ideally, one would want to estimate demand functions for each individual utility in the state. However, this would require an enormous amount of time and resources. For planning purposes, we believe the values generated from aggregate data are more than sufficient.

[10] In Texas, state law requires retail and wholesale water providers to prepare and submit plans to the Texas Commission on Environmental Quality (TCEQ). Plans must specify demand management measures for use during drought including curtailment of

is based on several secondary sources. The first is a major study sponsored by the American Water Works Association, which surveyed cities in states including Colorado, Oregon, Washington, California, Florida and Arizona. On average across all cities surveyed 58 percent of single family residential water use was for outdoor activities. In cities with climates comparable to large metropolitan areas of Texas, the average was 40 percent.[11] Earlier findings of the U.S. Water Resources Council showed a national average of 33 percent. Similarly, the United States Environmental Protection Agency (USEPA) estimated that landscape watering accounts for 32 percent of total residential and commercial water use on annual basis.[12] A study conducted for the California Urban Water Agencies (CUWA) calculated average annual values ranging from 25 to 35 percent.[13] Unfortunately, there does not appear to be any comprehensive research that has estimated non-agricultural outdoor water use in Texas. As an approximation, an average annual value of 30 percent based on the above references was selected to serve as a rough estimate in this study.

3) As shortages approach 100 percent values become immense and theoretically infinite at 100 percent because at that point death would result, and willingness to pay for water is immeasurable. Thus, as shortages approach 80 percent of monthly consumption, we assume that households and non-water intensive commercial businesses (those that use water only for drinking and sanitation would have water delivered by tanker truck or commercial water delivery companies. Based on reports from water companies throughout the state, we estimate that the cost of trucking in water is around $21,000 to $27,000 per acre-feet assuming a hauling distance of between 20 to 60 miles. This is not an unreasonable assumption. The practice was widespread during the 1950s drought and recently during droughts in this decade. For example, in 2000 at the heels of three consecutive drought years Electra - a small town in North Texas - was down to its last 45 days worth of reservoir water when rain replenished the lake, and the city was able to refurbish old wells to provide supplemental groundwater. At the time, residents were forced to limit water use to 1,000 gallons per person per month - less than half of what most people use - and many were having water delivered to their homes by private contractors.[14] In 2003 citizens of Ballinger, Texas, were also faced with a dwindling water supply due to prolonged drought. After three years of drought, Lake Ballinger, which supplies water to more than 4,300 residents in Ballinger and to 600 residents in nearby Rowena, was almost dry. Each day, people lined up to get water from a well in nearby City Park. Trucks hauling trailers outfitted with large plastic and metal tanks hauled water to and from City Park to Ballinger.[15]

"non-essential water uses." Non-essential uses include, but are not limited to, landscape irrigation and water for swimming pools or fountains. For further information see the Texas Environmental Quality Code §288.20.

[11] See, Mayer, P.W., DeOreo, W.B., Opitz, E.M., Kiefer, J.C., Davis, W., Dziegielewski, D., Nelson, J.O. "*Residential End Uses of Water*." Research sponsored by the American Water Works Association and completed by Aquacraft, Inc. and Planning and Management Consultants, Ltd. (PMCL@CDM).

[12] U.S. Environmental Protection Agency. *"Cleaner Water through Conservation*." USEPA Report no. 841-B-95-002. April, 1995.

[13] Planning and Management Consultants, Ltd. "*Evaluating Urban Water Conservation Programs: A Procedures Manual*." Prepared for the California Urban Water Agencies. February 1992.

[14] Zewe, C. "*Tap Threatens to Run Dry in Texas Town*." July 11, 2000. CNN Cable News Network.

[15] Associated Press, "*Ballinger Scrambles to Finish Pipeline before Lake Dries Up*." May 19, 2003.

Table 6: Economic Losses Associated with Domestic Water Shortages in Communities with Populations Exceeding 100,000 people						
Water shortages as a percentage of total monthly household demands	**No. of gallons remaining per household per day**	**No of gallons remaining per person per day**	**Economic loss (per acre-foot)**		**Economic loss (per gallon)**	
1%	278	93	$748		$0.00005	
5%	266	89	$812		$0.0002	
10%	252	84	$900		$0.0005	
15%	238	79	$999		$0.0008	
20%	224	75	$1,110		$0.0012	
25%	210	70	$1,235		$0.0015	
30%[a]	196	65	$1,699		$0.0020	
35%	182	61	$3,825		$0.0085	
40%	168	56	$4,181		$0.0096	
45%	154	51	$4,603		$0.011	
50%	140	47	$5,109		$0.012	
55%	126	42	$5,727		$0.014	
60%	112	37	$6,500		$0.017	
65%	98	33	$7,493		$0.02	
70%	84	28	$8,818		$0.02	
75%	70	23	$10,672		$0.03	
80%	56	19	$13,454		$0.04	
85%	42	14	$18,091	($24,000)[b]	$0.05	($0.07)[b]
90%	28	9	$27,363	($24,000)	$0.08	($0.07)
95%	14	5	$55,182	($24,000)	$0.17	($0.07)
99%	3	0.9	$277,728	($24,000)	$0.85	($0.07)
99.9%	1	0.5	$2,781,377	($24,000)	$8.53	($0.07)
100%	0	0	Infinite	($24,000)	Infinite	($0.07)

[a] The first 30 percent of needs are assumed to be restrictions of outdoor water use; when needs reach 30 percent of total demands all outdoor water uses would be restricted. Needs greater than 30 percent include indoor use.

[b] As shortages approach 100 percent the value approaches infinity assuming there are not alternatives available; however, we assume that communities would begin to have water delivered by tanker truck at an estimated cost of $24,000 per acre-foot when shortages breached 85 percent.

Commercial Businesses

Effects of water shortages on commercial sectors were estimated in a fashion similar to other business sectors meaning that water shortages would affect the ability of these businesses to operate. This is particularly true for "water intensive" commercial sectors that are need large amounts of water (in addition to potable and sanitary water) to provide their services. These include:

- car-washes,
- laundry and cleaning facilities,
- sports and recreation clubs and facilities including race tracks,
- amusement and recreation services,
- hospitals and medical facilities,
- hotels and lodging places, and
- eating and drinking establishments.

A key assumption is that commercial operations would not be affected until water shortages were at least 50 percent of total municipal demand. In other words, we assume that residential water consumers would reduce water use including all non-essential uses before businesses were affected.

An example will illustrate the breakdown of municipal water needs and the overall approach to estimating impacts of municipal needs. Assume City A experiences an unexpected shortage of 50 acre-feet per year when their demands are 200 acre-feet per year. Thus, shortages are only 25 percent of total municipal use and residents of City A could eliminate needs by restricting landscape irrigation. City B, on the other hand, has a deficit of 150 acre-feet in 2020 and a projected demand of 200 acre-feet. Thus, total shortages are 75 percent of total demand. Emergency outdoor and some indoor conservation measures could eliminate 50 acre-feet of projected needs, yet 50 acre-feet would still remain. To eliminate" the remaining 50 acre-feet water intensive commercial businesses would have to curtail operations or shut down completely.

Three other areas were considered when analyzing municipal water shortages: 1) lost revenues to water utilities, 2) losses to the horticultural and landscaping industries stemming for reduction in water available for landscape irrigation, and 3) lost revenues and related economic impacts associated with reduced water related recreation.

Water Utility Revenues

Estimating lost water utility revenues was straightforward. We relied on annual data from the "*Water and Wastewater Rate Survey*" published annually by the Texas Municipal League to calculate an average value per acre-foot for water and sewer. For water revenues, average retail water and sewer rates multiplied by total water needs served as a proxy. For lost wastewater, total unmet needs were adjusted for return flow factor of 0.60 and multiplied by average sewer rates for the region. Needs reported as "county-other" were excluded under the presumption that these consist primarily of self-supplied water uses. In addition, 15 percent of water demand and needs are considered non-billed or "unaccountable" water that comprises things such as leakages and water for municipal government functions (e.g., fire departments). Lost tax receipts are based on current rates for the "miscellaneous gross receipts tax, "which the state collects from utilities located in most incorporated cities or towns in Texas. We do not include lost water utility revenues when aggregating impacts of municipal water shortages to regional and state levels to prevent double counting.

Horticultural and Landscaping Industry

The horticultural and landscaping industry, also referred to as the "green Industry," consists of businesses that produce, distribute and provide services associated with ornamental plants, landscape and garden supplies and equipment. Horticultural industries often face big losses during drought. For example, the recent drought in the Southeast affecting the Carolinas and Georgia horticultural and landscaping businesses had a harsh year. Plant sales were down, plant mortality increased, and watering costs increased. Many businesses were forced to close locations, lay off employees, and even file for bankruptcy. University of Georgia economists put statewide losses for the industry at around $3.2 billion during the 3-year drought that ended in 2008.[16] Municipal restrictions on outdoor watering play a significant role. During drought, water restrictions coupled with persistent heat has a psychological effect on homeowners that reduces demands for landscaping products and services. Simply put, people were afraid to spend any money on new plants and landscaping.

In Texas, there do not appear to be readily available studies that analyze the economic effects of water shortages on the industry. However, authors of this report believe negative impacts do and would result in restricting landscape irrigation to municipal water consumers. The difficulty in measuring them is two-fold. First, as noted above, data and research for these types of impacts that focus on Texas are limited; and second, economic data provided by IMPLAN do not disaggregate different sectors of the green industry to a level that would allow for meaningful and defensible analysis.[17]

Recreational Impacts

Recreational businesses often suffer when water levels and flows in rivers, springs and reservoirs fall significantly during drought. During droughts, many boat docks and lake beaches are forced to close, leading to big losses for lakeside business owners and local communities. Communities adjacent to popular river and stream destinations such as Comal Springs and the Guadalupe River also see their business plummet when springs and rivers dry up. Although there are many examples of businesses that have suffered due to drought, dollar figures for drought-related losses to the recreation and tourism industry are not readily available, and very difficult to measure without extensive local surveys. Thus, while they are important, economic impacts are not measured in this study.

Table 7 summarizes impacts of municipal water shortages at differing levels of magnitude, and shows the ranges of economic costs or losses per acre-foot of shortage for each level.

[16] Williams, D. *"Georgia landscapers eye rebound from Southeast drought."* Atlanta Business Chronicle, Friday, June 19, 2009

[17] Economic impact analyses prepared by the TWDB for 2006 regional water plans did include estimates for the horticultural industry. However, year 2000 and prior IMPLAN data were disaggregated to a finer level. In the current dataset (2006), the sector previously listed as "Landscaping and Horticultural Services" (IMPLAN Sector 27) is aggregated into "Services to Buildings and Dwellings" (IMPLAN Sector 458).

Table 7: Impacts of Municipal Water Shortages at Different Magnitudes of Shortages		
Water shortages as percent of total municipal demands	Impacts	Economic costs per acre-foot*
0-30%	✓ Lost water utility revenues ✓ Restricted landscape irrigation and non-essential water uses	$730 - $2,040
30-50%	✓ Lost water utility revenues ✓ Elimination of landscape irrigation and non-essential water uses ✓ Rationing of indoor use	$2,040 - $10,970
>50%	✓ Lost water utility revenues ✓ Elimination of landscape irrigation and non-essential water uses ✓ Rationing of indoor use ✓ Restriction or elimination of commercial water use ✓ Importing water by tanker truck	$10,970 - varies
*Figures are rounded		

1.1.4 Industrial Water User Groups

Manufacturing

Impacts to manufacturing were estimated by distributing water shortages among industrial sectors at the county level. For example, if a planning group estimates that during a drought of record water supplies in County A would only meet 50 percent of total annual demands for manufactures in the county, we reduced output for each sector by 50 percent. Since projected manufacturing demands are based on TWDB Water Uses Survey data for each county, we only include IMPLAN sectors represented in the TWBD survey database. Some sectors in IMPLAN databases are not part of the TWDB database given that they use relatively small amounts of water - primarily for on-site sanitation and potable purposes. To maintain consistency between IMPLAN and TWDB databases, Standard Industrial Classification (SIC) codes both databases were cross referenced in county with shortages. Non-matches were excluded when calculating direct impacts.

Mining

The process of mining is very similar to that of manufacturing. We assume that within a given county, shortages would apply equally to relevant mining sectors, and IMPLAN sectors are cross referenced with TWDB data to ensure consistency.

In Texas, oil and gas extraction and sand and gravel (aggregates) operations are the primary mining industries that rely on large volumes of water. For sand and gravel, estimated output reductions are straightforward; however, oil and gas is more complicated for a number of reasons. IMPLAN does not necessarily report the physical extraction of minerals by geographic local, but rather the sales revenues reported by a particular corporation.

For example, at the state level revenues for IMPLAN sector 19 (oil and gas extraction) and sector 27 (drilling oil and gas wells) totals $257 billion. Of this, nearly $85 billion is attributed to Harris County. However, only a very small fraction (less than one percent) of actual production takes place in the county. To measure actual potential losses in well head capacity due to water shortages, we relied on county level production data from the Texas Railroad Commission (TRC) and average well-head market prices for crude and gas to estimate lost revenues in a given county. After which, we used to IMPLAN ratios to estimate resultant losses in income and employment.

Other considerations with respect to mining include:

> 1) Petroleum and gas extraction industry only uses water in significant amounts for secondary recovery. Known in the industry as enhanced or water flood extraction, secondary recovery involves pumping water down injection wells to increase underground pressure thereby pushing oil or gas into other wells. IMPLAN output numbers do not distinguish between secondary and non-secondary recovery. To account for the discrepancy, county-level TRC data that show the proportion of barrels produced using secondary methods were used to adjust IMPLAN data to reflect only the portion of sales attributed to secondary recovery.
>
> 2) A substantial portion of output from mining operations goes directly to businesses that are classified as manufacturing in our schema. Thus, multipliers measuring backward linkages for a given manufacturer might include impacts to a supplying mining operation. Care was taken not to double count in such situations if both a mining operation and a manufacturer were reported as having water shortages.

Steam-electric

At minimum without adequate cooling water, power plants cannot safely operate. As water availability falls below projected demands, water levels in lakes and rivers that provide cooling water would also decline. Low water levels could affect raw water intakes and outfalls at electrical generating units in several ways. For one, power plants are regulated by thermal emission guidelines that specify the maximum amount of heat that can go back into a river or lake via discharged cooling water. Low water levels could result in permit compliance issues due to reduced dilution and dispersion of heat and subsequent impacts on aquatic biota near outfalls.[18] However, the primary concern would be a loss of head (i.e., pressure) over intake structures that would decrease flows through intake tunnels. This would affect safety related pumps, increase operating costs and/or result in sustained shut-downs. Assuming plants did shutdown, they would not be able to generate electricity.

[18] Section 316 (b) of the Clean Water Act requires that thermal wastewater discharges do not harm fish and other wildlife.

Among all water use categories steam-electric is unique and cautions are needed when applying methods used in this study. Measured changes to an economy using input-output models stem directly from changes in sales revenues. In the case of water shortages, one assumes that businesses will suffer lost output if process water is in short supply. For power generation facilities this is true as well. However, the electric services sector in IMPLAN represents a corporate entity that may own and operate several electrical generating units in a given region. If one unit became inoperable due to water shortages, plants in other areas or generation facilities that do not rely heavily on water such as gas powered turbines might be able to compensate for lost generating capacity. Utilities could also offset lost production via purchases on the spot market.[19] Thus, depending upon the severity of the shortages and conditions at a given electrical generating unit, energy supplies for local and regional communities could be maintained. But in general, without enough cooling water, utilities would have to throttle back plant operations, forcing them to buy or generate more costly power to meet customer demands.

Measuring impacts end users of electricity is not part of this study as it would require extensive local and regional level analysis of energy production and demand. To maintain consistency with other water user groups, impacts of steam-electric water shortages are measured in terms of lost revenues (and hence income) and jobs associated with shutting down electrical generating units.

1.2 Social Impacts of Water Shortages

As the name implies, the effects of water shortages can be social or economic. Distinctions between the two are both semantic and analytical in nature – more so analytic in the sense that social impacts are harder to quantify. Nevertheless, social effects associated with drought and water shortages are closely tied to economic impacts. For example, they might include:

- demographic effects such as changes in population,
- disruptions in institutional settings including activity in schools and government,
- conflicts between water users such as farmers and urban consumers,
- health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations),
- mental and physical stress (e.g., anxiety, depression, domestic violence),
- public safety issues from forest and range fires and reduced fire fighting capability,
- increased disease caused by wildlife concentrations,
- loss of aesthetic and property values, and
- reduced recreational opportunities.[20]

[19] Today, most utilities participate in large interstate “power pools” and can buy or sell electricity “on the grid” from other utilities or power marketers. Thus, assuming power was available to buy, and assuming that no contractual or physical limitations were in place such as transmission constraints; utilities could offset lost power that resulted from waters shortages with purchases via the power grid.

[20] Based on information from the website of the National Drought Mitigation Center at the University of Nebraska Lincoln. Available online at: http://www.drought.unl.edu/risk/impacts.htm. See also, Vanclay, F. “*Social Impact Assessment*.” in Petts, J. (ed) International Handbook of Environmental Impact Assessment. 1999.

Social impacts measured in this study focus strictly on demographic effects including changes in population and school enrollment. Methods are based on demographic projection models developed by the Texas State Data Center and used by the TWDB for state and regional water planning. Basically, the social impact model uses results from the economic component of the study and assesses how changes in labor demand would affect migration patterns in a region. Declines in labor demand as measured using adjusted IMPLAN data are assumed to affect net economic migration in a given regional water planning area. Employment losses are adjusted to reflect the notion that some people would not relocate but would seek employment in the region and/or public assistance and wait for conditions to improve. Changes in school enrollment are simply the proportion of lost population between the ages of 5 and 17.

2. Results

Section 2 presents the results of the analysis at the regional level. Included are baseline economic data for each water use category, and estimated economics impacts of water shortages for water user groups with reported deficits. According to the 2011 *Region H Regional Water Plan*, during severe drought irrigation, municipal, manufacturing, mining and steam-electric water user groups would experience water shortages in the absence of new water management strategies.

2.1 Overview of Regional Economy

On an annual basis, the Region H economy generates slightly more than $373 billion in gross state product for Texas ($342 billion in income and $31 billion in state and local business taxes) and supports 3,386,000 jobs (Table 8). Generating nearly $79 billion worth of income per year manufacturing (particularly petrochemical refining) is the primary base economic sector in the region and state.[21] Municipal sectors also generate substantial amounts of activity, nearly $212 billion per year in gross state product, and are major employers in the region. While municipal sectors are the largest employer and source of wealth, many businesses that make up the municipal category such as restaurants and retail stores are non-basic industries meaning they exist to provide services to people who work would in base industries such as manufacturing, agriculture and mining. In other words, without base industries such agriculture, many municipal jobs in the region would not exist.

[21] Base industries are those that supply markets outside of a region. These industries are crucial to the local economy and are called the economic base of a region. Appendix A shows how IMPLAN's 529 sectors were allocated to water use category, and shows economic data for each sector.

Table 8: The Region H Economy by Water User Group ($millions)[a]						
Water Use Category	**Total sales**	**Intermediate sales**	**Final sales**	**Jobs**	**Income**	**Business taxes**
Irrigation[b]	$401.01	$46.25	$354.76	966	$69.22	$3.73
Livestock	$1,812.22	$772.84	$1,039.38	15,033	$210.98	$17.29
Manufacturing	$377,287.75	$120,954.26	$256,333.49	493,526	$75,600.29	$2,527.00
Mining	$100,671.55	$69,837.10	$30,834.44	124,166	$56,104.32	$6,280.56
Steam-electric	$25,548.42	$7,187.34	$18,361.09	12,412	$17,800.89	$2,967.22
Municipal	$333,733.23	$116,264.88	$217,468.36	2,740,308	$192,557.01	$19,069.36
Regional total	$839,461.58	$315,061.19	$524,048.55	3,386,006	$342,302.00	$30,862.53

[a] Appendix 1 displays data for individual IMPLAN sectors that make up each water use category. Based on data from the Texas Water Development Board, and year 2006 data from the Minnesota IMPLAN Group, Inc.

[b] Irrigation includes activity for both rice farms and rice mills.

2.2 Impacts of Agricultural Water Shortages

According to the 2011 *Region H Regional Water Plan*, during severe drought the counties of Brazoria, Chambers, Galveston, Liberty, and Waller would experiences shortages of irrigation water without new management strategies. In 2010, shortages range from about 15 to 90 percent of annual irrigation demands. Shortages of these magnitudes would reduce gross state product (income plus state and local business taxes) by an estimated $68 million in 2010 and $61 million in 2060 with potential job losses ranging from 849 to 730. These figures include impacts to rice mills.

Table 9: Economic Impacts of Water Shortages for Irrigation Water User Groups ($millions)			
Decade	**Lost income from reduced rice production and milling activity [a]**	**Lost state and local tax revenues from reduced rice production and milling activity**	**Lost jobs from rice production and milling activity**
2010	$68.19	$7.89	849
2020	$62.37	$7.22	769
2030	$59.88	$6.93	739
2040	$58.65	$6.79	722
2050	$59.82	$6.92	726
2060	$61.15	$7.08	730

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.3 Impacts of Municipal Water Shortages

Water shortages are projected to occur in a significant number of communities in Region H. At the regional level, the estimated economic value of domestic water shortages totals $97 million in 2010 and $4,798 million in 2060 (Table 10). Municipal shortages would also restrict the operation of many commercial businesses reducing gross state product by an estimated $30 million in 2010 and $2,738 million in 2060.

Table 10: Economic Impacts of Water Shortages for Municipal Water User Groups ($millions)

Decade	Monetary value of domestic water shortages	Lost income from reduced commercial business activity*	Lost state and local taxes from reduced commercial business activity	Lost jobs from reduced commercial business activity	Lost water utility revenues
2010	$96.95	$26.40	$3.57	813	$78.89
2020	$312.58	$364.24	$40.51	8,583	$349.72
2030	$847.63	$1,297.19	$143.13	30,419	$535.20
2040	$1,581.98	$1,439.98	$162.99	34,850	$618.95
2050	$2,948.37	$2,089.60	$226.17	48,039	$726.54
2060	$4,810.50	$2,520.56	$272.38	57,821	$905.55

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.4 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in Brazoria, Chambers, Fort Bend, Harris, Leon, Liberty, Madison, Montgomery, San Jacinto, Walker, and Waller. The Region H planning group estimates that these manufacturers would be short nearly 75,000 acre-feet of water in 2010 and 253,000 acre-feet in 2060. Shortages of these magnitudes would reduce gross state product (income plus taxes) by an estimated $2,939 million in 2010 and $12,199 million in 2060 (Table 11).

Table 11: Economic Impacts of Water Shortages for Manufacturing Water User Groups ($millions)			
Decade	**Lost income due to reduced manufacturing output**	**Lost state and local business tax revenues due to reduced manufacturing output**	**Lost jobs due to reduced manufacturing output**
2010	$2,732.37	$263.52	16,765
2020	$4,049.18	$388.78	25,236
2030	$7,425.93	$701.18	46,038
2040	$8,772.39	$831.23	54,765
2050	$9,992.81	$946.84	62,577
2060	$11,240.68	$1,076.53	71,341

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.5 Impacts of Mining Water Shortages

Ming water shortages in the region are projected to occur in Harris, Liberty, Montgomery and Polk counties, and would primarily affect the oil and gas and aggregates operations. In total, shortages would reduce gross state product by $35 million in 2010 and $233 million in 2060 (Table 12).

Table 12: Economic Impacts of Water Shortages for Mining Water User Groups ($millions)			
Decade	**Lost income due to reduced mining output**	**Lost state and local business tax revenues due to reduced mining output**	**Lost jobs due to reduced mining output**
2010	$35.39	$3.42	619
2020	$61.78	$5.94	1,048
2030	$84.50	$8.15	1,390
2040	$101.86	$9.79	1,659
2050	$204.68	$19.78	3,472
2060	$233.81	$22.46	3,916

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.6 Impacts of Steam-electric Water Shortages

Water shortages for steam-electric water user groups are projected to occur in Fort Bend, Galveston, Harris, Liberty, and Montgomery counties, and would reduce gross state product by $380 million dollars in 2010, and $5,238 million 2060 (Table 13).

Table 13: Economic Impacts of Water Shortages for Steam-electric Water User Groups ($millions)

Decade	Lost income due to reduced electrical generation	Lost state and local business tax revenues due to reduced electrical generation	Lost jobs due to reduced electrical generation
2010	$332.33	$47.70	1,130
2020	$650.93	$93.43	2,213
2030	$1,144.78	$164.32	3,892
2040	$2,537.55	$364.23	8,626
2050	$3,411.75	$489.70	11,598
2060	$4,580.79	$657.50	15,572

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to Gross Domestic Product measured at the state rather than national level.

2.7 Social Impacts of Water Shortages

As discussed previously, estimated social impacts focus on changes in population and school enrollment. In 2010, estimated population losses total 24,433 with corresponding reductions in school enrollment of 6,891 students (Table 14). In 2060, population in the region would decline by 175,389 people and school enrollment would fall by 32,522 students.

Table 14: Social Impacts of Water Shortages (2010-2060)

Year	Population Losses	Declines in School Enrollment
2010	24,433	6,891
2020	45,514	12,913
2030	99,071	26,242
2040	122,686	22,674
2050	152,028	28,078
2060	175,839	32,522

2.8 Distribution of Impacts by Major River Basin

Administrative rules require that impacts are presented by both planning region and major river basin. To meet rule requirements, impacts were allocated among basins based on the distribution of water shortages in relevant basins. For example, if 50 percent of water shortages in River Basin A and 50 percent occur in River Basin B, then impacts were split equally among the two basins. Table 15 displays the results.

Table 15: Distribution of Impacts by Major River Basin (2010-2060)

Water Use	2010	2020	2030	2040	2050	2060
Irrigation						
Brazos	2%	1%	1%	1%	1%	1%
Brazos-Colorado	1%	1%	1%	1%	1%	1%
Neches	1%	1%	1%	1%	1%	1%
San Jacinto	0%	<1%	0%	<1%	1%	2%
San Jacinto-Brazos	72%	70%	68%	67%	65%	63%
Trinity	18%	19%	21%	23%	24%	24%
Trinity-San Jacinto	7%	8%	8%	8%	8%	8%
Manufacturing						
Brazos	52%	61%	60%	60%	60%	63%
Brazos-Colorado	0%	<1%	<1%	<1%	<1%	<1%
San Jacinto	1%	1%	2%	2%	2%	2%
San Jacinto-Brazos	6%	8%	12%	14%	15%	14%
Trinity	0%	1%	1%	1%	1%	1%
Trinity-San Jacinto	42%	29%	26%	24%	23%	20%
Mining						
Brazos	0%	3%	4%	3%	3%	3%
Brazos-Colorado	0%	5%	5%	6%	6%	6%
Neches Trinity	2%	2%	2%	2%	2%	2%
San Jacinto	4%	5%	6%	6%	6%	6%
San Jacinto-Brazos	<1%	2%	6%	6%	6%	5%
Trinity	72%	64%	59%	60%	59%	59%
Trinity-San Jacinto	21%	19%	17%	18%	19%	19%
Municipal						
Brazos	<1%	2%	4%	6%	7%	8%
Brazos-Colorado	4%	1%	1%	1%	1%	<1%
Colorado	0%	<1%	<1%	<1%	<1%	<1%
Neches	0%	<1%	<1%	<1%	<1%	<1%
Neches-Trinity	<1%	<1%	<1%	<1%	<1%	<1%
San Jacinto	71%	85%	81%	77%	74%	73%
San Jacinto-Brazos	23%	10%	13%	15%	17%	17%
Trinity	2%	1%	1%	1%	1%	1%
Trinity-San Jacinto	<1%	<1%	<1%	<1%	<1%	<1%

Table continued on following page.

Table 15: Distribution of Impacts by Major River Basin (continued from previous page)						
Water Use	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Steam-electric power						
Brazos	88%	14%	14%	13%	12%	10%
San Jacinto-Brazos	12%	11%	9%	7%	6%	5%
San Jacinto	0%	65%	67%	68%	70%	61%
Trinity	0%	10%	11%	12%	11%	9%

Appendix 1: Economic Data for Individual IMPLAN Sectors

Economic Data for Agricultural Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Irrigation	Rice milling	49	$351.85	$2.69	$349.15	577	$45.17	$2.78
Irrigation	Rice ("all other crop farming")	10	$49.16	$43.55	$5.61	389	$24.06	$0.95
Irrigation	Fruit farming	5	$4.10	0.87	3.23	92	$2.33	$0.09
Irrigation	Vegetable and melon farming	3	$1.28	0.05	1.23	21	$0.94	$0.01
Irrigation	Tree nut farming	4	$1.03	0.05	0.98	16	$0.72	$0.03
Irrigation	Grain farming	6	$0.99	0.25	0.74	43	$0.46	$0.02
Irrigation	Total irrigation	NA	$56.56	$44.77	$11.79	561	$28.51	$1.10
Irrigation	Non-irrigated crops	various	$342.84	$90.91	$251.93	7,723	$239.52	$65.69
Irrigation	Total crop production	NA	$455.97	$180.46	$275.51	8,845	$296.53	$67.89
Livestock	Meat processed from carcasses	68	$646.65	$190.77	$455.88	1,473	$71.87	$3.77
Livestock	Cattle ranching and farming	11	$408.82	$283.48	$125.35	9,382	$32.30	$8.60
Livestock	Fluid milk manufacturing	62	$330.75	$79.57	$251.18	576	$27.71	$1.69
Livestock	Cheese manufacturing	64	$174.09	$72.10	$101.99	236	$12.04	$1.09
Livestock	Poultry and egg production	12	$78.31	$61.37	$16.94	453	$26.39	$0.27
Livestock	Animal- except poultry- slaughtering	67	$57.66	$15.42	$42.25	139	$9.83	$0.39
Livestock	Animal production- except cattle and poultry	13	$53.43	$45.31	$8.13	2,622	$5.19	$0.83
Livestock	Poultry processing	70	$40.62	$12.93	$27.70	123	$16.62	$0.44
Livestock	Rendering and meat byproduct processing	69	$21.32	$11.83	$9.49	28	$8.82	$0.23
Livestock	Creamery butter manufacturing	63	$0.56	$0.06	$0.50	1	$0.23	$0.001
Total livestock		NA	$1,812.22	$772.84	$1,039.38	15,033	$210.98	$17.29

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Economic Data for Mining and Steam-electric Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Mining	Oil and gas extraction	19	$71,360.84	$66,271.93	$5,088.91	80,231	$41,061.13	$4,313.45
Mining	Drilling oil and gas wells	27	$15,338.84	$76.56	$15,262.27	19,088	$5,682.63	$749.02
Mining	Support activities for oil and gas operations	28	$7,764.77	$1,078.50	$6,686.27	19,751	$7,042.02	$316.89
Mining	Natural gas distribution	31	$5,774.59	$2,314.45	$3,460.14	3,524	$2,105.92	$873.61
Mining	Coal mining	20	$170.63	$63.94	$106.69	440	$66.31	$20.40
Mining	Sand- gravel- clay- and refractory mining	25	$143.01	$15.09	$127.92	719	$84.81	$4.14
Mining	Other nonmetallic mineral mining	26	$89.78	$8.98	$80.80	351	$44.69	$2.51
Mining	Support activities for other mining	29	$13.64	$0.20	$13.44	17	$9.69	$0.08
Mining	Gold- silver- and other metal ore mining	23	$10.48	$5.85	$4.63	30	$4.44	$0.36
Mining	Stone mining and quarrying	24	$3.20	$0.33	$2.87	10	$1.89	$0.02
Mining	Copper- nickel- lead- and zinc mining	22	$1.36	$1.26	$0.10	4	$0.65	$0.07
	Total mining		$100,671.55	$69,837.10	$30,834.44	124,166	$56,104.32	$6,280.56
Steam-electric	Power generation and supply	30	$25,548.42	$7,187.34	$18,361.09	12,412	$17,800.89	$2,967.22

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Economic Data for Manufacturing Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Manufacturing	Petrochemical manufacturing	147	$130,689.99	$59,878.02	$70,811.97	16,007	$15,106.03	$858.08
Manufacturing	Petroleum refineries	142	$111,335.06	$41,383.30	$69,951.75	11,584	$16,861.18	$645.91
Manufacturing	Electronic computer manufacturing	302	$17,825.77	$4,149.41	$13,676.36	7,073	$1,215.14	$95.08
Manufacturing	New residential 1-unit structures- all	33	$14,072.59	$0.02	$14,072.57	86,401	$5,311.90	$83.61
Manufacturing	Oil and gas field machinery and equipment	261	$9,925.65	$369.64	$9,556.01	24,970	$3,065.70	$62.70
Manufacturing	Commercial and institutional buildings	38	$8,348.60	$0.00	$8,348.59	75,325	$4,552.64	$56.09
Manufacturing	Other basic organic chemical manufacturing	151	$7,337.98	$1,368.11	$5,969.86	5,934	$1,492.89	$60.26
Manufacturing	Plastics material and resin manufacturing	152	$7,252.15	$287.19	$6,964.96	4,644	$1,755.50	$56.96
Manufacturing	Other new construction	41	$3,676.19	$0.01	$3,676.20	34,557	$2,111.29	$16.61
Manufacturing	Pesticide and other agricultural chemical man	159	$2,696.36	$451.80	$2,244.56	1,361	$1,020.88	$17.86
Manufacturing	New residential additions and alterations-all	35	$2,040.72	$0.02	$2,040.70	10,284	$842.21	$11.88
Manufacturing	Industrial gas manufacturing	148	$1,899.82	$998.97	$900.84	1,682	$809.22	$12.23
Manufacturing	Metal valve manufacturing	248	$1,852.57	$200.63	$1,651.95	5,927	$892.57	$11.56
Manufacturing	Highway- street- bridge- and tunnel construct	39	$1,800.58	$0.00	$1,800.59	14,585	$975.02	$12.42
Manufacturing	Other miscellaneous chemical product manufacturing	171	$1,657.38	$867.12	$790.26	2,996	$512.28	$13.09
Manufacturing	New multifamily housing structures- all	34	$1,606.21	$0.00	$1,606.20	12,556	$819.77	$4.74
Manufacturing	Automobile and light truck manufacturing	344	$1,588.93	$1.70	$1,587.23	1,130	$141.73	$4.59
Manufacturing	Guided missile and space vehicle manufacturing	354	$1,543.80	$75.00	$1,468.80	3,564	$534.45	$6.38
Manufacturing	Pharmaceutical and medicine manufacturing	160	$1,451.15	$265.20	$1,185.95	1,700	$355.77	$8.11
Manufacturing	Water- sewer- and pipeline construction	40	$1,285.08	$0.01	$1,285.10	9,543	$625.45	$9.03
Manufacturing	Soft drink and ice manufacturing	85	$1,251.40	$69.90	$1,181.50	1,836	$253.95	$11.25
Manufacturing	Other basic inorganic chemical manufacturing	150	$1,230.88	$271.19	$959.69	1,873	$493.21	$5.39
Manufacturing	Plate work manufacturing	234	$1,173.25	$73.85	$1,099.40	4,225	$516.20	$6.72
Manufacturing	Plastics pipe- fittings- and profile shapes	173	$1,114.96	$685.80	$429.16	2,673	$397.37	$9.02
Manufacturing	Machine shops	243	$1,103.43	$266.31	$837.12	7,136	$567.99	$9.09
Manufacturing	Paint and coating manufacturing	161	$1,079.49	$13.73	$1,065.76	1,683	$256.74	$6.18
Manufacturing	Semiconductors and related device manufacturing	311	$1,035.36	$551.05	$484.31	1,142	$225.39	$6.37
Manufacturing	Fabricated pipe and pipe fitting manufacturing	252	$1,032.18	$116.61	$915.57	4,508	$444.76	$6.14
Manufacturing	All other manufacturing		$38,380.24	$8,609.73	$29,770.51	136,627	$13,443.08	$419.66
Manufacturing	Total manufacturing		$377,287.75	$120,954.26	$256,333.49	493526	$75,600.29	$2,527.00

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Economic Data for Municipal Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Municipal	Wholesale trade	390	$33,539.00	$16,057.24	$17,481.76	160,611	$17,653.96	$4,964.22
Municipal	Real estate	431	$25,137.80	$9,950.90	$15,186.91	121,747	$14,545.48	$3,095.94
Municipal	Owner-occupied dwellings	509	$21,656.85	-$0.01	$21,656.86	0	$16,776.87	$2,560.80
Municipal	Architectural and engineering services	439	$14,855.13	$9,364.16	$5,490.97	106,669	$8,524.77	$70.68
Municipal	State & Local Education	503	$11,107.95	$0.01	$11,107.94	236,560	$11,107.95	$0.00
Municipal	Food services and drinking places	481	$9,823.10	$1,254.40	$8,568.71	185,919	$4,340.10	$507.03
Municipal	Pipeline transportation	396	$9,578.11	$4,188.82	$5,389.29	6,791	$3,971.45	$849.62
Municipal	Monetary authorities and depository credit in	430	$9,078.09	$2,989.90	$6,088.19	33,849	$6,374.76	$116.14
Municipal	Offices of physicians- dentists- and other he	465	$8,010.08	$0.00	$8,010.08	64,239	$5,711.95	$50.07
Municipal	Hospitals	467	$7,955.92	$0.00	$7,955.92	65,074	$4,408.69	$56.20
Municipal	Telecommunications	422	$6,823.45	$2,343.73	$4,479.72	18,481	$2,848.73	$474.82
Municipal	Legal services	437	$6,720.69	$4,265.34	$2,455.35	43,458	$4,334.35	$134.97
Municipal	Air transportation	391	$5,966.11	$664.50	$5,301.61	24,528	$2,034.40	$256.18
Municipal	Truck transportation	394	$5,714.00	$3,093.97	$2,620.04	49,614	$2,346.61	$53.82
Municipal	Insurance carriers	427	$5,645.46	$1,646.20	$3,999.26	22,867	$1,994.24	$247.20
Municipal	State & Local Non-Education	504	$5,631.04	$0.00	$5,631.05	81,782	$5,631.04	$0.00
Municipal	Office administrative services	452	$5,538.55	$2,463.92	$3,074.63	22,568	$3,263.33	$56.26
Municipal	Motor vehicle and parts dealers	401	$5,042.54	$548.32	$4,494.22	41,078	$2,626.84	$743.26
Municipal	Cable networks and program distribution	421	$4,748.61	$1,127.36	$3,621.25	5,132	$1,587.48	$87.12
Municipal	All other miscellaneous professional and tech	450	$4,657.77	$4,158.57	$499.20	8,112	$1,884.06	$37.77
Municipal	Management of companies and enterprises	451	$4,541.85	$4,271.19	$270.66	27,749	$2,386.75	$38.10
Municipal	Securities- commodity contracts- investments	426	$4,341.56	$2,883.19	$1,458.36	25,729	$2,234.36	$65.37
Municipal	Management consulting services	444	$4,224.70	$3,252.06	$972.64	29,572	$2,251.86	$17.49
Municipal	Scenic and sightseeing transportation and sup	397	$3,844.57	$1,442.33	$2,402.24	26,914	$2,610.03	$443.86
Municipal	Insurance agencies and brokerages	428	$3,642.87	$2,137.73	$1,505.14	24,528	$3,089.52	$19.51
Municipal	All other municipal	NA	$105,907.43	$38,161.04	$67,746.39	1,306,737	$58,017.46	$4,122.92
Municipal	Total municipal	NA	$333,733.23	$116,264.88	$217,468.36	2,740,308	$192,557.01	$19,069.36

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Appendix 2: Impacts by Water User Group

Irrigation ($millions)						
	2010	2020	2030	2040	2050	2060
Brazoria County						
Reduced income from curtailed rice production and milling activity	$57.80	$51.41	$48.95	$47.48	$47.48	$47.48
Reduced business taxes from curtailed rice production and milling activity	$6.69	$5.95	$5.67	$5.50	$5.50	$5.50
Reduced jobs from curtailed rice production and milling activity	762	678	646	626	626	626
Chambers County						
Reduced income from curtailed rice production and milling activity	$3.79	$3.82	$3.84	$3.85	$3.87	$3.88
Reduced business taxes from curtailed rice production and milling activity	$0.44	$0.44	$0.44	$0.45	$0.45	$0.45
Reduced jobs from curtailed rice production and milling activity	0	0	0	0	0	0
Galveston County						
Reduced income from curtailed rice production and milling activity	$5.14	$5.14	$5.14	$5.14	$5.14	$5.14
Reduced business taxes from curtailed rice production and milling activity	$0.59	$0.59	$0.59	$0.59	$0.59	$0.59
Reduced jobs from curtailed rice production and milling activity	68	68	68	68	68	68
Liberty County						
Reduced income from curtailed rice production and milling activity	$1.46	$1.74	$1.95	$2.18	$2.45	$2.75
Reduced business taxes from curtailed rice production and milling activity	$0.17	$0.20	$0.23	$0.25	$0.28	$0.32
Reduced jobs from curtailed rice production and milling activity	19	23	26	29	32	36
Waller County						
Reduced income from curtailed rice production and milling activity	$0.00	$0.27	$0.00	$0.01	$0.89	$1.90
Reduced business taxes from curtailed rice production and milling activity	$0.00	$0.03	$0.00	$0.00	$0.10	$0.22
Reduced jobs from curtailed rice production and milling activity	0	0	0	0	0	0

Manufacturing ($millions)						
	2010	2020	2030	2040	2050	2060
Austin County						
Reduced income from reduced manufacturing output	$0.00	$11.86	$22.17	$31.96	$40.21	$106.20
Reduced business taxes from reduced manufacturing output	$0.00	$1.07	$2.00	$2.89	$3.63	$9.59
Reduced jobs from reduced manufacturing output	0	139	260	375	472	1,246
Brazoria County						
Reduced income from reduced manufacturing output	$700.34	$1,470.14	$3,790.98	$4,648.20	$5,408.39	$6,327.48
Reduced business taxes from reduced manufacturing output	$74.51	$156.40	$403.31	$494.51	$575.38	$673.16
Reduced jobs from reduced manufacturing output	4,548	9,546	24,616	30,183	35,119	41,087
Chambers County						
Reduced income from reduced manufacturing output	$1,705.29	$1,944.04	$2,156.17	$2,367.47	$2,557.52	$2,803.08
Reduced business taxes from reduced manufacturing output	$162.69	$185.46	$205.70	$225.86	$243.99	$267.42
Reduced jobs from reduced manufacturing output	9,989	11,388	12,630	13,868	14,981	16,420
Fort Bend County						
Reduced income from reduced manufacturing output	$0.00	$74.25	$593.24	$635.04	$662.78	$583.42
Reduced business taxes from reduced manufacturing output	$0.00	$2.98	$23.83	$25.51	$26.63	$23.44
Reduced jobs from reduced manufacturing output	0	242	1,935	2,071	2,162	1,903
Harris County						
Reduced income from reduced manufacturing output	$301.80	$413.05	$507.94	$591.82	$654.59	$623.10
Reduced business taxes from reduced manufacturing output	$24.43	$33.44	$41.12	$47.91	$52.99	$50.44
Reduced jobs from reduced manufacturing output	1,978	2,707	3,329	3,879	4,290	4,084
Leon County						
Reduced income from reduced manufacturing output	$0.00	$10.18	$20.12	$60.27	$78.40	$95.25
Reduced business taxes from reduced manufacturing output	$0.00	$0.62	$1.22	$3.66	$4.76	$5.78
Reduced jobs from reduced manufacturing output	0	51	101	304	395	480
Liberty County						
Reduced income from reduced manufacturing output	$0.00	$13.93	$27.86	$42.18	$110.29	$132.73
Reduced business taxes from reduced manufacturing output	$0.00	$0.45	$0.91	$1.37	$3.59	$4.32
Reduced jobs from reduced manufacturing output	0	45	91	138	360	433

Manufacturing (cont.)						
	2010	2020	2030	2040	2050	2060
Madison County						
Reduced income from reduced manufacturing activity	$0.00	$0.52	$1.00	$1.48	$1.91	$4.93
Reduced business taxes from reduced manufacturing activity	$0.00	$0.02	$0.04	$0.07	$0.09	$0.22
Reduced jobs from reduced manufacturing activity	0	6	12	18	23	59
Montgomery County						
Reduced income from reduced manufacturing activity	$24.95	$105.12	$294.50	$373.66	$453.03	$532.83
Reduced business taxes from reduced manufacturing activity	$1.90	$8.00	$22.42	$28.44	$34.48	$40.56
Reduced jobs from reduced manufacturing activity	250	1,054	2,952	3,745	4,541	5,341
San Jacinto County						
Reduced income from reduced manufacturing activity	$0.00	$0.04	$0.08	$0.12	$0.15	$0.20
Reduced business taxes from reduced manufacturing activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Reduced jobs from reduced manufacturing activity	0	0	0	1	1	1
Walker Bend County						
Reduced income from reduced manufacturing activity	$0.00	$1.42	$2.97	$7.03	$8.52	$10.17
Reduced business taxes from reduced manufacturing activity	$0.00	$0.05	$0.10	$0.23	$0.28	$0.34
Reduced jobs from reduced manufacturing activity	0	11	24	56	68	82
Waller County						
Reduced income from reduced manufacturing activity	$0.00	$4.64	$8.90	$13.16	$17.03	$21.28
Reduced business taxes from reduced manufacturing activity	$0.00	$0.28	$0.53	$0.78	$1.01	$1.27
Reduced jobs from reduced manufacturing activity	0	45	87	128	166	207

Mining ($millions)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Harris County						
Reduced income from reduced mining activity	$0.68	$1.41	$1.86	$4.63	$5.55	$6.36
Reduced business taxes from reduced mining activity	$0.05	$0.11	$0.14	$0.35	$0.41	$0.47
Reduced jobs from reduced mining activity	4	9	11	28	34	39
Liberty County						
Reduced income from reduced mining activity	$0.00	$1.23	$2.28	$3.25	$4.35	$5.51
Reduced business taxes from reduced mining activity	$0.00	$0.16	$0.30	$0.43	$0.58	$0.74
Reduced jobs from reduced mining activity	0	45	83	118	159	201
Montgomery County						
Reduced income from reduced mining activity	$0.65	$2.55	$6.59	$7.82	$9.03	$10.04
Reduced business taxes from reduced mining activity	$0.06	$0.25	$0.64	$0.76	$0.87	$0.97
Reduced jobs from reduced mining activity	11	22	29	34	40	44
Polk County						
Reduced income from reduced mining activity	$0.00	$0.001	$0.002	$0.002	$0.003	$0.003
Reduced business taxes from reduced mining activity	$0.00	$0.0001	$0.0001	$0.0001	$0.0002	$0.0002
Reduced jobs from reduced mining activity	0	0	0	0	0	0

Steam-electric ($millions)

	2010	2020	2030	2040	2050	2060
Fort Bend County						
Reduced income from reduced electrical generation	$0.00	$0.00	$0.00	$0.00	$0.00	$103.48
Reduced business taxes from reduced electrical generation	$0.00	$0.00	$0.00	$0.00	$0.00	$14.85
Reduced jobs from reduced electrical generation	0	0	0	0	0	352
Galveston County						
Reduced income from reduced electrical generation	$321.83	$102.30	$282.56	$377.52	$493.37	$634.48
Reduced business taxes from reduced electrical generation	$46.19	$14.68	$40.56	$54.19	$70.82	$91.07
Reduced jobs from reduced electrical generation	1,094	348	961	1,283	1,677	2,157
Harris County						
Reduced income from reduced electrical generation	$10.49	$501.07	$713.74	$1,945.92	$2,577.91	$3,348.21
Reduced business taxes from reduced electrical generation	$1.51	$71.92	$102.45	$279.31	$370.02	$480.58
Reduced jobs from reduced electrical generation	36	1,703	2,426	6,615	8,763	11,382
Liberty County						
Reduced income from reduced electrical generation	$0.00	$47.56	$148.48	$213.53	$292.79	$389.47
Reduced business taxes from reduced electrical generation	$0.00	$6.83	$21.31	$30.65	$42.03	$55.90
Reduced jobs from reduced electrical generation	0	162	505	726	995	1,324
Montgomery County						
Reduced income from reduced electrical generation	$0.00	$0.00	$0.00	$0.59	$47.69	$105.16
Reduced business taxes from reduced electrical generation	$0.00	$0.00	$0.00	$0.08	$6.85	$15.09
Reduced jobs from reduced electrical generation	0	0	0	2	162	357

Municipal ($millions)

	2010	2020	2030	2040	2050	2060
Alvin						
Monetary value of domestic water shortages	$0.00	$0.16	$0.32	$0.44	$0.80	$1.09
Lost utility revenues	$0.00	$0.31	$0.58	$0.79	$1.14	$1.55
Ames						
Monetary value of domestic water shortages	$0.00	$0.03	$0.07	$0.12	$0.76	$1.12
Lost utility revenues	$0.00	$0.04	$0.08	$0.12	$0.17	$0.22
Angleton						
Monetary value of domestic water shortages	$0.32	$0.33	$0.35	$0.35	$0.42	$0.58
Lost utility revenues	$0.51	$0.52	$0.55	$0.57	$0.67	$0.83
Arcola						
Monetary value of domestic water shortages	$0.00	$1.17	$4.90	$5.56	$6.43	$8.83
Lost income from reduced commercial business activity	$0.00	$0.00	$0.12	$0.15	$0.19	$0.24
Lost jobs due to reduced commercial business activity	0	0	5	6	8	10
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.02	$0.02	$0.03	$0.04
Lost utility revenues	$0.00	$0.26	$0.56	$0.64	$0.74	$0.86
Bailey's Prairie						
Monetary value of domestic water shortages	$0.00	$0.01	$0.07	$0.13	$0.23	$0.02
Lost utility revenues	$0.00	$0.01	$0.01	$0.02	$0.02	$0.03
Beach City						
Monetary value of domestic water shortages	$3.82	$7.01	$8.99	$10.87	$12.77	$14.64
Lost income from reduced commercial business activity	$0.26	$0.41	$0.55	$0.67	$0.80	$0.93
Lost jobs due to reduced commercial business activity	10	17	22	27	32	38
Lost state and local taxes from reduced commercial business activity	$0.04	$0.06	$0.09	$0.10	$0.12	$0.14
Lost utility revenues	$0.45	$0.64	$0.82	$0.97	$1.13	$1.30
Beasley						
Monetary value of domestic water shortages	$0.00	$0.01	$0.04	$0.09	$0.58	$0.99
Lost utility revenues	$0.00	$0.02	$0.05	$0.08	$0.13	$0.18

Municipal (cont.)	2010	2020	2030	2040	2050	2060
Bellaire						
Monetary value of domestic water shortages	$0.35	$7.38	$8.64	$8.50	$8.41	$8.41
Lost income from reduced commercial business activity	$0.00	$2.60	$3.21	$3.16	$3.12	$3.12
Lost jobs due to reduced commercial business activity	0	82	101	100	98	98
Lost state and local taxes from reduced commercial business activity	$0.00	$0.37	$0.46	$0.45	$0.45	$0.45
Lost utility revenues	$3.07	$3.55	$4.02	$4.52	$5.05	$5.63
Belleville						
Monetary value of domestic water shortages	$0.00	$0.37	$0.77	$0.92	$3.27	$4.02
Lost utility revenues	$0.00	$0.52	$0.86	$1.04	$1.13	$1.28
Blue Manor Utility Co.						
Monetary value of domestic water shortages	$0.35	$7.38	$8.64	$8.50	$8.41	$8.41
Lost income from reduced commercial business activity	$0.00	$2.60	$3.21	$3.16	$3.12	$3.12
Lost jobs due to reduced commercial business activity	0	82	101	100	98	98
Lost state and local taxes from reduced commercial business activity	$0.00	$0.37	$0.46	$0.45	$0.45	$0.45
Lost utility revenues	$0.34	$0.78	$0.88	$0.87	$0.86	$0.86
Brazoria MUD #1						
Monetary value of domestic water shortages	$0.00	$4.08	$16.92	$16.17	$25.56	$33.73
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$2.87	$4.32	$11.70
Lost jobs due to reduced commercial business activity	0	0	0	90	136	369
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.41	$0.62	$1.67
Lost utility revenues	$0.00	$0.68	$1.36	$1.96	$2.62	$3.31
Brazoria MUD #2						
Monetary value of domestic water shortages	$0.00	$3.34	$13.70	$13.21	$17.36	$26.05
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$3.52	$5.33	$14.44
Lost jobs due to reduced commercial business activity	0	0	0	111	168	455
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.50	$0.76	$2.06
Lost utility revenues	$0.00	$0.94	$1.85	$2.67	$3.55	$4.48

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Brazoria MUD #3						
Monetary value of domestic water shortages	$0.00	$2.95	$6.46	$11.72	$18.38	$22.79
Lost income from reduced commercial business activity	$0.00	$0.00	$0.56	$2.07	$3.12	$8.43
Lost jobs due to reduced commercial business activity	0	0	18	65	98	266
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.08	$0.29	$0.44	$1.20
Lost utility revenues	$0.00	$0.53	$1.06	$1.52	$2.04	$2.57
Britmoore Utility						
Monetary value of domestic water shortages	$1.55	$7.15	$9.75	$11.74	$13.47	$15.10
Lost income from reduced commercial business activity	$0.00	$2.54	$3.62	$4.26	$4.89	$5.55
Lost jobs due to reduced commercial business activity	0	80	114	134	154	175
Lost state and local taxes from reduced commercial business activity	$0.00	$0.36	$0.52	$0.61	$0.70	$0.79
Lost utility revenues	$0.28	$0.76	$0.99	$1.15	$1.30	$1.46
Brookshire						
Monetary value of domestic water shortages	$0.00	$1.44	$5.09	$13.19	$12.89	$20.70
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$2.25	$3.52
Lost jobs due to reduced commercial business activity	0	0	0	0	71	111
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.32	$0.50
Lost utility revenues	$0.00	$0.34	$0.72	$1.15	$1.67	$2.30
Brookside Village						
Monetary value of domestic water shortages	$0.00	$0.04	$0.09	$0.15	$0.23	$1.21
Lost utility revenues	$0.00	$0.06	$0.11	$0.16	$0.22	$0.29
Buffalo						
Monetary value of domestic water shortages	$0.00	$0.04	$0.07	$0.06	$0.05	$0.06
Lost utility revenues	$0.00	$0.07	$0.10	$0.10	$0.09	$0.09
Bunker Village						
Monetary value of domestic water shortages	$0.90	$1.14	$4.52	$4.44	$4.42	$4.42
Lost utility revenues	$1.12	$1.10	$1.09	$1.07	$1.06	$1.06

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Candlelight Hills Sub.						
Monetary value of domestic water shortages	$1.48	$7.01	$9.49	$11.03	$12.52	$14.09
Lost income from reduced commercial business activity	$0.00	$0.94	$1.36	$1.61	$1.86	$2.11
Lost jobs due to reduced commercial business activity	0	38	55	65	75	85
Lost state and local taxes from reduced commercial business activity	$0.00	$0.15	$0.21	$0.25	$0.29	$0.33
Lost utility revenues	$0.27	$0.73	$0.97	$1.13	$1.28	$1.45
Centerville						
Monetary value of domestic water shortages	$0.00	$0.02	$0.03	$0.02	$0.02	$0.02
Lost utility revenues	$0.00	$0.03	$0.04	$0.04	$0.03	$0.03
Central Harris Co. Regional Water Authority						
Monetary value of domestic water shortages	$0.00	$4.33	$27.43	$27.43	$27.43	$27.43
Lost utility revenues	$0.00	$3.90	$5.08	$5.08	$5.08	$5.08
Chimney Hill MUD						
Monetary value of domestic water shortages	$0.00	$0.03	$0.09	$0.08	$0.08	$0.08
Lost utility revenues	$0.00	$0.05	$0.14	$0.12	$0.12	$0.12
Clear Lake Shores						
Monetary value of domestic water shortages	$0.82	$0.86	$0.88	$0.86	$0.86	$0.96
Lost utility revenues	$0.20	$0.21	$0.21	$0.21	$0.21	$0.21
Cleveland						
Monetary value of domestic water shortages	$0.00	$0.02	$0.05	$0.07	$0.13	$0.19
Lost utility revenues	$0.00	$0.04	$0.09	$0.14	$0.23	$0.34
Clute						
Monetary value of domestic water shortages	$0.03	$0.06	$0.12	$0.15	$0.23	$0.36
Lost utility revenues	$0.06	$0.12	$0.22	$0.26	$0.37	$0.51
Coldspring						
Monetary value of domestic water shortages	$0.00	$0.04	$0.09	$0.12	$0.15	$0.16
Lost utility revenues	$0.00	$0.06	$0.11	$0.13	$0.15	$0.16

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Conroe						
Monetary value of domestic water shortages	$14.91	$74.86	$234.26	$199.42	$303.76	$423.28
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$102.70	$170.72
Lost jobs due to reduced commercial business activity	0	0	0	0	2,289	3,806
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$10.93	$18.17
Lost utility revenues	$4.73	$11.32	$17.88	$18.67	$30.19	$43.52
Consumers Water Inc.						
Monetary value of domestic water shortages	$1.78	$8.87	$12.63	$15.72	$20.45	$26.13
Lost income from reduced commercial business activity	$0.00	$0.93	$1.61	$2.06	$3.00	$3.75
Lost jobs due to reduced commercial business activity	0	38	65	83	121	151
Lost state and local taxes from reduced commercial business activity	$0.00	$0.14	$0.25	$0.32	$0.47	$0.58
Lost utility revenues	$0.34	$0.93	$1.35	$1.71	$2.15	$2.62
County-other (Austin)						
Monetary value of domestic water shortages	$0.00	$0.02	$0.05	$0.05	$0.06	$0.07
County-other (Brazoria)						
Monetary value of domestic water shortages	$51.27	$60.68	$79.48	$100.95	$113.90	$128.36
County-other (Chambers)						
Monetary value of domestic water shortages	$6.07	$5.88	$5.71	$5.53	$5.39	$5.38
County-other (Fort Bend)						
Monetary value of domestic water shortages	$0.00	$0.35	$5.08	$19.74	$220.50	$646.50
County-other (Harris)						
Monetary value of domestic water shortages	$3.25	$0.00	$99.80	$405.59	$826.26	$1,270.87

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
County-other (Leon)						
Monetary value of domestic water shortages	$0.00	$0.06	$0.07	$0.03	$0.01	$0.02
County-other (Liberty)						
Monetary value of domestic water shortages	$0.00	$0.61	$1.52	$2.91	$12.96	$20.82
County-other (Madison)						
Monetary value of domestic water shortages	$0.00	$0.06	$0.12	$0.08	$0.11	$0.21
County-other (Montgomery)						
Monetary value of domestic water shortages	$9.42	$103.75	$255.07	$532.19	$950.21	$1,625.12
County-other (Polk)						
Monetary value of domestic water shortages	$0.00	$0.08	$0.15	$0.20	$0.32	$0.48
County-other (San Jacinto)						
Monetary value of domestic water shortages	$0.00	$0.11	$0.19	$0.26	$0.28	$0.34
County-other (Waller)						
Monetary value of domestic water shortages	$0.00	$0.24	$0.59	$1.14	$6.19	$10.52
Crosby MUD						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.01
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$0.02

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Crystal Springs Water Co.						
Monetary value of domestic water shortages	$1.26	$5.98	$8.23	$11.94	$22.06	$29.45
Lost income from reduced commercial business activity	$0.00	$0.00	$1.24	$2.20	$7.47	$11.06
Lost jobs due to reduced commercial business activity	0	0	39	69	236	349
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.18	$0.31	$1.07	$1.58
Lost utility revenues	$0.27	$0.59	$0.96	$1.42	$2.13	$2.95
Cut and Shoot						
Monetary value of domestic water shortages	$0.43	$1.86	$2.82	$2.80	$3.59	$6.02
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.24	$0.40
Lost jobs due to reduced commercial business activity	0	0	0	0	10	16
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.04	$0.06
Lost utility revenues	$0.10	$0.20	$0.30	$0.30	$0.47	$0.67
Daisetta						
Monetary value of domestic water shortages	$0.00	$0.00	$0.01	$0.01	$0.01	$0.02
Lost utility revenues	$0.00	$0.01	$0.01	$0.01	$0.02	$0.04
Danbury						
Monetary value of domestic water shortages	$0.00	$0.01	$0.02	$0.03	$0.05	$0.09
Lost utility revenues	$0.00	$0.02	$0.04	$0.05	$0.08	$0.11
Dayton						
Monetary value of domestic water shortages	$0.00	$0.69	$6.43	$0.00	$0.00	$20.74
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$12.62
Lost jobs due to reduced commercial business activity	0	0	0	0	0	281
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$1.34
Lost utility revenues	$0.00	$0.78	$1.49	$2.17	$2.96	$3.88
Deer Park						
Monetary value of domestic water shortages	$0.00	$0.00	$0.03	$0.04	$0.13	$0.27
Lost utility revenues	$0.00	$0.00	$0.05	$0.08	$0.22	$0.46

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Dickinson						
Monetary value of domestic water shortages	$1.08	$2.07	$9.79	$10.07	$10.38	$10.73
Lost utility revenues	$1.25	$1.86	$2.17	$2.23	$2.30	$2.38
East Plantation UD						
Monetary value of domestic water shortages	$0.97	$4.40	$7.24	$7.86	$10.79	$19.08
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.77	$2.65
Lost jobs due to reduced commercial business activity	0	0	0	0	31	106
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.12	$0.41
Lost utility revenues	$0.21	$0.46	$0.76	$0.83	$1.43	$2.12
El Dorado UD						
Monetary value of domestic water shortages	$1.52	$6.70	$8.46	$9.22	$10.03	$10.94
Lost income from reduced commercial business activity	$0.00	$0.90	$1.21	$1.33	$1.47	$1.62
Lost jobs due to reduced commercial business activity	0	36	49	54	59	65
Lost state and local taxes from reduced commercial business activity	$0.00	$0.14	$0.19	$0.21	$0.23	$0.25
Lost utility revenues	$0.28	$0.70	$0.86	$0.94	$1.03	$1.12
EL Lago						
Monetary value of domestic water shortages	$4.02	$4.53	$4.69	$4.82	$4.89	$6.30
Lost income from reduced commercial business activity	$0.26	$0.32	$0.35	$0.37	$0.39	$0.42
Lost jobs due to reduced commercial business activity	11	13	14	15	16	17
Lost state and local taxes from reduced commercial business activity	$0.04	$0.05	$0.05	$0.06	$0.06	$0.06
Lost utility revenues	$0.55	$0.59	$0.62	$0.63	$0.65	$0.67
Fairchilds						
Monetary value of domestic water shortages	$0.00	$1.39	$6.73	$9.00	$15.27	$19.78
Lost income from reduced commercial business activity	$0.00	$0.00	$0.17	$0.28	$0.84	$1.17
Lost jobs due to reduced commercial business activity	0	0	7	11	34	47
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.03	$0.04	$0.13	$0.18
Lost utility revenues	$0.00	$0.30	$0.77	$1.04	$1.41	$1.83

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
First Colony MUD #9						
Monetary value of domestic water shortages	$0.00	$0.69	$10.05	$10.40	$10.99	$11.53
Lost income from reduced commercial business activity	$0.00	$0.00	$0.38	$0.41	$0.45	$0.49
Lost jobs due to reduced commercial business activity	0	0	15	17	18	20
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.06	$0.06	$0.07	$0.08
Lost utility revenues	$0.00	$0.78	$1.61	$1.69	$1.78	$1.87
Flo Community WSC						
Monetary value of domestic water shortages	$0.00	$0.17	$0.33	$0.22	$0.20	$0.21
Lost utility revenues	$0.00	$0.20	$0.29	$0.29	$0.26	$0.27
Fort Bend County MUD #106						
Monetary value of domestic water shortages	$0.00	$0.17	$0.33	$0.22	$0.20	$0.21
Lost income from reduced commercial business activity	$0.00	$0.00	$0.25	$0.25	$0.25	$0.25
Lost jobs due to reduced commercial business activity	0	0	10	10	10	10
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.04	$0.04	$0.04
Lost utility revenues	$0.00	$0.57	$1.14	$1.14	$1.14	$1.14
Fort Bend County MUD #108						
Monetary value of domestic water shortages	$0.00	$1.43	$5.08	$5.07	$5.07	$5.07
Lost income from reduced commercial business activity	$0.00	$0.00	$0.15	$0.15	$0.15	$0.15
Lost jobs due to reduced commercial business activity	0	0	6	6	6	6
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.02	$0.02	$0.02	$0.02
Lost utility revenues	$0.00	$0.34	$0.68	$0.68	$0.68	$0.68
Fort Bend County MUD #23						
Monetary value of domestic water shortages	$0.00	$4.26	$12.47	$12.47	$12.48	$12.48
Lost income from reduced commercial business activity	$0.00	$0.00	$1.35	$1.35	$1.35	$1.35
Lost jobs due to reduced commercial business activity	0	0	54	54	54	54
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.21	$0.21	$0.21	$0.21
Lost utility revenues	$0.00	$1.11	$2.22	$2.22	$2.22	$2.22

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Fort Bend County MUD #25						
Monetary value of domestic water shortages	$0.00	$4.70	$17.59	$29.86	$65.65	$88.26
Lost income from reduced commercial business activity	$0.00	$0.00	$2.01	$3.24	$4.92	$6.83
Lost jobs due to reduced commercial business activity	0	0	81	130	198	275
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.31	$0.50	$0.76	$1.06
Lost utility revenues	$0.00	$1.22	$3.31	$4.76	$6.73	$8.97
Fort Bend County MUD #67						
Monetary value of domestic water shortages	$0.00	$2.70	$7.33	$7.30	$7.30	$7.30
Lost income from reduced commercial business activity	$0.00	$0.00	$0.55	$0.54	$0.54	$0.54
Lost jobs due to reduced commercial business activity	0	0	22	22	22	22
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.08	$0.08	$0.08	$0.08
Lost utility revenues	$0.00	$0.49	$0.97	$0.97	$0.97	$0.97
Fort Bend County MUD #69						
Monetary value of domestic water shortages	$0.00	$1.58	$4.28	$4.28	$4.28	$4.28
Lost income from reduced commercial business activity	$0.00	$0.00	$0.32	$0.32	$0.32	$0.32
Lost jobs due to reduced commercial business activity	0	0	13	13	13	13
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.05	$0.05	$0.05	$0.05
Lost utility revenues	$0.00	$0.29	$0.57	$0.57	$0.57	$0.57
Fort Bend County MUD #81						
Monetary value of domestic water shortages	$0.00	$3.40	$12.11	$16.49	$22.31	$28.95
Lost income from reduced commercial business activity	$0.00	$0.00	$0.90	$1.41	$4.16	$5.70
Lost jobs due to reduced commercial business activity	0	0	36	57	167	229
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.14	$0.22	$0.65	$0.88
Lost utility revenues	$0.00	$0.61	$1.60	$2.25	$3.10	$4.08

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Fountain View Sub.						
Monetary value of domestic water shortages	$2.25	$11.60	$17.27	$12.02	$17.55	$28.36
Lost income from reduced commercial business activity	$0.00	$0.69	$0.97	$1.11	$1.27	$1.43
Lost jobs due to reduced commercial business activity	0	28	39	45	51	58
Lost state and local taxes from reduced commercial business activity	$0.00	$0.11	$0.15	$0.17	$0.20	$0.22
Lost utility revenues	$0.20	$0.54	$0.69	$0.78	$0.88	$0.98
Freeport						
Monetary value of domestic water shortages	$0.00	$0.33	$0.86	$1.39	$6.70	$9.56
Lost utility revenues	$0.00	$0.53	$1.09	$1.57	$2.13	$2.76
Fulshear						
Monetary value of domestic water shortages	$0.00	$1.45	$4.97	$7.87	$11.18	$15.14
Lost income from reduced commercial business activity	$0.00	$0.00	$0.37	$1.09	$1.56	$2.12
Lost jobs due to reduced commercial business activity	0	0	15	44	63	85
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.06	$0.17	$0.24	$0.33
Lost utility revenues	$0.00	$0.26	$0.66	$0.88	$1.18	$1.53
Galena Park						
Monetary value of domestic water shortages	$0.10	$0.10	$0.11	$0.12	$0.16	$0.22
Lost utility revenues	$0.18	$0.19	$0.21	$0.22	$0.28	$0.37
Green Trails MUD						
Monetary value of domestic water shortages	$0.56	$9.26	$13.11	$17.12	$19.10	$21.07
Lost income from reduced commercial business activity	$0.00	$0.18	$0.60	$0.70	$0.81	$0.91
Lost jobs due to reduced commercial business activity	0	7	48	57	65	73
Lost state and local taxes from reduced commercial business activity	$0.56	$8.80	$12.35	$16.23	$17.98	$19.80
Lost utility revenues	$0.00	$0.03	$0.09	$0.11	$0.13	$0.14

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
HMW SUD						
Monetary value of domestic water shortages	$2.25	$11.57	$17.50	$12.10	$18.48	$30.92
Lost income from reduced commercial business activity	$0.00	$0.00	$2.98	$2.06	$4.96	$8.27
Lost jobs due to reduced commercial business activity	0	0	94	65	156	261
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.42	$0.29	$0.71	$1.18
Lost utility revenues	$0.71	$1.45	$2.20	$2.17	$3.46	$4.93
Hardin						
Monetary value of domestic water shortages	$0.00	$0.02	$0.06	$0.11	$0.62	$0.89
Lost utility revenues	$0.00	$0.04	$0.07	$0.11	$0.15	$0.20
Hardin WSC						
Monetary value of domestic water shortages	$0.00	$0.14	$0.36	$2.46	$3.66	$5.83
Lost utility revenues	$0.00	$0.20	$0.40	$0.59	$0.80	$1.05
Harris Co. FWSD #47						
Monetary value of domestic water shortages	$0.05	$0.04	$0.03	$0.02	$0.01	$0.01
Lost utility revenues	$0.10	$0.08	$0.05	$0.03	$0.02	$0.02
Harris Co. FWSD #51						
Monetary value of domestic water shortages	$0.77	$0.69	$0.48	$0.44	$0.44	$0.44
Lost utility revenues	$0.90	$0.80	$0.77	$0.70	$0.70	$0.70
Harris Co. FWSD #6						
Monetary value of domestic water shortages	$1.72	$3.27	$5.26	$4.13	$4.84	$6.78
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.28	$0.35	$0.44
Lost jobs due to reduced commercial business activity	0	0	0	22	28	36
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.04	$0.05	$0.07
Lost utility revenues	$0.25	$0.34	$0.43	$0.54	$0.64	$0.75

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Harris Co. MUD #11						
Monetary value of domestic water shortages	$1.37	$6.21	$8.13	$9.50	$10.55	$11.53
Lost income from reduced commercial business activity	$0.00	$0.84	$1.16	$1.32	$1.49	$1.42
Lost jobs due to reduced commercial business activity	0	34	47	53	60	57
Lost state and local taxes from reduced commercial business activity	$0.00	$0.13	$0.18	$0.20	$0.23	$0.22
Lost utility revenues	$0.25	$0.65	$0.83	$0.93	$1.03	$1.15
Harris Co. MUD #119						
Monetary value of domestic water shortages	$1.85	$11.52	$12.96	$12.69	$12.54	$12.54
Lost income from reduced commercial business activity	$0.00	$1.63	$2.00	$1.96	$1.94	$1.94
Lost jobs due to reduced commercial business activity	0	66	80	79	78	78
Lost state and local taxes from reduced commercial business activity	$0.00	$0.25	$0.31	$0.30	$0.30	$0.30
Lost utility revenues	$0.48	$1.18	$1.32	$1.29	$1.27	$1.27
Harris Co. MUD #132						
Monetary value of domestic water shortages	$3.70	$27.29	$37.18	$45.60	$58.69	$67.07
Lost income from reduced commercial business activity	$0.00	$3.87	$5.74	$7.01	$8.25	$9.55
Lost jobs due to reduced commercial business activity	0	156	231	282	332	384
Lost state and local taxes from reduced commercial business activity	$0.00	$0.60	$0.89	$1.09	$1.28	$1.48
Lost utility revenues	$0.96	$2.79	$3.78	$4.52	$5.25	$6.02
Harris Co. MUD #151						
Monetary value of domestic water shortages	$2.69	$16.75	$19.59	$19.46	$19.46	$19.46
Lost income from reduced commercial business activity	$0.00	$2.26	$2.80	$2.78	$2.78	$2.78
Lost jobs due to reduced commercial business activity	0	91	113	112	112	112
Lost state and local taxes from reduced commercial business activity	$0.00	$0.35	$0.43	$0.43	$0.43	$0.43
Lost utility revenues	$0.70	$1.62	$1.84	$1.83	$1.83	$1.83

* MUDs are not necessarily listed in numerical order.

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Harris Co. MUD #152						
Monetary value of domestic water shortages	$1.66	$12.72	$17.70	$22.11	$29.11	$33.65
Lost income from reduced commercial business activity	$0.00	$1.81	$2.73	$3.40	$4.11	$4.81
Lost jobs due to reduced commercial business activity	0	73	110	137	165	193
Lost state and local taxes from reduced commercial business activity	$0.00	$0.28	$0.42	$0.53	$0.64	$0.75
Lost utility revenues	$0.43	$1.30	$1.80	$2.19	$2.61	$3.02
Harris Co. MUD #154						
Monetary value of domestic water shortages	$0.67	$61.56	$90.21	$109.53	$128.25	$148.59
Lost income from reduced commercial business activity	$0.00	$1.02	$2.02	$2.97	$5.68	$6.58
Lost jobs due to reduced commercial business activity	$0.00	$1.48	$2.17	$2.63	$3.07	$3.56
Lost state and local taxes from reduced commercial business activity	$0.00	$0.23	$0.34	$0.41	$0.48	$0.55
Lost utility revenues	$0.37	$1.06	$1.43	$1.70	$1.96	$2.25
Harris Co. MUD #158						
Monetary value of domestic water shortages	$0.00	$0.01	$0.06	$0.05	$0.05	$0.05
Lost utility revenues	$0.00	$0.01	$0.11	$0.09	$0.09	$0.09
Harris Co. MUD #180						
Monetary value of domestic water shortages	$1.30	$9.30	$12.46	$15.09	$19.24	$21.90
Lost income from reduced commercial business activity	$0.00	$1.32	$1.92	$2.31	$2.70	$3.11
Lost jobs due to reduced commercial business activity	0	53	77	93	108	125
Lost state and local taxes from reduced commercial business activity	$0.00	$0.20	$0.30	$0.36	$0.42	$0.48
Lost utility revenues	$0.34	$0.95	$1.27	$1.50	$1.72	$1.96
Harris Co. MUD #189						
Monetary value of domestic water shortages	$0.39	$6.73	$16.33	$19.80	$25.27	$28.78
Lost income from reduced commercial business activity	$0.00	$1.73	$2.52	$3.04	$3.54	$4.09
Lost jobs due to reduced commercial business activity	0	69	101	122	143	164
Lost state and local taxes from reduced commercial business activity	$0.00	$0.27	$0.39	$0.47	$0.55	$0.63
Lost utility revenues	$0.44	$1.24	$1.66	$1.96	$2.26	$2.58

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Harris Co. MUD #261						
Monetary value of domestic water shortages	$0.30	$7.55	$14.28	$11.78	$11.78	$11.78
Lost utility revenues	$0.37	$1.08	$1.25	$1.24	$1.24	$1.24
Harris Co. MUD #345						
Monetary value of domestic water shortages	$2.99	$17.59	$20.22	$20.76	$23.00	$23.00
Lost income from reduced commercial business activity	$0.00	$2.50	$3.12	$3.11	$3.11	$3.11
Lost jobs due to reduced commercial business activity	0	100	125	125	125	125
Lost state and local taxes from reduced commercial business activity	$0.00	$0.39	$0.48	$0.48	$0.48	$0.48
Lost utility revenues	$0.78	$1.80	$2.05	$2.05	$2.05	$2.05
Harris Co. MUD #46						
Monetary value of domestic water shortages	$1.77	$10.30	$11.64	$11.91	$13.19	$13.19
Lost income from reduced commercial business activity	$0.00	$1.46	$1.80	$1.78	$1.78	$1.78
Lost jobs due to reduced commercial business activity	0	59	72	72	72	72
Lost state and local taxes from reduced commercial business activity	$0.00	$0.23	$0.28	$0.28	$0.28	$0.28
Lost utility revenues	$0.46	$1.05	$1.18	$1.17	$1.17	$1.17
Harris Co. MUD #5						
Monetary value of domestic water shortages	$1.38	$8.05	$16.58	$9.12	$9.96	$9.96
Lost income from reduced commercial business activity	$0.00	$1.14	$1.40	$1.37	$1.35	$1.35
Lost jobs due to reduced commercial business activity	0	46	56	55	54	54
Lost state and local taxes from reduced commercial business activity	$0.00	$0.18	$0.22	$0.21	$0.21	$0.21
Lost utility revenues	$0.39	$0.89	$0.99	$0.97	$0.96	$0.96
Harris Co. MUD #50						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.03	$0.09	$0.17
Lost utility revenues	$0.00	$0.00	$0.00	$0.06	$0.15	$0.24

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Harris Co. WCID #133						
Monetary value of domestic water shortages	$0.46	$9.92	$10.78	$10.63	$10.71	$10.71
Lost income from reduced commercial business activity	$0.00	$1.34	$1.66	$1.64	$1.65	$1.65
Lost jobs due to reduced commercial business activity	0	54	67	66	66	66
Lost state and local taxes from reduced commercial business activity	$0.00	$0.21	$0.26	$0.25	$0.26	$0.26
Lost utility revenues	$0.45	$1.04	$1.18	$1.17	$1.18	$1.18
Harris Co. WCID #21						
Monetary value of domestic water shortages	$0.65	$0.67	$0.74	$0.80	$2.93	$3.63
Lost utility revenues	$0.66	$0.75	$0.83	$0.90	$1.01	$1.15
Harris Co. WCID #36						
Monetary value of domestic water shortages	$0.35	$0.63	$0.77	$3.06	$3.99	$5.21
Lost utility revenues	$0.50	$0.71	$0.87	$1.06	$1.27	$1.50
Harris Co. WCID #50						
Monetary value of domestic water shortages	$19.77	$21.91	$23.83	$14.39	$15.60	$16.95
Lost income from reduced commercial business activity	$1.61	$1.79	$1.96	$2.13	$2.31	$2.52
Lost jobs due to reduced commercial business activity	65	72	79	86	93	101
Lost state and local taxes from reduced commercial business activity	$1.08	$1.19	$1.30	$1.40	$1.52	$1.66
Lost utility revenues	$0.18	$3.82	$5.45	$5.33	$5.26	$5.26
Harris Co. WCID #76						
Monetary value of domestic water shortages	$0.18	$3.82	$5.45	$5.33	$5.26	$5.26
Lost utility revenues	$0.18	$0.40	$0.45	$0.44	$0.43	$0.43
Harris Co. WCID #84						
Monetary value of domestic water shortages	$2.09	$2.11	$2.13	$2.11	$2.17	$2.26
Lost utility revenues	$0.46	$0.46	$0.47	$0.46	$0.48	$0.50

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Hedwig Village						
Monetary value of domestic water shortages	$7.60	$7.60	$8.99	$8.98	$9.10	$9.18
Lost income from reduced commercial business activity	$1.47	$1.49	$1.51	$1.53	$1.56	$1.59
Lost jobs due to reduced commercial business activity	46	47	48	48	49	50
Lost state and local taxes from reduced commercial business activity	$0.21	$0.21	$0.22	$0.22	$0.22	$0.23
Lost utility revenues	$1.00	$1.00	$1.00	$1.00	$1.01	$1.02
Hempstead						
Monetary value of domestic water shortages	$0.00	$4.19	$18.12	$19.21	$32.33	$68.46
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$5.45	$17.91	$26.16
Lost jobs due to reduced commercial business activity	0	0	0	172	565	825
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.78	$2.55	$3.73
Lost utility revenues	$0.00	$1.09	$2.27	$3.61	$5.20	$7.06
Hill Crest Village						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.01	$0.01
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.01	$0.02
Hillshire Village						
Monetary value of domestic water shortages	$0.00	$0.02	$0.05	$0.04	$0.04	$0.04
Lost utility revenues	$0.00	$0.03	$0.06	$0.06	$0.06	$0.06
Houston						
Monetary value of domestic water shortages	$0.01	$6.51	$12.01	$16.38	$20.20	$60.15
Lost utility revenues	$0.02	$11.66	$19.76	$20.04	$20.41	$77.37
Humble						
Monetary value of domestic water shortages	$7.41	$49.74	$63.56	$70.50	$77.72	$85.35
Lost income from reduced commercial business activity	$0.00	$18.25	$25.22	$28.46	$31.84	$35.41
Lost jobs due to reduced commercial business activity	0	575	795	898	1,004	1,117
Lost state and local taxes from reduced commercial business activity	$0.00	$2.60	$3.59	$4.06	$4.54	$5.05
Lost utility revenues	$1.93	$5.12	$6.44	$7.18	$7.94	$8.75

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Hunters Creek Village						
Monetary value of domestic water shortages	$25.38	$28.35	$39.28	$24.59	$26.43	$28.67
Lost income from reduced commercial business activity	$3.09	$3.52	$3.94	$8.68	$9.57	$10.53
Lost jobs due to reduced commercial business activity	98	111	124	274	302	332
Lost state and local taxes from reduced commercial business activity	$0.44	$0.50	$0.56	$1.24	$1.36	$1.50
Lost utility revenues	$2.10	$2.31	$2.53	$2.73	$2.95	$3.19
Iowa Colony						
Monetary value of domestic water shortages	$0.00	$0.01	$0.02	$0.04	$0.37	$0.59
Lost utility revenues	$0.00	$0.02	$0.04	$0.05	$0.07	$0.10
Jacinto City						
Monetary value of domestic water shortages	$0.00	$0.00	$0.02	$0.07	$0.15	$0.27
Lost utility revenues	$0.00	$0.00	$0.05	$0.14	$0.27	$0.42
Jersey Village						
Monetary value of domestic water shortages	$0.00	$2.75	$10.85	$10.42	$14.58	$17.31
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$2.61	$3.78	$5.00
Lost jobs due to reduced commercial business activity	0	0	0	82	119	158
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.37	$0.54	$0.71
Lost utility revenues	$0.00	$0.87	$1.64	$2.18	$2.71	$3.26
Jewett						
Monetary value of domestic water shortages	$0.00	$0.05	$0.09	$0.08	$0.08	$0.08
Lost utility revenues	$0.00	$0.07	$0.11	$0.10	$0.10	$0.10
Katy						
Monetary value of domestic water shortages	$7.93	$58.27	$80.49	$101.51	$131.87	$154.21
Lost income from reduced commercial business activity	$0.00	$49.14	$73.83	$91.80	$110.75	$131.41
Lost jobs due to reduced commercial business activity	0	1,033	1,543	1,905	2,281	2,686
Lost state and local taxes from reduced commercial business activity	$0.00	$5.00	$7.47	$9.24	$11.08	$13.07
Lost utility revenues	$2.09	$6.04	$8.30	$10.12	$12.03	$14.12

Municipal (cont.)	2010	2020	2030	2040	2050	2060
Kemah						
Monetary value of domestic water shortages	$3.28	$4.33	$4.79	$4.93	$5.00	$5.11
Lost income from reduced commercial business activity	$1.19	$1.54	$1.75	$1.82	$1.85	$1.90
Lost jobs due to reduced commercial business activity	37	49	55	57	58	60
Lost state and local taxes from reduced commercial business activity	$0.17	$0.22	$0.25	$0.26	$0.26	$0.27
Lost utility revenues	$0.37	$0.46	$0.51	$0.52	$0.53	$0.54
Kendleton						
Monetary value of domestic water shortages	$0.00	$0.07	$0.90	$1.64	$4.76	$7.29
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.17	$0.32	$1.01
Lost jobs due to reduced commercial business activity	0	0	0	7	13	41
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.03	$0.05	$0.16
Lost utility revenues	$0.00	$0.09	$0.20	$0.34	$0.53	$0.77
Kenefick						
Monetary value of domestic water shortages	$0.00	$0.02	$0.06	$0.41	$0.61	$0.98
Lost utility revenues	$0.00	$0.04	$0.07	$0.10	$0.13	$0.18
Lake Jackson						
Monetary value of domestic water shortages	$1.44	$1.90	$8.43	$10.78	$12.66	$16.37
Lost utility revenues	$1.83	$2.41	$2.92	$3.42	$4.02	$4.72
Lake Livingston Water Supply and Sewer Co.						
Monetary value of domestic water shortages	$0.00	$0.06	$0.12	$0.15	$0.23	$0.36
Lost utility revenues	$0.00	$0.11	$0.21	$0.25	$0.35	$0.47
Longhorn Town UD						
Monetary value of domestic water shortages	$1.96	$11.33	$17.31	$23.47	$28.59	$33.69
Lost income from reduced commercial business activity	$0.00	$3.97	$6.44	$8.51	$10.56	$12.61
Lost jobs due to reduced commercial business activity	0	125	203	268	333	398
Lost state and local taxes from reduced commercial business activity	$0.00	$0.57	$0.92	$1.21	$1.51	$1.80
Lost utility revenues	$0.35	$1.19	$1.76	$2.27	$2.77	$3.27

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Madison						
Monetary value of domestic water shortages	$0.00	$0.04	$0.07	$0.09	$0.12	$0.18
Lost utility revenues	$0.00	$0.07	$0.11	$0.15	$0.20	$0.25
Magnolia						
Monetary value of domestic water shortages	$8.85	$12.18	$16.13	$20.46	$26.25	$33.12
Lost income from reduced commercial business activity	$3.55	$4.89	$6.48	$8.22	$10.54	$13.30
Lost jobs due to reduced commercial business activity	112	154	204	259	332	419
Lost state and local taxes from reduced commercial business activity	$0.51	$0.70	$0.92	$1.17	$1.50	$1.90
Lost utility revenues	$0.20	$0.53	$0.92	$1.34	$1.91	$2.59
Manvel						
Monetary value of domestic water shortages	$0.00	$0.16	$0.16	$0.15	$0.15	$0.15
Lost utility revenues	$0.00	$0.20	$0.20	$0.19	$0.19	$0.19
Mason Creek UD						
Monetary value of domestic water shortages	$4.97	$29.11	$33.04	$32.75	$32.60	$32.60
Lost income from reduced commercial business activity	$0.00	$10.74	$13.25	$13.14	$13.08	$13.08
Lost jobs due to reduced commercial business activity	0	339	418	414	412	412
Lost state and local taxes from reduced commercial business activity	$0.00	$1.53	$1.89	$1.87	$1.86	$1.86
Lost utility revenues	$1.29	$2.98	$3.36	$3.33	$3.31	$3.31
Meadows						
Monetary value of domestic water shortages	$0.00	$4.32	$11.82	$11.68	$11.63	$11.63
Lost income from reduced commercial business activity	$0.00	$0.00	$3.51	$3.47	$3.45	$3.45
Lost jobs due to reduced commercial business activity	0	0	111	109	109	109
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.50	$0.49	$0.49	$0.49
Lost utility revenues	$0.00	$1.12	$2.22	$2.20	$2.18	$2.18
Mercy WSC						
Monetary value of domestic water shortages	$0.00	$0.11	$0.25	$0.62	$1.83	$2.18
Lost utility revenues	$0.00	$0.16	$0.28	$0.37	$0.43	$0.48
Missouri City						
Monetary value of domestic water shortages	$0.00	$0.00	$6.76	$16.42	$95.68	$121.77
Lost utility revenues	$0.00	$0.00	$7.97	$15.07	$20.49	$32.02

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Mont Belvieu						
Monetary value of domestic water shortages	$16.73	$23.27	$29.83	$35.04	$40.45	$46.00
Lost income from reduced commercial business activity	$2.56	$3.76	$4.85	$5.81	$6.80	$7.82
Lost jobs due to reduced commercial business activity	81	118	153	183	214	247
Lost state and local taxes from reduced commercial business activity	$0.37	$0.54	$0.69	$0.83	$0.97	$1.11
Lost utility revenues	$1.53	$2.11	$2.65	$3.12	$3.60	$4.10
Montgomery						
Monetary value of domestic water shortages	$0.51	$16.06	$26.64	$36.18	$39.77	$50.18
Lost income from reduced commercial business activity	$0.00	$6.03	$9.91	$13.74	$13.86	$18.18
Lost jobs due to reduced commercial business activity	0	190	313	433	437	573
Lost state and local taxes from reduced commercial business activity	$0.00	$0.86	$1.41	$1.96	$1.98	$2.59
Lost utility revenues	$0.11	$1.64	$2.59	$3.52	$3.82	$4.85
Montgomery MUD #18						
Monetary value of domestic water shortages	$2.48	$12.20	$20.13	$25.33	$49.72	$115.72
Lost income from reduced commercial business activity	$0.00	$0.00	$2.28	$2.43	$10.49	$17.04
Lost jobs due to reduced commercial business activity	0	0	91	97	420	683
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.35	$0.38	$1.63	$2.64
Lost utility revenues	$0.79	$1.84	$3.81	$4.67	$7.97	$11.81
Montgomery MUD #19						
Monetary value of domestic water shortages	$0.95	$3.61	$3.63	$2.35	$3.63	$5.07
Lost income from reduced commercial business activity	$0.00	$0.00	$0.23	$0.13	$0.25	$0.34
Lost jobs due to reduced commercial business activity	0	0	9	5	10	14
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.02	$0.04	$0.05
Lost utility revenues	$0.21	$0.38	$0.47	$0.38	$0.49	$0.56
Montgomery MUD #8						
Monetary value of domestic water shortages	$1.74	$8.72	$10.80	$10.85	$12.51	$16.52
Lost income from reduced commercial business activity	$0.00	$0.00	$0.68	$0.61	$0.92	$1.15
Lost jobs due to reduced commercial business activity	0	0	27	24	37	46
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.11	$0.09	$0.14	$0.18
Lost utility revenues	$0.38	$0.92	$1.39	$1.37	$1.64	$1.84

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Montgomery MUD #9						
Monetary value of domestic water shortages	$1.64	$8.66	$11.58	$11.73	$13.67	$18.67
Lost income from reduced commercial business activity	$0.00	$0.00	$0.77	$0.65	$1.01	$1.29
Lost jobs due to reduced commercial business activity	0	0	31	26	40	52
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.12	$0.10	$0.16	$0.20
Lost utility revenues	$0.36	$0.91	$1.50	$1.47	$1.81	$2.06
Montgomery MUD #2						
Monetary value of domestic water shortages	$1.15	$4.40	$4.47	$4.94	$5.55	$7.11
Lost income from reduced commercial business activity	$0.00	$0.00	$0.28	$0.37	$0.46	$0.53
Lost jobs due to reduced commercial business activity	0	0	11	15	18	21
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.06	$0.07	$0.08
Lost utility revenues	$0.25	$0.46	$0.57	$0.65	$0.73	$0.79
Montgomery MUD #3						
Monetary value of domestic water shortages	$1.00	$4.02	$4.60	$4.48	$6.34	$9.69
Lost income from reduced commercial business activity	$0.00	$0.00	$0.29	$0.18	$0.41	$0.64
Lost jobs due to reduced commercial business activity	0	0	11	7	16	26
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.03	$0.06	$0.10
Lost utility revenues	$0.22	$0.42	$0.59	$0.53	$0.79	$1.08
Montgomery MUD #4						
Monetary value of domestic water shortages	$2.03	$7.72	$7.87	$6.75	$8.27	$10.85
Lost income from reduced commercial business activity	$0.00	$0.00	$0.49	$0.27	$0.53	$0.73
Lost jobs due to reduced commercial business activity	0	0	20	11	21	29
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.08	$0.04	$0.08	$0.11
Lost utility revenues	$0.45	$0.81	$1.01	$0.81	$1.04	$1.21
Montgomery County WCID #1						
Monetary value of domestic water shortages	$1.03	$4.13	$4.73	$5.98	$7.80	$12.48
Lost income from reduced commercial business activity	$0.00	$0.00	$0.30	$0.45	$1.28	$1.72
Lost jobs due to reduced commercial business activity	0	0	12	18	51	69
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.05	$0.07	$0.20	$0.27
Lost utility revenues	$0.23	$0.44	$0.61	$0.79	$1.02	$1.29

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Needville						
Monetary value of domestic water shortages	$0.00	$0.20	$2.36	$6.33	$6.26	$10.66
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$1.26	$2.07
Lost jobs due to reduced commercial business activity	0	0	0	0	40	65
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.18	$0.29
Lost utility revenues	$0.00	$0.19	$0.43	$0.67	$1.00	$1.40
New Caney MUD						
Monetary value of domestic water shortages	$1.93	$8.47	$11.32	$16.01	$27.42	$29.52
Lost income from reduced commercial business activity	$0.00	$0.00	$2.88	$4.83	$15.46	$23.02
Lost jobs due to reduced commercial business activity	0	0	91	152	488	726
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.41	$0.69	$2.20	$3.28
Lost utility revenues	$0.61	$1.28	$2.10	$3.02	$4.38	$6.08
New Waverly						
Monetary value of domestic water shortages	$0.00	$0.02	$0.03	$0.02	$0.02	$0.02
Lost utility revenues	$0.00	$0.03	$0.05	$0.04	$0.03	$0.03
Normangee						
Monetary value of domestic water shortages	$0.00	$0.02	$0.04	$0.03	$0.03	$0.04
Lost utility revenues	$0.00	$0.03	$0.05	$0.05	$0.04	$0.05
North Belt UD						
Monetary value of domestic water shortages	$0.28	$7.93	$11.38	$12.76	$17.50	$20.28
Lost income from reduced commercial business activity	$0.00	$1.07	$1.63	$2.04	$2.47	$2.90
Lost jobs due to reduced commercial business activity	0	43	65	82	99	116
Lost state and local taxes from reduced commercial business activity	$0.00	$0.17	$0.25	$0.32	$0.38	$0.45
Lost utility revenues	$0.28	$0.83	$1.16	$1.42	$1.70	$1.97
North Fort Bend Water Authority						
Monetary value of domestic water shortages	$0.00	$8.10	$169.31	$178.63	$330.72	$413.42
Lost income from reduced commercial business activity	$0.00	$0.09	$1.88	$2.51	$303.68	$405.39
Lost jobs due to reduced commercial business activity	0	3	59	79	4,676	6,229
Lost state and local taxes from reduced commercial business activity	$0.00	$0.01	$0.27	$0.36	$24.28	$32.36
Lost utility revenues	$0.00	$7.34	$39.28	$61.96	$80.05	$96.19

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
North Green MUD						
Monetary value of domestic water shortages	$1.15	$5.01	$6.30	$6.75	$7.26	$7.82
Lost income from reduced commercial business activity	$0.00	$0.67	$0.90	$0.96	$1.04	$1.12
Lost jobs due to reduced commercial business activity	0	27	36	39	42	45
Lost state and local taxes from reduced commercial business activity	$0.00	$0.10	$0.14	$0.15	$0.16	$0.17
Lost utility revenues	$0.21	$0.52	$0.64	$0.69	$0.74	$0.80
North Harris County Regional Water Authority						
Monetary value of domestic water shortages	$0.00	$500.43	$581.32	$632.60	$660.64	$685.97
Lost income from reduced commercial business activity	$0.00	$0.00	$547.06	$626.69	$658.95	$697.63
Lost jobs due to reduced commercial business activity	0	0	12,171	13,942	14,660	15,521
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$58.22	$66.69	$70.13	$74.24
Lost utility revenues	$0.16	$92.49	$132.44	$145.56	$150.87	$157.24
Northwest Harris County MUD #23						
Monetary value of domestic water shortages	$1.93	$9.63	$13.58	$17.02	$19.98	$22.93
Lost income from reduced commercial business activity	$0.00	$1.30	$1.94	$2.35	$2.81	$3.27
Lost jobs due to reduced commercial business activity	0	52	78	94	113	131
Lost state and local taxes from reduced commercial business activity	$0.00	$0.20	$0.30	$0.36	$0.44	$0.51
Lost utility revenues	$0.35	$1.01	$1.38	$1.64	$1.93	$2.22
Northwest Park MUD						
Monetary value of domestic water shortages	$5.96	$42.93	$49.42	$48.43	$47.96	$47.96
Lost income from reduced commercial business activity	$0.00	$15.84	$19.82	$19.42	$19.24	$19.24
Lost jobs due to reduced commercial business activity	0	499	625	613	607	607
Lost state and local taxes from reduced commercial business activity	$0.00	$2.26	$2.83	$2.77	$2.74	$2.74
Lost utility revenues	$1.55	$4.39	$5.02	$4.92	$4.87	$4.87
Oak Ridge North						
Monetary value of domestic water shortages	$1.41	$5.96	$7.26	$7.50	$10.85	$17.91
Lost income from reduced commercial business activity	$0.00	$0.00	$1.17	$0.79	$1.88	$3.08
Lost jobs due to reduced commercial business activity	0	0	37	25	59	97
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.17	$0.11	$0.27	$0.44
Lost utility revenues	$0.31	$0.63	$0.93	$0.90	$1.41	$1.99

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Old River-Winfree						
Monetary value of domestic water shortages	$3.89	$4.26	$4.53	$4.75	$5.08	$5.45
Lost income from reduced commercial business activity	$0.24	$0.26	$0.28	$0.30	$0.32	$0.35
Lost jobs due to reduced commercial business activity	9	11	11	12	13	14
Lost state and local taxes from reduced commercial business activity	$0.04	$0.04	$0.04	$0.05	$0.05	$0.05
Lost utility revenues	$0.34	$0.38	$0.40	$0.42	$0.45	$0.49
Onalaska						
Monetary value of domestic water shortages	$0.00	$0.06	$0.14	$0.76	$1.02	$1.23
Lost utility revenues	$0.00	$0.08	$0.14	$0.18	$0.22	$0.27
Orbit Systems, Inc.						
Monetary value of domestic water shortages	$0.00	$0.11	$0.41	$1.97	$2.84	$3.97
Lost utility revenues	$0.00	$0.15	$0.31	$0.45	$0.59	$0.76
Oyster Creek						
Monetary value of domestic water shortages	$0.28	$0.61	$1.08	$0.26	$0.33	$1.93
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.14
Lost jobs due to reduced commercial business activity	0	0	0	0	0	6
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.02
Lost utility revenues	$0.07	$0.11	$0.15	$0.19	$0.24	$0.29
Panorama Village						
Monetary value of domestic water shortages	$1.35	$5.43	$8.75	$5.22	$6.49	$9.26
Lost income from reduced commercial business activity	$0.00	$0.00	$0.93	$0.55	$1.12	$1.60
Lost jobs due to reduced commercial business activity	0	0	29	17	35	50
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.13	$0.08	$0.16	$0.23
Lost utility revenues	$0.30	$0.57	$0.74	$0.63	$0.85	$1.03
Parkway UD						
Monetary value of domestic water shortages	$4.71	$4.61	$4.48	$4.36	$4.28	$4.32
Lost income from reduced commercial business activity	$0.67	$0.66	$0.64	$0.62	$0.61	$0.62
Lost jobs due to reduced commercial business activity	27	26	26	25	25	25
Lost state and local taxes from reduced commercial business activity	$0.10	$0.10	$0.10	$0.10	$0.09	$0.10
Lost utility revenues	$0.48	$0.47	$0.46	$0.44	$0.44	$0.44

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Patton Village						
Monetary value of domestic water shortages	$0.18	$0.70	$0.82	$1.05	$1.39	$2.33
Lost income from reduced commercial business activity	$0.00	$0.00	$0.05	$0.08	$0.23	$0.32
Lost jobs due to reduced commercial business activity	0	0	2	3	9	13
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.01	$0.01	$0.04	$0.05
Lost utility revenues	$0.04	$0.07	$0.10	$0.14	$0.18	$0.24
Pearland						
Monetary value of domestic water shortages	$0.00	$0.00	$1.83	$5.45	$11.37	$56.64
Lost utility revenues	$0.00	$0.00	$3.28	$7.78	$12.92	$18.27
Pine Island						
Monetary value of domestic water shortages	$0.00	$0.24	$0.83	$2.11	$2.49	$3.34
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.35	$0.56
Lost jobs due to reduced commercial business activity	0	0	0	0	11	18
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.05	$0.08
Lost utility revenues	$0.00	$0.06	$0.12	$0.18	$0.27	$0.37
Pine Trails Utility						
Monetary value of domestic water shortages	$0.44	$1.80	$2.32	$2.71	$3.44	$4.39
Lost utility revenues	$0.50	$0.62	$0.74	$0.86	$0.99	$1.14
Piney Point Village						
Monetary value of domestic water shortages	$8.91	$9.36	$9.91	$10.35	$10.88	$11.46
Lost income from reduced commercial business activity	$2.26	$2.44	$2.62	$2.79	$5.99	$6.44
Lost jobs due to reduced commercial business activity	71	77	83	88	189	203
Lost state and local taxes from reduced commercial business activity	$0.32	$0.35	$0.37	$0.40	$0.85	$0.92
Lost utility revenues	$1.53	$1.62	$1.70	$1.79	$1.89	$2.00
Plantation MUD						
Monetary value of domestic water shortages	$0.00	$1.82	$4.88	$4.79	$4.76	$4.76
Lost income from reduced commercial business activity	$0.00	$0.00	$0.94	$0.92	$0.92	$0.92
Lost jobs due to reduced commercial business activity	0	0	30	29	29	29
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.13	$0.13	$0.13	$0.13
Lost utility revenues	$0.00	$0.33	$0.65	$0.63	$0.63	$0.63

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Pleak						
Monetary value of domestic water shortages	$0.00	$0.14	$0.45	$3.14	$5.66	$8.70
Lost utility revenues	$0.00	$0.20	$0.44	$0.69	$1.02	$1.40
Plum Grove						
Monetary value of domestic water shortages	$0.00	$0.06	$0.72	$0.79	$0.91	$1.43
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.48
Lost jobs due to reduced commercial business activity	0	0	0	0	0	15
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.07
Lost utility revenues	$0.00	$0.07	$0.13	$0.20	$0.27	$0.35
Point Aquarius MUD						
Monetary value of domestic water shortages	$1.51	$7.24	$11.23	$18.14	$32.34	$51.26
Lost income from reduced commercial business activity	$0.00	$0.00	$0.77	$2.98	$4.90	$7.14
Lost jobs due to reduced commercial business activity	0	0	31	119	196	286
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.12	$0.46	$0.76	$1.11
Lost utility revenues	$0.33	$0.76	$1.46	$2.37	$3.59	$5.01
Point Blank						
Monetary value of domestic water shortages	$0.00	$0.01	$0.03	$0.04	$0.05	$0.05
Lost utility revenues	$0.00	$0.02	$0.04	$0.05	$0.05	$0.05
Porter WSC						
Monetary value of domestic water shortages	$2.57	$11.07	$13.03	$19.78	$40.27	$43.97
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$11.96	$14.60	$16.82
Lost jobs due to reduced commercial business activity	0	0	0	189	460	530
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$1.70	$2.08	$2.40
Lost utility revenues	$0.82	$1.67	$2.62	$3.73	$4.13	$4.49
Prairie View						
Monetary value of domestic water shortages	$0.00	$0.11	$0.27	$0.51	$0.97	$5.47
Lost utility revenues	$0.00	$0.18	$0.39	$0.64	$0.94	$1.31

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Rayford Road MUD						
Monetary value of domestic water shortages	$4.78	$18.25	$22.44	$18.33	$19.03	$25.68
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$1.28	$1.73
Lost jobs due to reduced commercial business activity	0	0	0	0	51	69
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.20	$0.27
Lost utility revenues	$0.97	$1.78	$2.19	$1.79	$2.30	$2.67
Richmond						
Monetary value of domestic water shortages	$0.08	$0.11	$0.12	$0.15	$0.18	$0.95
Lost utility revenues	$0.11	$0.14	$0.15	$0.17	$0.20	$1.36
River Plantation MUD						
Monetary value of domestic water shortages	$1.72	$6.56	$6.59	$5.65	$6.69	$9.14
Lost income from reduced commercial business activity	$0.00	$0.00	$1.07	$0.60	$1.17	$1.59
Lost jobs due to reduced commercial business activity	0	0	34	19	37	50
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.15	$0.09	$0.17	$0.23
Lost utility revenues	$0.38	$0.69	$0.85	$0.68	$0.87	$1.02
Riverside WSC						
Monetary value of domestic water shortages	$0.00	$0.05	$0.70	$2.32	$2.97	$2.79
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.50
Lost jobs due to reduced commercial business activity	0	0	0	0	0	16
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.07
Lost utility revenues	$0.00	$0.06	$0.13	$0.33	$0.44	$0.59
Rolling Fork MUD						
Monetary value of domestic water shortages	$14.23	$14.70	$15.18	$15.66	$16.25	$16.91
Lost income from reduced commercial business activity	$2.20	$2.27	$2.35	$2.42	$2.51	$2.61
Lost jobs due to reduced commercial business activity	88	91	94	97	101	105
Lost state and local taxes from reduced commercial business activity	$0.34	$0.35	$0.36	$0.38	$0.39	$0.41
Lost utility revenues	$0.42	$1.01	$1.19	$1.24	$1.30	$1.36

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Roman Forest						
Monetary value of domestic water shortages	$1.13	$9.56	$13.74	$21.53	$32.24	$46.28
Lost income from reduced commercial business activity	$0.00	$0.00	$2.41	$7.87	$11.97	$16.87
Lost jobs due to reduced commercial business activity	0	0	76	248	378	532
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.34	$1.12	$1.71	$2.41
Lost utility revenues	$0.25	$0.83	$1.53	$2.28	$3.28	$4.48
Rosenberg						
Monetary value of domestic water shortages	$0.00	$0.00	$0.41	$3.72	$35.71	$7.45
Lost utility revenues	$0.00	$0.00	$0.47	$3.35	$7.26	$11.90
San Felipe						
Monetary value of domestic water shortages	$0.00	$0.03	$0.06	$0.08	$0.09	$0.11
Lost utility revenues	$0.00	$0.04	$0.07	$0.09	$0.09	$0.10
Seabrook						
Monetary value of domestic water shortages	$9.85	$9.91	$21.30	$25.08	$47.21	$53.63
Lost income from reduced commercial business activity	$7.03	$10.74	$14.31	$18.15	$21.96	$25.99
Lost jobs due to reduced commercial business activity	157	239	319	405	490	579
Lost state and local taxes from reduced commercial business activity	$0.75	$1.14	$1.52	$1.93	$2.34	$2.77
Lost utility revenues	$2.31	$3.07	$3.80	$4.58	$5.35	$6.16
Sealy						
Monetary value of domestic water shortages	$0.00	$0.46	$0.99	$3.83	$4.53	$5.13
Lost utility revenues	$0.00	$0.66	$1.11	$1.33	$1.44	$1.63
Shenandoah						
Monetary value of domestic water shortages	$2.31	$10.39	$12.29	$12.32	$17.24	$27.09
Lost income from reduced commercial business activity	$0.00	$0.00	$3.07	$2.01	$4.62	$7.45
Lost jobs due to reduced commercial business activity	0	0	97	63	146	235
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.44	$0.29	$0.66	$1.06
Lost utility revenues	$0.73	$1.57	$2.27	$2.13	$3.23	$4.44

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Shephard						
Monetary value of domestic water shortages	$0.00	$0.07	$0.17	$0.22	$0.25	$0.26
Lost utility revenues	$0.00	$0.11	$0.18	$0.22	$0.24	$0.26
Sienna Plantation MUD #2						
Monetary value of domestic water shortages	$0.00	$3.99	$10.88	$10.82	$10.82	$10.82
Lost income from reduced commercial business activity	$0.00	$0.00	$2.10	$2.09	$2.09	$2.09
Lost jobs due to reduced commercial business activity	0	0	66	66	66	66
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.30	$0.30	$0.30	$0.30
Lost utility revenues	$0.00	$0.67	$1.33	$1.32	$1.32	$1.32
Simonton						
Monetary value of domestic water shortages	$0.00	$0.14	$1.90	$0.00	$0.00	$10.41
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$1.49
Lost jobs due to reduced commercial business activity	0	0	0	0	0	47
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.21
Lost utility revenues	$0.00	$0.15	$0.34	$0.53	$0.79	$1.09
Southern Montgomery County MUD						
Monetary value of domestic water shortages	$2.52	$12.33	$12.61	$11.31	$13.61	$18.48
Lost income from reduced commercial business activity	$0.00	$0.00	$1.21	$0.71	$1.41	$1.96
Lost jobs due to reduced commercial business activity	0	0	49	29	57	79
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.19	$0.11	$0.22	$0.30
Lost utility revenues	$0.80	$1.86	$2.33	$1.96	$2.55	$3.03
Southside Place						
Monetary value of domestic water shortages	$0.01	$0.27	$0.08	$0.13	$0.17	$0.25
Lost utility revenues	$0.01	$0.07	$0.11	$0.16	$0.22	$0.28
Southwest Utilities						
Monetary value of domestic water shortages	$2.86	$12.74	$16.62	$19.90	$24.88	$29.29
Lost income from reduced commercial business activity	$0.00	$3.67	$5.29	$6.05	$7.38	$8.56
Lost jobs due to reduced commercial business activity	0	116	168	193	241	281
Lost state and local taxes from reduced commercial business activity	$0.00	$0.52	$0.76	$0.87	$1.06	$1.24
Lost utility revenues	$0.50	$1.26	$1.68	$1.98	$2.36	$2.81

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Splendora						
Monetary value of domestic water shortages	$0.39	$1.79	$2.41	$3.58	$6.74	$9.69
Lost income from reduced commercial business activity	$0.00	$0.00	$0.15	$0.28	$0.92	$1.35
Lost jobs due to reduced commercial business activity	0	0	6	11	37	54
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.02	$0.04	$0.14	$0.21
Lost utility revenues	$0.09	$0.19	$0.31	$0.47	$0.71	$0.98
Spring Creek UD						
Monetary value of domestic water shortages	$1.11	$4.89	$6.47	$7.27	$11.42	$19.80
Lost income from reduced commercial business activity	$0.00	$0.00	$0.40	$0.29	$0.78	$2.72
Lost jobs due to reduced commercial business activity	0	0	16	12	31	109
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.06	$0.05	$0.12	$0.42
Lost utility revenues	$0.23	$0.48	$0.77	$0.80	$1.37	$2.05
Spring Valley						
Monetary value of domestic water shortages	$2.89	$13.65	$18.14	$18.89	$19.86	$21.43
Lost income from reduced commercial business activity	$0.00	$4.23	$5.46	$5.68	$5.98	$6.31
Lost jobs due to reduced commercial business activity	0	133	172	179	188	199
Lost state and local taxes from reduced commercial business activity	$0.00	$0.60	$0.78	$0.81	$0.85	$0.90
Lost utility revenues	$0.53	$1.27	$1.50	$1.55	$1.62	$1.70
Stagecoach						
Monetary value of domestic water shortages	$0.16	$0.85	$1.99	$2.01	$3.99	$6.25
Lost income from reduced commercial business activity	$0.00	$0.00	$0.09	$0.33	$0.55	$0.87
Lost jobs due to reduced commercial business activity	0	0	4	13	22	35
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.01	$0.05	$0.09	$0.13
Lost utility revenues	$0.04	$0.09	$0.16	$0.26	$0.40	$0.60
Stanley Lake MUD						
Monetary value of domestic water shortages	$1.53	$7.20	$10.64	$6.27	$7.47	$10.73
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.25	$0.50	$0.68
Lost jobs due to reduced commercial business activity	0	0	0	10	20	27
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.04	$0.08	$0.11
Lost utility revenues	$0.34	$0.76	$0.94	$0.76	$0.97	$1.14

Municipal (cont.)	2010	2020	2030	2040	2050	2060
Sugarland						
Monetary value of domestic water shortages	$0.00	$0.00	$2.46	$2.38	$2.38	$3.70
Lost utility revenues	$0.00	$0.00	$4.40	$4.26	$4.26	$5.91
Sunbelt FWSD						
Monetary value of domestic water shortages	$1.40	$30.82	$75.69	$89.34	$103.77	$117.01
Lost income from reduced commercial business activity	$0.00	$3.57	$11.02	$13.33	$15.59	$17.97
Lost jobs due to reduced commercial business activity	0	143	441	534	624	720
Lost state and local taxes from reduced commercial business activity	$0.00	$0.55	$1.71	$2.07	$2.42	$2.79
Lost utility revenues	$1.58	$5.81	$7.79	$9.14	$10.47	$11.88
Surfside Beach						
Monetary value of domestic water shortages	$0.00	$0.03	$0.06	$0.11	$0.16	$0.93
Lost utility revenues	$0.00	$0.04	$0.08	$0.12	$0.16	$0.20
Sweeney						
Monetary value of domestic water shortages	$0.00	$0.04	$0.07	$0.10	$0.15	$0.24
Lost utility revenues	$0.00	$0.06	$0.11	$0.15	$0.22	$0.30
Tomball						
Monetary value of domestic water shortages	$1.27	$41.40	$55.40	$83.23	$97.91	$119.44
Lost income from reduced commercial business activity	$0.00	$34.67	$50.44	$68.67	$82.04	$101.67
Lost jobs due to reduced commercial business activity	0	773	1,124	1,531	1,829	2,266
Lost state and local taxes from reduced commercial business activity	$0.00	$3.69	$5.37	$7.31	$8.73	$10.82
Lost utility revenues	$1.44	$4.23	$5.63	$7.45	$8.78	$10.74
Trail of the Lakes MUD						
Monetary value of domestic water shortages	$2.98	$17.25	$19.66	$22.03	$22.03	$22.03
Lost income from reduced commercial business activity	$0.00	$2.45	$3.03	$2.98	$2.98	$2.98
Lost jobs due to reduced commercial business activity	0	98	122	119	119	119
Lost state and local taxes from reduced commercial business activity	$0.00	$0.38	$0.47	$0.46	$0.46	$0.46
Lost utility revenues	$0.78	$1.76	$2.00	$1.96	$1.96	$1.96
Walker County Rural WSC						
Monetary value of domestic water shortages	$0.00	$0.10	$0.14	$0.14	$0.15	$0.19
Lost utility revenues	$0.00	$0.14	$0.22	$0.22	$0.24	$0.27

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Waller						
Monetary value of domestic water shortages	$0.01	$0.23	$1.69	$3.70	$8.58	$7.99
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$1.31
Lost jobs due to reduced commercial business activity	0	0	0	0	0	41
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.19
Lost utility revenues	$0.01	$0.30	$0.55	$0.81	$1.11	$1.45
Wallis						
Monetary value of domestic water shortages	$0.00	$0.02	$0.03	$0.04	$0.04	$0.06
Lost utility revenues	$0.00	$0.03	$0.05	$0.06	$0.06	$0.07
West Hardin WSC						
Monetary value of domestic water shortages	$0.00	$0.01	$0.03	$0.16	$0.25	$0.42
Lost utility revenues	$0.00	$0.01	$0.03	$0.04	$0.05	$0.07
West Harris County MUD #6						
Monetary value of domestic water shortages	$1.85	$12.81	$15.47	$8.54	$8.42	$8.42
Lost income from reduced commercial business activity	$0.00	$1.00	$1.25	$1.22	$1.20	$1.20
Lost jobs due to reduced commercial business activity	0	40	50	49	48	48
Lost state and local taxes from reduced commercial business activity	$0.00	$0.16	$0.19	$0.19	$0.19	$0.19
Lost utility revenues	$0.33	$0.78	$0.89	$0.87	$0.86	$0.86
West Harris County Regional Water Authority						
Monetary value of domestic water shortages	$0.00	$179.39	$294.01	$329.57	$344.12	$352.42
Lost income from reduced commercial business activity	$0.00	$0.00	$228.89	$271.73	$286.11	$293.75
Lost jobs due to reduced commercial business activity	0	0	5,102	6,057	6,378	6,548
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$24.36	$28.92	$30.45	$31.26
Lost utility revenues	$0.00	$42.61	$63.03	$71.05	$74.30	$76.41
West University Place						
Monetary value of domestic water shortages	$0.49	$0.77	$0.98	$1.32	$1.80	$6.95
Lost utility revenues	$0.78	$1.10	$1.40	$1.68	$2.03	$2.41

Municipal (cont.)

	2010	2020	2030	2040	2050	2060
Willis						
Monetary value of domestic water shortages	$0.75	$3.33	$4.25	$4.64	$6.97	$6.42
Lost income from reduced commercial business activity	$0.00	$0.00	$1.07	$0.76	$1.87	$3.18
Lost jobs due to reduced commercial business activity	0	0	34	24	59	100
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.15	$0.11	$0.27	$0.45
Lost utility revenues	$0.24	$0.50	$0.79	$0.80	$1.30	$1.90
Willow Run Subdivision						
Monetary value of domestic water shortages	$2.18	$8.61	$9.96	$9.77	$9.65	$9.65
Lost income from reduced commercial business activity	$0.00	$1.16	$1.42	$1.40	$1.38	$1.38
Lost jobs due to reduced commercial business activity	0	46	57	56	55	55
Lost state and local taxes from reduced commercial business activity	$0.00	$0.18	$0.22	$0.22	$0.21	$0.21
Lost utility revenues	$0.39	$0.90	$1.01	$0.99	$0.98	$0.98
Windfern Forest UD						
Monetary value of domestic water shortages	$0.92	$11.79	$13.88	$13.73	$13.73	$13.73
Lost income from reduced commercial business activity	$0.00	$1.53	$1.94	$1.92	$1.92	$1.92
Lost jobs due to reduced commercial business activity	0	61	78	77	77	77
Lost state and local taxes from reduced commercial business activity	$0.00	$0.24	$0.30	$0.30	$0.30	$0.30
Lost utility revenues	$0.32	$1.20	$1.36	$1.34	$1.34	$1.34
Wood Branch						
Monetary value of domestic water shortages	$0.38	$1.60	$1.83	$2.29	$3.61	$4.54
Lost income from reduced commercial business activity	$0.00	$0.00	$0.30	$0.45	$1.25	$1.67
Lost jobs due to reduced commercial business activity	0	0	9	14	39	53
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.04	$0.06	$0.18	$0.24
Lost utility revenues	$0.08	$0.17	$0.24	$0.30	$0.38	$0.48
Wood Creek MUN						
Monetary value of domestic water shortages	$2.05	$10.77	$15.55	$19.89	$24.00	$27.83
Lost income from reduced commercial business activity	$0.00	$1.45	$2.22	$2.80	$3.39	$3.98
Lost jobs due to reduced commercial business activity	0	58	89	112	136	160
Lost state and local taxes from reduced commercial business activity	$0.00	$0.22	$0.34	$0.43	$0.53	$0.62
Lost utility revenues	$0.37	$1.13	$1.58	$1.95	$2.32	$2.70

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
The Woodlands						
Monetary value of domestic water shortages	$19.44	$149.15	$162.28	$96.11	$152.29	$206.39
Lost income from reduced commercial business activity	$0.00	$134.57	$152.10	$66.22	$128.96	$175.60
Lost jobs due to reduced commercial business activity	0	1,872	2,115	921	1,794	2,442
Lost state and local taxes from reduced commercial business activity	$0.00	$10.83	$12.24	$5.33	$10.38	$14.14
Lost utility revenues	$6.17	$28.03	$30.73	$22.09	$28.27	$32.92