

North Fort Bend Water Authority



Groundwater Reduction Plan

March 2008

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Section 1 Executive Summary

The North Fort Bend Water Authority (the Authority) is a governmental entity created by Senate Bill 1798 of the 79th Texas Legislature. The primary mission of the Authority is to develop a strategy to comply with regulations set forth by the Fort Bend Subsidence District (FBSD). These regulations require water users within the Authority's territory and subject to FBSD's disincentive fee to limit groundwater pumpage to a percentage of their total water demand beginning in 2013. The water supply exceeding this amount must come from an alternative supply. Typically, this supply is surface water, although reclaimed water reuse and conservation are other options to reduce groundwater demand.

The following milestones are significant to the Authority's master plan for surface water conversion:

- 2008 – Receive FBSD certification of Groundwater Reduction Plan (GRP)
- 2013 – Meet 30 percent reduction in groundwater use
- 2025 – Meet 60 percent reduction in groundwater use

The Authority has identified the City of Houston (COH) as the preferred source of water for long-term surface water supply. The COH has raw water available in the Trinity and San Jacinto River basins that can be treated by three water purification plants and then conveyed through the existing COH water transmission and distribution system and future infrastructure to meet the Authority's long-term demands. The initial supply of treated surface water used to meet the Authority's demands through 2024 will be received in the vicinity of Bellaire Boulevard and South Dairy Ashford Street near the western perimeter of the COH water system. Beginning in 2025, this supply will be supplemented with treated COH water delivered by way of a pipeline with capacity shared between the Authority and the West Harris County Regional Water Authority (WHCRWA). The Authority will participate in this project to provide a treated water supply originating from the northern side of the Authority's boundary.

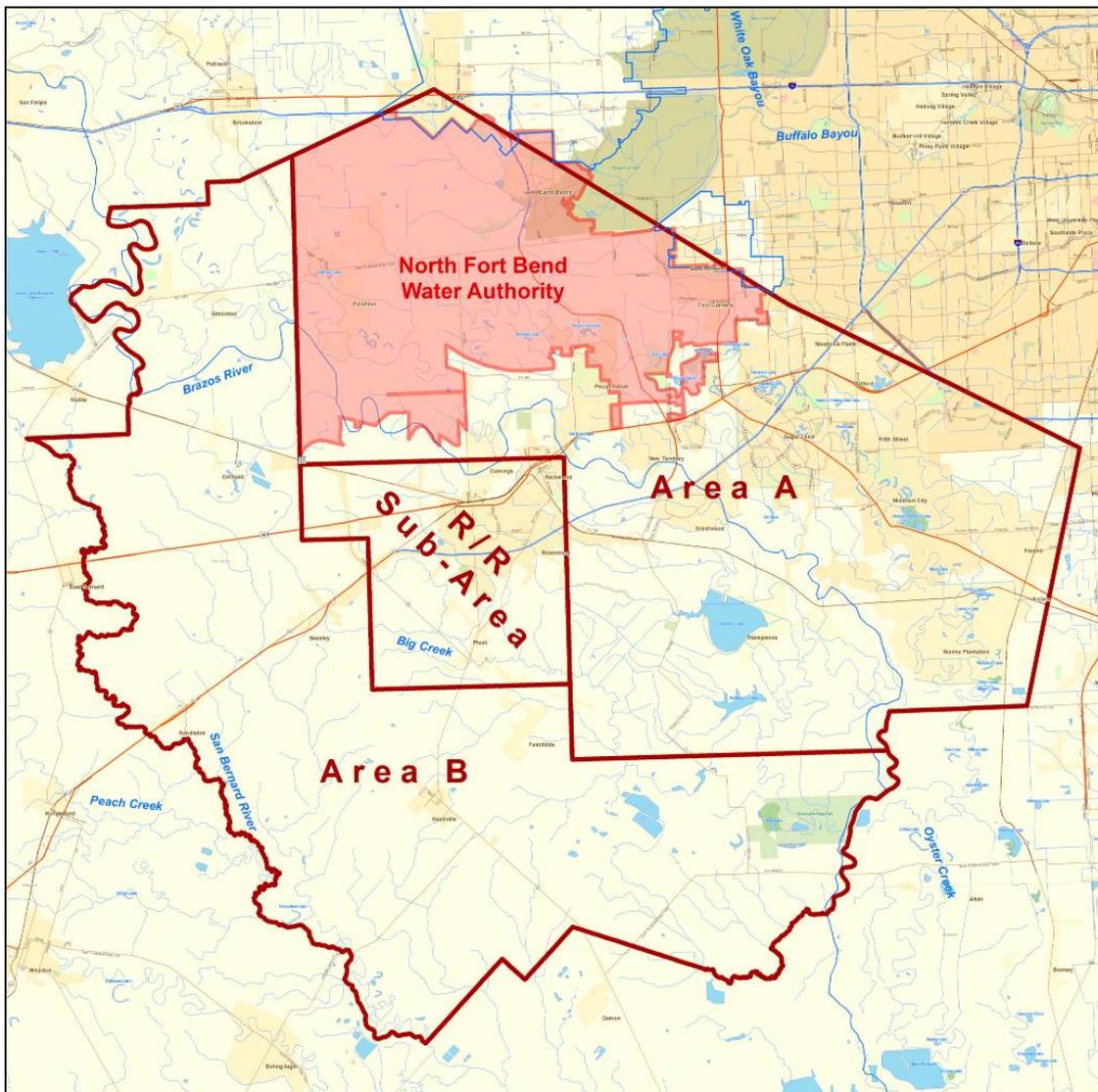
The Authority's water transmission system will be expanded from the 2013 service area which is intended to meet surface water supply requirements through the end of 2024, to a larger system capable of meeting the more stringent subsidence regulation and increased demands of the Authority out to the year 2055. Pump station facilities will be phased in as necessary over the life of the transmission system.

The Authority anticipates that reclaimed water use and early or over conversion will generate credits that may be used to offset the total amount of surface water required to achieve compliance. The Authority may use these credits to meet regulatory requirements in years of higher than anticipated demand or to adjust the second phase of surface water conversion as the system becomes operational.

Section 2 Introduction

Fort Bend Subsidence District (FBSD) regulations drive the need and schedule for conversion of the Authority to surface water. In the 2003 District Regulatory Plan (DRP), the FBSD has divided Fort Bend County into three distinct areas with separate conversion goals and requirements. These areas are shown in *Figure 1*.

**Figure 1
FBSD Regulatory Areas**



As shown in *Figure 1*, the entirety of the Authority is located within Regulatory Area A. Permitted groundwater users within Regulatory Area A are required to have a certified Groundwater Reduction Plan (GRP) before permits are renewed in 2008 in anticipation of regulations requiring the reduction of groundwater use starting in 2013. Beginning in 2013, groundwater use will be limited to 70% of the permittee's total water demand. This amount will decrease to 40% beginning in 2025.

There are currently no regulations on groundwater use in Area B, except that groundwater produced within this area cannot be imported into Area A as an alternative source of water to fulfill conversion requirements. Additionally, groundwater users in Area A may also be considered exempt from regulation if they meet one of the following criteria:

1. Water is used for irrigation of agricultural crops.
2. The permittee has a total water demand of 10.0 million gallons per year or less. However, if an alternative water supply is available at the site, the permittee may be required to convert unless they are in compliance with a GRP.
3. The permittee meets requirements for exemption based on economic hardship.

Barring these exemptions, all permitted well operators are required to follow the regulations set forth for Area A.

2.1 Creation of the Authority

The Authority was created by the 79th Texas Legislature through the passage of Senate Bill 1798 in May 2005 in response to the need to reduce ground water use described above. The objectives of the Authority are to reach compliance with FBSD's groundwater reduction initiative and to develop a long term plan for surface water delivery to its customers.

The Authority currently encompasses 44 utility districts and the City of Fulshear as well as other private well owners within its jurisdictional boundary (see *Exhibit 1*). A list of included participants can be found in *Appendix A*. Although originally included in the Authority boundary, FB MUD 25 requested and was excluded (see *Appendix B*). The Authority has the power to raise funds through various means including groundwater pump-age fees and the selling of bonds.

2.2 GRP Plan Participants

Participants in the Authority's GRP include two types of water users. The first group includes the owners of wells subject to FBSD's disincentive fee within the boundary of the Authority, shown in *Figure 1* and listed in *Appendix A*.

The second type of participant is included in the GRP by contract. The George Foundation has reached an agreement with the Authority to include portions of The George Ranch in the Authority's GRP. A copy of the agreement between the Authority and the George Foundation can be found in *Appendix C*. Other entities may also choose to contract with the Authority. However, the George Foundation is the only existing contract participant.

The George Foundation will pay groundwater pumpage fees as if they were within the Authority boundary. In turn, the Authority will convert within its boundary in excess of the required amount in order to meet the conversion requirements of contract participants.

The Authority has coordinated with the FBSD to amend the expiration date for all existing non-exempt well permits for permittees participating in the Authority's GRP to a single permit expiration date of September 2008. It is the intent of the Authority to comply with all regulations and obtain a certified GRP in advance of that deadline.

2.3 Planning for Surface Water Conversion

Extensive planning has been performed in an effort to create this GRP. Previous planning efforts included the Potential Water Source Study, and the Alternative Analysis of alternative surface water sources and delivery options. These studies were prepared to guide the Authority's decision in selecting a preferred strategy. *Appendix D* includes the Potential Water Source Study completed by the Authority's consultants to identify viable sources of water for meeting conversion requirements. The Alternative Analysis of various delivery strategies is included in *Appendix E* of this GRP. This document presents detailed information regarding the development of population and water demand projections throughout the planning period as well as the development of capital and operation and maintenance costs for the selected alternative which is incorporated into this GRP.

Section 3

Population and Water Demands

3.1 Population Projection Methodology

An accurate estimate of future population is an essential component of the overall planning efforts to adequately anticipate future demand for water. Past forecasts of future population for Fort Bend County have consistently underestimated the population growth. Therefore, high priority was placed on identifying and evaluating multiple sources of information and data available to accurately forecast population in the Authority.

Potential sources of population projections and projection methodologies were investigated to evaluate their advantages, disadvantages and usefulness to the Authority. Sources of population data and/or projections that were identified utilize data from the 2000 Census and include:

- UH Center for Public Policy - UH Houston Economic Multi-Sector (HEMS) Model
- UH Center for Public Policy - Small Area Model-Houston
- Population and Survey Analysis (PASA)
- Municipal Information Services (MIS)
- Houston-Galveston Area Council (H-GAC)
- American METRO/STUDY Corporation
- Texas State Data Center, and
- Texas Water Development Board (TWDB)

The above sources of data were evaluated to determine which source would be best suited for use in developing population forecasts for the Authority. For each data source, the length of forecast and overall detail of the data available were considered in selecting the preferred data source for developing the population forecasts for the Authority.

Each of the above data sources tended to aggregate population geographically at different grid sizes and arrangements. For example, depending on the data source, population forecast may be aggregated for an entire county, incorporated area (towns and cities), groups of census tracts (analysis zones), individual census tracts, or even smaller areas, such as a residential subdivision or a cell within a grid of cells. Developing a GRP requires that not only the overall population and water demands for a given area be estimated but that the location of that water demand be identified as accurately as possible. For this reason, a data source that provides population forecasting for the Authority area at a smaller, discrete level of detail is more useful in developing the GRP.

The FBSD regulations require that a GRP be developed for a period not less than the year 2030. However, the availability of a population forecast beyond the 2030 timeframe is advantageous to assist in the overall planning of the facilities required to implement a GRP. For example, each phase of conversion (i.e., 2013 and 2025) will include facilities that will be constructed at a size to accommodate future water demands well beyond the demand estimated for that particular phase

Water demands are generated based on the projected populations provided by a given forecasting model and the estimated per capita water use developed for a given area. Per capita water demands vary depending on the types of development forecast for a given area (i.e., single-family residential, multi-family residential, commercial). Therefore, a population data source that provides sufficient detail to estimate subsets of population such as single-family and multi-family populations, and/or a forecast of employment in addition to population is also valuable in developing a comprehensive GRP.

Municipal Information Services (MIS) is recognized in the region as an expert in collecting and evaluating financial and demographic data for special districts in the Houston region and publishes the "Guide to Houston Area Municipal Utility Districts." In its work, MIS utilizes tax role data, current aerial photography, official statements related to sales of bonds, 911 (emergency services) information, and other sources of data. MIS has more than 25 years of experience with clients including forecasting population through the anticipated life of the development to complete build-out. In addition, MIS was well-suited to develop an estimate of existing population and short-term forecast of population to approximately 2010 based on their database and hands-on knowledge of existing developments and the development trends in the Authority area. For these reasons, MIS was selected to provide a forecast of total population for the Authority.

After considering the information and forecasts available from the potential sources, the detailed land use data and computer modeling capabilities provided by the Houston-Galveston Area Council (H-GAC) were determined to best satisfy the need for a projection that forecasts where development is most likely to occur within a larger area. The H-GAC land use model uses numerous economic variables to estimate the relative 'attractiveness' of 1,000' x 1,000' grid cells compared to other cells. More attractive cells receive a greater proportion of forecast total population than less attractive cells receive. The two forecasts are used together in the methodology described in the following paragraphs.

Only in the process of understanding the data and forecasts available could a complete methodology be developed to project population within the NFBWA. Major steps within the methodology include:

1. Estimate population in the Authority from 1990 to present to develop baseline estimates of population growth.
2. Develop high level forecast of Authority-wide population.
3. Develop grid-level forecast of Authority population.

The following sections provide additional information for each of these steps in the methodology.

3.2 Estimate Population in the Authority from 1990 to Present

New Municipal Utility Districts (MUD) were identified and current MUD information was obtained to update MIS' MUD database. Data typically consists of counts of lots and housing units and does not address population directly. 2000 Census data was used to determine "Occupancy Rate" and "Population per Occupied Unit" for each of the sixteen census tracts entirely or partially within the boundaries of the Authority. Occupancy rates vary from approximately 80% to more than 99%. Population per occupied unit varies between 2.7 and 3.5 people/unit.

The estimated population within the Authority from 1990 to present was calculated based on estimates of single- and multi-family housing units multiplied by corresponding factors for "Occupancy Rate" and "Population per Occupied Unit." The population in the Authority is estimated to have been 107,000 in 2005.

3.3 Develop High Level Forecast of Authority-Wide Population

Based on MIS years of experience analyzing and developing similar projections, it was determined that MUD information, on-site inspection of current development, and housing market conditions would be used to develop a short-term forecast through 2010 of residential lots and housing units. Based on this information, estimates of population were developed by applying the occupancy rate and persons per occupied unit factors obtained from the 2000 Census. This forecast projects the population to grow from approximately 107,000 in 2005 to 160,000 in 2010.

Being confident that a land-use based model is the preferred method to forecast long-term population, it was necessary to compare H-GAC's estimated 2010 population to MIS' estimated 2010 population in the Authority. H-GAC's population is based on grid cells to spatially distribute population over the entire area. Based on summing the populations of grid cells within the Authority, H-GAC's estimate of the Authority's population in 2010 is approximately 40% less than MIS' estimated population of 160,000. This disparity did not diminish the value of H-GAC's forecast because a land use model attempts to accurately represent the relative "attractiveness" of an area with respect to other areas based on factors such as proximity to transportation and likelihood of flooding. Therefore, a method was needed to take advantage of the benefits of H-GAC's forecast while adjusting the forecast upward to eliminate the difference in the starting 2010 population.

Of several methods considered, the concept of "capture rate" was chosen because it is consistent with the common idea that some areas develop before other areas because they are more attractive. Therefore, attractive areas capture a greater proportion of the population moving in than do less attractive areas of the County. By comparing the estimated populations within the Authority territory and Fort Bend County since 1990, the Authority's capture rate (i.e., the population that moves into the Authority territory as a percentage of the population moving into the County) has increased from approximately 18% from 1990 to 1995 to more than 50% from 2000 to 2005. An obvious limitation on the ability of the Authority to continue to capture 50% of the population moving into the County is that the Authority territory fills up. Therefore, the capture rate must decrease as attractive space available to

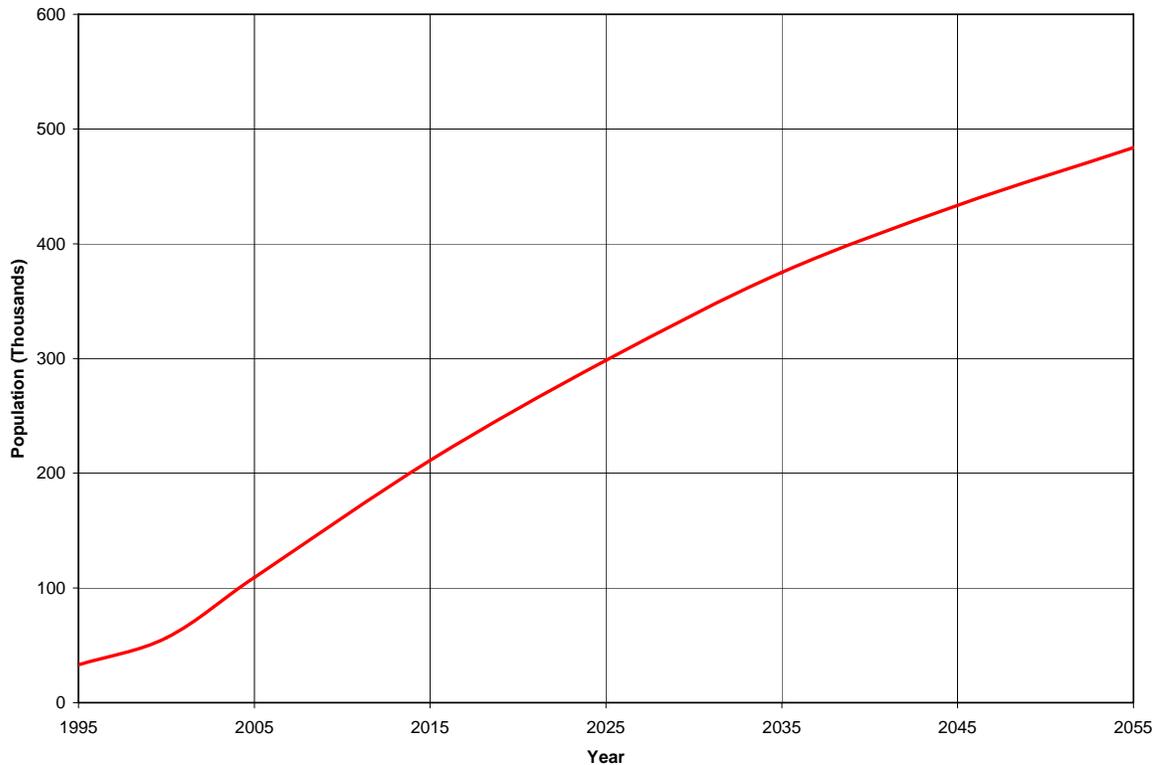
absorb population decreases and decreasing capture rate was the method developed to utilize H-GAC's forecast.

Beginning in 2010, future population within the Authority was estimated assuming that the Authority's capture rate decreases to 95% of the capture rate of the previous five-year period. Using this method the projected population within the Authority is approximately 205,000 in 2015: 289,000 in 2025: and 365,000 in 2035 – the end of H-GAC's forecast.

Adequate water supply planning relies on forecasts of 50 years or more: therefore, the population forecast had to be extended from 2035 to at least 2050 or beyond. It was determined to continue the forecast at 10-year intervals to 2045 and 2055. Analysis of H-GAC's forecast indicates that the population over five-year periods increases at a predictable rate. Therefore, this predictable trend as well as the TWDB projections of population were used to extend the forecast assuming that the percent increase in population during each five-year period is 88% of the previous five-year period. The projected population within the Authority is approximately 429,000 in 2045 and 481,000 in 2055.

Figure 2 shows the historic and projected growth of the Authority from 1995 through the year 2055.

Figure 2
Population Forecast for the Authority



3.4 Develop Grid-Level Forecast of Authority Population

The H-GAC grid cell population was used as the basis or starting point to forecast population at the grid level. H-GAC's population for grid cells within the Authority had already been found to be significantly less than the Authority's estimate of existing population. However there is value of a land use model in representing the "attractiveness" of an area relative to other areas. The process to adjust H-GAC grid cell population so that the total matches the Authority estimate simply requires multiplying H-GAC's population for each cell by the ratio of the Authority's estimate to H-GAC's total.

The process described above was limited by a "population cap" placing a maximum on the population that could be assigned to a cell based on population density (people per useable acre). Applying a population cap required a determination of 1) the maximum population density to allow and 2) useable area for each cell.

The maximum population density (people per useable acre) was determined by analyzing the densities of built-out developments within the Authority. The criterion used to categorize a development as built-out is that the number of houses be at least 95% of the number of residential lots in the development. Seventeen developments meet this criterion and were found to have an average population density of approximately ten people per useable acre.

The useable area was determined using the Authority's geographic information system (GIS) to analyze land use. Useable area excludes floodways, electric power and petro-chemical transmission corridors, transportation rights-of-way, and school and other governmental entity property (See *Exhibit 2*).

Once the population density factor was determined and the usable area for each cell was obtained using GIS, the adjusted population for each grid cell is the smaller of the population cap or the projected population. If the projected population exceeded the population cap, the population in excess of the cap was added to the adjacent cell to the southwest. This process began at the most northeasterly cell in the Authority and continued until the population remained under the cap. If the southern or southwesterly edge of the Authority was reached and there was still population in excess of the cap, then the excess was added to the next cell at the northeasterly edge of the Authority not already processed. This procedure was repeated for projected populations in 2015, 2025, 2035, 2045, and 2055. The changes in population between 2005 and 2055 are shown in *Exhibits 3* through 6.

3.5 Development of Per Capita Water Demands

Two approaches were taken to investigate per capita water demand in the Authority. The first approach was at the MUD level and is based on dividing metered groundwater pumpage for the MUD by the MUD's estimated population. To the extent possible, this effort also made use of responses received to the Authority's questionnaire to check population (indirectly based on connection data), pumpage, and interconnections to other Districts to discover possible import/export of water that would otherwise skew the pumpage information. Due to limitations on availability and quality of data, per capita demand based on MUD information was only estimated for 2005. Note that 2005 was a dry year for which pumpage in most MUDs was higher than average.

The results of this effort revealed variations in per capita demand from approximately 100 gallons per capita per day (gpcd) for older development without amenity lakes and significant lawn or esplanade irrigation to approximately 240-gpcd in newer developments with amenity lakes and/or irrigation of large green spaces. The average demand for eighteen MUDs, weighted based on estimated population, was found to be 210-gpcd.

The second approach was at the Authority level and is based on dividing groundwater pumpage reported to the Subsidence District by the estimated population within the Authority. This calculation was made for each year from 1990 to 2005. The first observation is that data for population and pumpage show similar patterns of increase over this period. The similar patterns confirm the strong, direct relationship between population and water demand. In addition, the largest deviations from the pattern are increased pumpage in the dry years of 1999, 2000, and 2005. Decreased pumpage in wet years does not stand out as clearly, but 1997 and 2004 are notable.

After dividing pumpage by population for each year, a trend of increasing per capita water use is evident. This trend is attributed to the movement toward larger, master-planned communities with amenity lakes and significant irrigation of esplanades and green spaces. Because the upward slope of the trend appears to be skewed by the recent dry years (1999, 2000, 2005), the data were divided into three components for further analysis. Without recent wet or dry years, the four most recent “average years” (1998, 2001, 2002, 2003) have an average of approximately 170-gpcd with only a slight upward trend. Analysis of average years was limited to these four years because recent history is more representative of current conditions in the Authority than are earlier data.

Based on the trend for the average years, lines with the same slope were fit to the wet years and dry years. These lines provide a range of per capita water demand applicable to the Authority depending on rainfall. The average water demand in the Authority is approximately 170-gpcd and the water demand in a dry year is expected to be approximately 210-gpcd.

3.6 Demands for Contract Participants

In addition to the demands summarized in the sections above, water demands were also considered for participants outside of the Authority boundary. Other entities may participate in the Authority’s Groundwater Reduction Plan (GRP) through contract. These contract participants will pay the same rates as rates paid by districts within the Authority in exchange for inclusion in the Authority’s GRP. The Authority will then over-convert areas within the Authority boundary to meet the groundwater reduction requirements of the contract participants’ groundwater withdrawals outside the Authority boundary up to the contract cap amounts.

Interest was expressed by The George Foundation to participate in the Authority’s GRP through contract. The George Foundation owns over 21,000 acres of undeveloped land south of the Brazos River and southeast of Richmond making it the most significant contract participant. Forecast demands for the George Ranch property were provided by The George Foundation reflecting a projected development schedule. The George Foundation water demands are listed in *Table 1*. There is enough extra capacity in the phasing of the Author-

ity’s facilities to account for the lower demands in the near future. Consequently the Authority modified these original demands as shown below for planning purposes.

Table 1
Water Demand for Contract Participants

Contract Participant	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
George Ranch ¹	6.0	8.0	14.0	15.0	15.0	15.0
Modified George Ranch	0.0	0.0	10.0	15.0	15.0	15.0
Total Contract Participant Demand	6.0	8.0	10.0	15.0	15.0	15.0

¹ Source: The George Foundation

3.7 Distribution of Water Demands through Planning Horizon

Per capita water demands were developed that allowed the application of these values to the population projections to determine total estimated water demand for the Authority, as shown in *Table 2*. *Figure 3* illustrates the growth in water demand for the Authority through 2055 as well as the required alternative water use based on the conversion requirements of FBSD regulations.

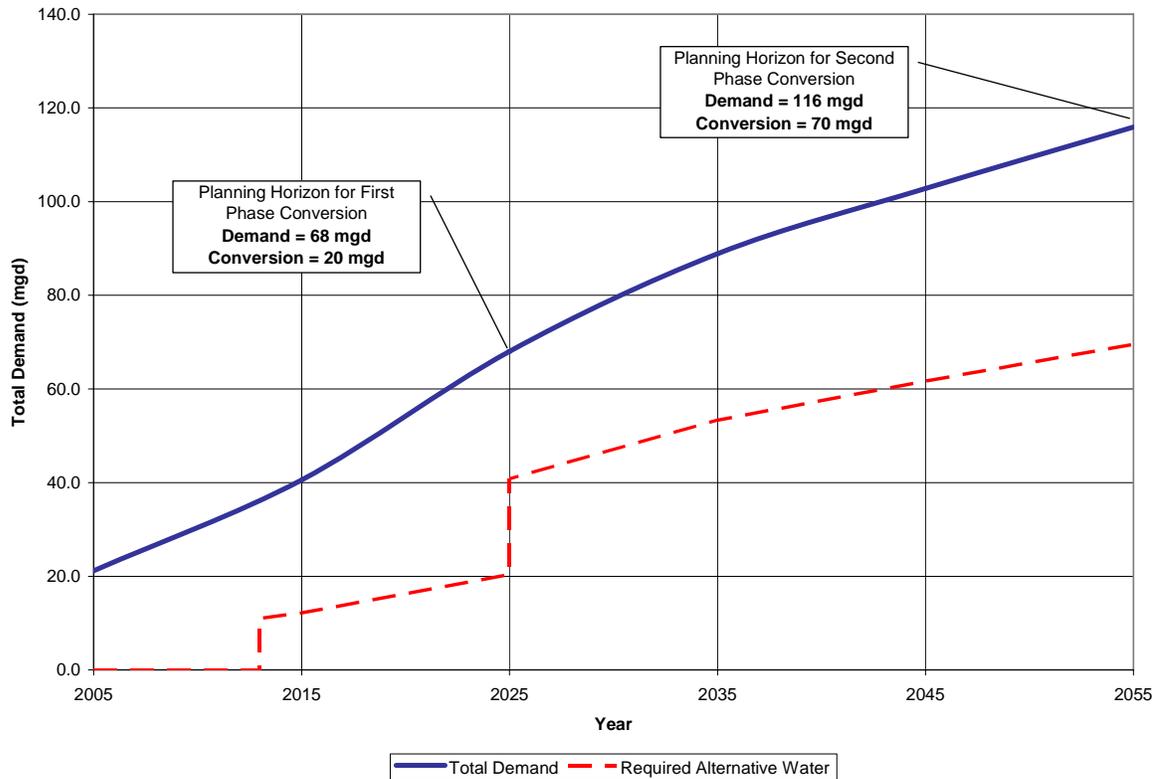
Table 2
Authority Projected Population and Demand

Year	Population	Authority (mgd)	George Ranch (mgd)	Total Demand (mgd)
2005	107,000	--	0.0	--
2013	173,300	36.4	0.0	36.4
2015	205,000	40.6	0.0	40.6
2025	289,000	58.0	10.0	68.0
2035	365,000	73.9	15.0	88.9
2045	429,000	87.8	15.0	102.8
2055	481,000	100.9	15.0	115.9

Authority demand projections based on a 210 gpcd rate.

FBSD regulations create two distinct planning horizons for surface water conversion in Fort Bend County. The first phase of conversion begins in 2013 and requires regulated groundwater users to convert at least 30% of their total water demand to an alternative water supply. The second and final phase starts in 2025 and requires conversion of at least 60% of the total water demand to an alternative water supply or supplies. For purposes of this study, the second phase conversion requirement (60%) is continued through the end of the study period in 2055.

Figure 3
Authority Water Demand and Minimum Regulatory Conversion Requirement through Planning Period



Exhibits 3, 4, 5, and 6 illustrate the spatial distribution, by 23-acre grid cell, of estimated water demand in 2005, 2015, 2025, and 2055, respectively. The growth in population, and therefore the corresponding increase in water demand, generally increases most significantly in the southwestern portions of the Authority.

The single largest component of demand in the Authority is existing utility districts. A large portion of the Fort Bend County water demand, particularly in later years, is associated with regions that are primarily undeveloped and outside existing utility districts. These portions of the Authority were divided into fourteen areas shown in *Exhibit 7*. Demand for these areas was forecast separately and is summarized in *Table 3*.

Table 3
Projected Water Demand for Undeveloped Areas

Undeveloped Area	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
Central Area 1	0.14	0.21	0.29	0.71	2.37	3.59
Central Area 2	0.04	0.14	0.49	0.78	1.71	2.51
Central Area 3	0.02	0.15	0.18	0.32	1.05	1.58
East Area 1	0.17	0.20	0.23	0.30	0.32	0.32
East Area 2	0.12	0.24	0.50	0.58	0.69	1.12
East Area 3	0.08	0.55	1.04	1.27	3.46	4.05
North Area 1	0.13	0.22	0.27	0.32	0.52	0.73
Northwest Area 1	0.03	0.15	0.29	0.31	0.42	0.52
Northwest Area 2	0.22	0.37	0.82	1.15	2.14	3.00
South Area 1	0.17	0.17	0.22	0.24	0.91	2.60
Southeast Area 1	1.30	1.82	2.14	2.41	2.87	2.87
Southwest Area 1	0.44	0.85	1.88	2.64	2.91	3.88
West Area 1	0.02	0.08	0.19	0.45	0.51	0.70
West Area 2	0.00	0.01	0.16	0.45	2.04	3.41
Total	2.88	5.16	8.68	11.92	21.91	30.89

It was also assumed that the unincorporated demands include water usage by private well owners. These include water usage by golf courses, home owners' associations, and other non-exempt well usage that is not included in the municipal demands specifically identified here.

Finally, *Table 4* summarizes all of the demand identified above to provide the total water demand for the Authority.

Table 4
Total Projected Water Demand for the Authority

Demand Type	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
NFBWA Utility Districts	33.5	35.5	49.3	62.0	65.9	70.0
NFBWA Undeveloped Areas	2.9	5.2	8.7	11.92	21.9	30.9
George Ranch	0.0	0.0	10.0	15.0	15.0	15.0
Total	36.4	40.7	68	88.9	102.8	115.9

Section 4 Water Supply

4.1 Water Supply Sources

In 2006, the NFBWA studied possible water supply options (*Source Supply Study*, BGE/TCB in *Appendix D*). The Study included the following major tasks:

1. Review of available information, models, reports & TCEQ data to identify potential water supply entities.
2. Evaluation of identified water supply entities to determine available water.
3. Evaluation of potential water rights acquisitions including reliability.

A number of entities were identified as potential providers of surface water to meet the Authority's needs. In alphabetical order, those entities are:

Brazos River Authority (BRA)
Chocolate Bayou Water Company (CBWC)
City of Houston (COH)
City of Missouri City (COMC)
City of Sugar Land (COSL)
Coastal Water Authority (CWA)
Gulf Coast Water Authority (GCWA)
Texas Genco
TXU Power (TXU)
West Harris County Regional Water Authority (WHCRWA)

Further review and study reduced the list of possible providers to the COH and the BRA. Using these two potential water supply sources, the NFBWA studied various alternatives (*Alternative Analysis*, BGE/TCB in *Appendix E*). The report recommended that the Authority move forward with contracting water from the COH.

4.2 Availability of COH Water

Water from the COH is projected to be available in sufficient quantities to meet the regulatory requirements of the Authority throughout the planning horizon. However, the existing infrastructure to deliver this water is generally not available at a capacity and location sufficient to facilitate conversion. Therefore, obtaining sufficient supply for each of the two phases of conversion outlined in this GRP will likely require additional infrastructure to deliver the required volume of water from the COH to the Authority.

The firm yield surface water supply for the COH is identified in the 2006 Region H Regional Water Plan (RWP) as 1,217,348 acre-feet per year. This firm yield supply represents the volume of water available under drought of record conditions at the end of the RWP planning horizon (year 2060). Over 80 percent of this water originates in the Trinity River basin as reservoir supply from Lake Livingston or as run-of-river supplies along the lower stretch of the Trinity River. These water supplies are made available to the COH through the Coastal Water Authority (CWA) Main Canal that conveys water to treatment facilities in Harris County. The remaining supply originates in the San Jacinto River basin with the majority of that water originating from Lake Houston and a smaller share coming out of the COH water right for Lake Conroe.

The COH operates three water purification plants, the East Water Purification Plant (EWPP), the Southeast Water Purification Plant (SEWPP), and the North East Water Purification Plant (NEWPP). The EWPP began operation in 1954 and currently has the largest capacity of the three facilities at 350 mgd. The EWPP receives water primarily from the CWA Main Canal but currently blends this supply with a small amount of water from Lake Houston. The SEWPP relies solely on Trinity River water from the Main Canal and is linked to a major portion of the COH water transmission system along with the EWPP. The SEWPP currently has a capacity of 200 mgd. The NEWPP is supplied entirely from Lake Houston and can only provide a limited amount of water to most areas served by the COH treated water transmission system. Although the current capacity of the plant is 80 mgd, only about 12 mgd of water is available to the system served by the EWPP and SEWPP because the majority of the capacity in the NEWPP is currently contracted to or is planned for use by the NHCRWA and WHCRWA.

The WHCRWA currently receives water from the COH by way of the City's Jersey Village Pump Station. This supply will eventually become inadequate to supply the entire WHCRWA surface water demand. At that time, the WHCRWA will augment their surface water supply with water conveyed through a future pipeline from the COH's water purification plants. This future pipeline is currently identified as the source of treated COH water for the Authority beginning in 2025.

4.2.1 2013 Conversion

The Authority plans to purchase surface water from the COH to serve their demands through the first conversion period of 2013 to 2024. Water will be supplied from the vicinity of the intersection of Bellaire Boulevard and South Dairy Ashford Street (See *Exhibit 8*). The COH has indicated that the infrastructure in place to convey water to this location is sufficient to provide for the Authority's demands until the beginning of the second conversion phase in 2025.

Water received at the above location is, at this time, treated at the COH EWPP and conveyed through the COH transmission system. The Authority will store and repump water received and convey it into the Authority.

4.2.2 2025 Conversion

The amount of water required by the Authority for surface water conversion beyond the year 2025 exceeds the capacity of the COH's existing system to convey that quantity of water to the Bellaire Boulevard location. The Authority plans to receive additional COH treated water from a second take point that extends 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 Authority will take water at a point north of the Authority's boundary near the intersection of Clay and Peek Roads (See *Exhibit 9*) and conveyed into the Authority. Either at the take point or within the Authority's territory, the water must be stored and the pressure boosted for delivery to the Authority's water transmission system. This supply will augment water from the earlier take point established to supply 2013 to 2024 demands and provide dual supply points.

4.3 COH Contract Provisions

The COH, by letter dated July 6, 2007, has agreed to supply water to the Authority (see *Appendix F*). Initially the COH agreed to supply water to the Authority under the terms of the existing contract between the City and the WHCRWA. Now, however, the Authority is pursuing a separate contract with the City. A draft contract was submitted to the COH in December 2007 and the City and the Authority are currently negotiating and plan to execute an agreement by mid 2008. NFBWA and WHCRWA have agreed to work together and are negotiating a separate contract to address how they can share facilities to reduce costs for both parties.

The Authority will participate with the WHCRWA for construction, operation, and maintenance of jointly shared facilities that are beneficial to both parties. The Authority plans to participate in the WHCRWA pipeline to bring water from the COH across town to the north of the Authority. This pipeline will provide the water for the Authority's second take point in 2025 (see *Exhibit 10*).

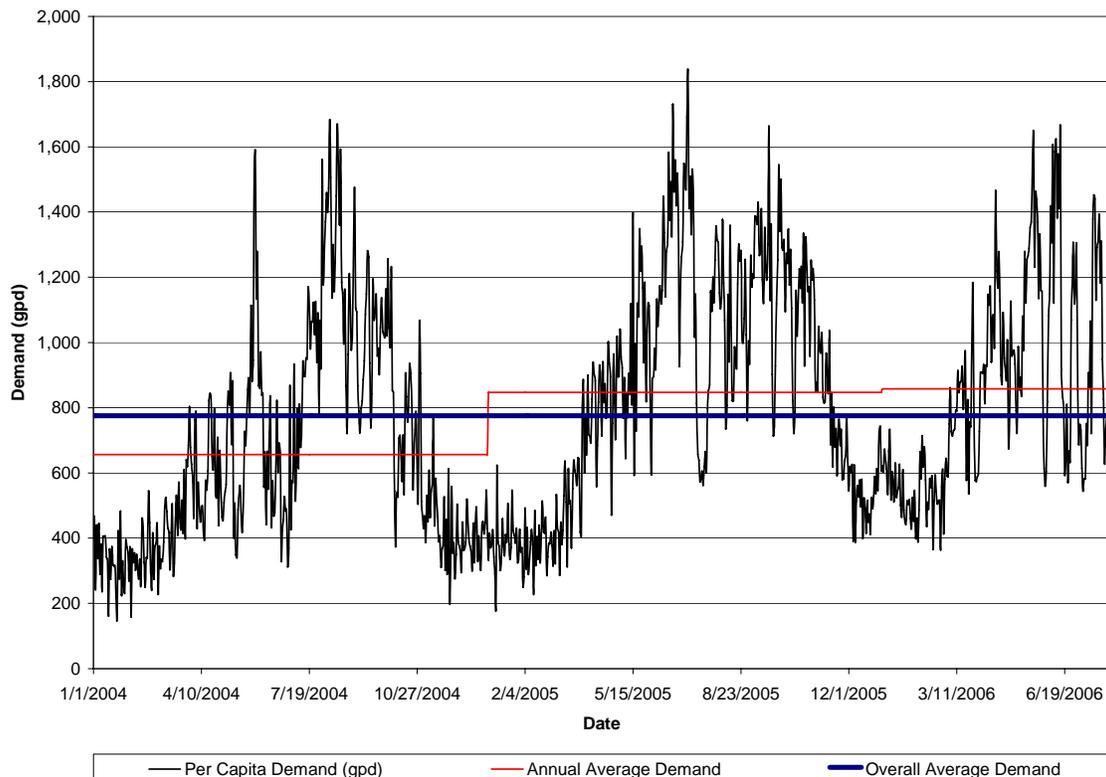
Section 5 Infrastructure Requirements

5.1 Surface Water Delivery Capacity

Three factors were considered when determining the necessary capacity of the Authority’s surface water transmission system. The first and most critical factor was the total water demand throughout the planning period. Secondly, the regulated use of groundwater directly affects the amount of surface water required for delivery to converted areas and these regulated levels are set by FBSD.

However, a third component that is vital to the sizing of the surface water delivery system is the seasonal variation of demand throughout the year. *Figure 4* provides a compilation of groundwater pumpage data on a per connection basis for fifteen MUDs in Fort Bend County. *Figure 4* illustrates that there are periods of time when the use of the various entities is less than the average day amount required to meet conversion goals. During these times, the surface water delivered and used will be less than the amount required to meet conversion goals on an annual basis. This means that a surface water delivery system must be sized to meet the 2025 and beyond conversion requirements by either converting more than 60% of the district demand, by increasing the peak delivery rate above the average day rate required to meet the goal for conversion, or a combination of both.

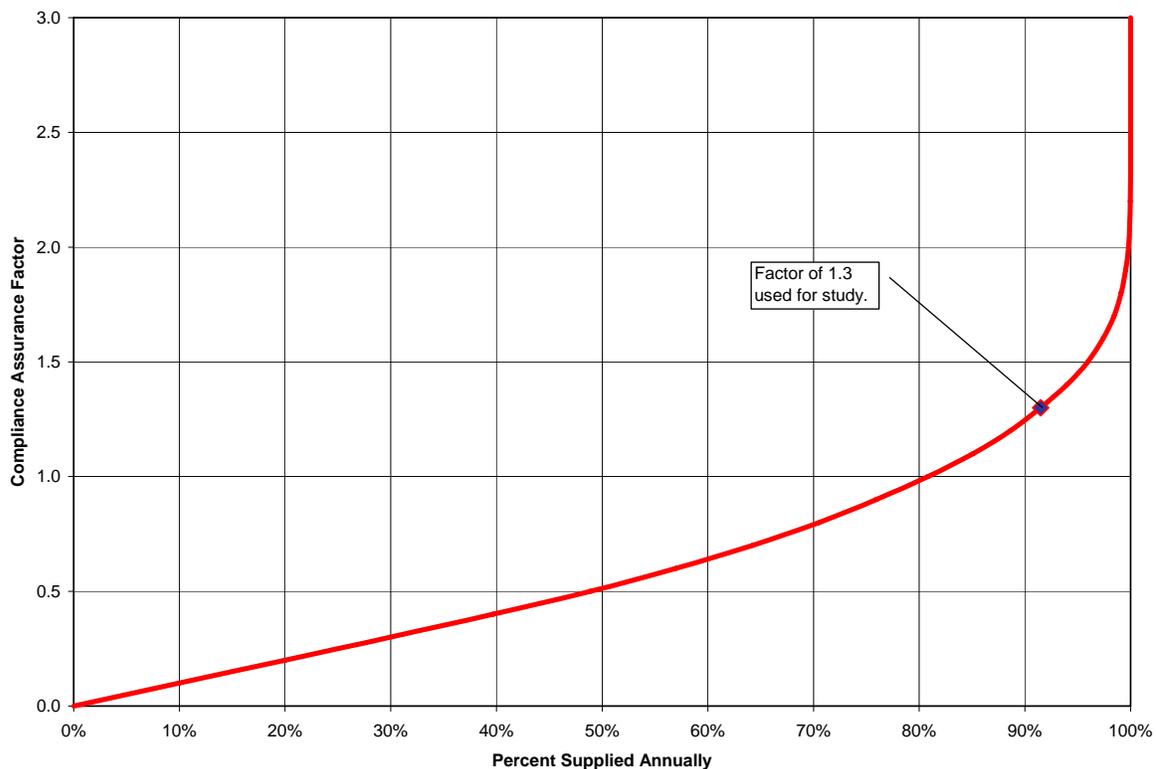
**Figure 4
 Groundwater Pumpage Data for Fifteen Fort Bend County Districts**



Consideration was given to this issue and it was recognized that two solutions exist. One solution would be to lay additional lines to convert more districts to compensate for this problem. Alternatively, the pipe system and plant facilities could be oversized to provide for a higher level of peak demand. The term ‘compliance assurance factor’ is used in this study to define the peak capacity rate at which surface water must be provided to those entities receiving surface water to ensure an annual use of 60% (starting in 2025) surface water in the Authority. It is not a peaking factor in the traditional sense of increasing the average day demand to a peak day or peak hour demand. MUD will continue to use their existing wells and storage facilities to meet peak day and peak hour water demands.

Figure 5 further illustrates the relationship between peaking (‘compliance assurance factor’) and the percentage of annual demand that can be supplied. The data for this Figure is derived from the information shown above in Figure 4. However, Figure 5 demonstrates how much of a district’s water demand could be met by building a surface water supply system with various compliance assurance factors incorporated. This Figure illustrates that supplying water at a rate of average day demand, or a factor of 1.0, would give a district the ability to receive only 80% of their demand from surface water.

Figure 5
Compliance Assurance Factor Relating to Various Supply Capacities



It was decided to apply a compliance assurance factor of 1.3 to the pipe system, which means that the system could supply approximately 90% of districts’ total annual water demand with surface water. This determination represents an economical compromise between the need for additional pipelines and the option of over-sizing facilities to provide greater peaking capacity. Table 5 provides the surface water design requirements with this factor included.

Table 5
Surface Water Facility Design Requirements

Demand Type	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
Total Demand	36.4	40.7	68	88.9	102.8	115.9
Required Conversion	10.9	12.2	40.8	53.3	61.7	69.5
Compliance Assurance Factor (30%)	3.3	3.7	12.2	16.0	18.5	20.9
Total Surface Water Design Demand	14.2	15.9	53.0	69.3	80.2	90.4

Districts were selected for conversion in each of the two conversion phases in order to meet the required conversion levels for each phase. The compliance assurance factor discussed above and resulting percent conversion was considered throughout this process. The districts selected for conversion in each of the two phases can be seen in *Exhibits 8 and 9*. *Table 6* provides a preliminary overview of the customers currently planned to be converted to surface water in each phase of conversion, as well as the level of conversion as a percentage of total projected annual demand. As the new districts are created, they may be added to the 2013 or 2025 conversion period depending on their location which may in turn affect others.

It should be noted that this level of conversion (90%) is greater than the overall requirement for the Authority. However, this level of over-conversion allows the Authority to meet the requirement for conversion by serving fewer districts at less cost while some districts remain unconverted. The use of over-conversion in excess of the levels required by FBSD is considered in *Section 7.3*.

Table 6 – Surface Water Preliminary Conversion Schedule

Demand Center		Conversion Phase and Rate	
		2013-2025	2025-2055
Member Districts / Municipalities	BIG OAKS MUD	90%	90%
	CINCO MUDs		90%
	CINCO SOUTHWEST MUDs		90%
	CORNERSTONES MUD		90%
	FBC FWSD 2	90%	90%
	FBC MUD 2	90%	90%
	FBC MUD 30	90%	90%
	FBC MUD 34	90%	90%
	FBC MUD 35	90%	90%
	FBC MUD 37		90%
	FBC MUD 41	90%	90%
	FBC MUD 50	90%	90%
	FBC MUD 51		
	FBC MUD 52		
	FBC MUD 53		90%
	FBC MUD 57		90%
	FBC MUD 58		90%
	FBC MUD 93	90%	90%
	FBC MUD 118	90%	90%
	FBC MUD 119	90%	90%
	FBC MUDs 122, 123	90%	90%
	FBC MUD 124		90%
	FBC MUD 130		90%
	FBC MUD 132	90%	90%
	FBC MUD 133	90%	90%
	FBC MUD 134	90%	90%
	FBC MUD 142	90%	90%
	FBC MUD 146	90%	90%
	FBC MUD 151		90%
	FBC MUD 161		90%
	FBC MUD 185		90%
	FULSHEAR, FBC MUDs 169-173		90%
	GRAND LAKES MUDs	90%	90%
GRAND MISSION MUDs, FBC MUDs 143, 165	90%	90%	
H-FBC MUDs 1, 5		90%	
KINGSBRIDGE MUD	90%	90%	
NORTH MISSION GLEN MUD	90%	90%	
WILLOW POINT MUD		90%	
Undeveloped Areas	C1		
	C2		90%
	C3		90%
	E1		
	E2		90%
	E3		90%
	N1		
	NW1		
	NW2		
	S1		90%
	SE1		
	SW1		
	W1		
	W2		
Contract	George Ranch		

5.1.1 2013 Conversion Strategy

The first phase of conversion requires that 30% of the total water demand for the Authority be substituted by an alternative to groundwater. It was assumed that facilities constructed during this phase would be sized to accommodate 30% of the year 2025 water demand. In addition, it was also assumed that the districts selected for conversion would receive 90% of their total annual water supply from the Authority, as determined above. Districts were added to the conversion strategy until 90% of their total water demand equaled the required conversion rate of 30% of the Authority's total demand.

Consideration was given for the location of water supply points and for minimizing initial pipeline lengths. Priority for conversion was also given to existing water districts. It was assumed that water would only be provided to existing districts for the 2013 Phase Conversion and demands in undeveloped areas were not considered for conversion during this phase. Water was supplied to all known water plants within each converted MUD or Master MUD. Interconnections between districts were not utilized to deliver water in this plan.

5.1.2 2025 Conversion Strategy

The second phase of conversion is based on future water needs through the year 2055. For purposes of this study, facilities were assumed to be sized to accommodate delivery of 60% of the year 2055 demand throughout the year. Again, it was assumed that the districts that would be connected to the conversion system would receive 90% of their total annual water supply and an adequate number of districts were connected to the surface water system until the required overall conversion rate was reached for the Authority as a whole.

Similar to the 2013 conversion system, priority for conversion was given to existing districts in the Authority. However, based on the significant increase in required conversion (60%) for the 2025 phase, surface water was supplied to undeveloped areas in order to reach the overall conversion goals for the Authority after all existing districts were converted.

5.2 Sizing of Transmission Pipelines

Pipelines were sized to have capacity to provide water to meet the 2013 and 2025 conversion requirements. The ultimate water demands through 2055 were used to avoid paralleling existing pipelines at a later date. This results in some pipes with extra capacity in early phases of conversion. However, this extra capacity may be viewed as a factor of safety or as a mechanism to achieve early and over-conversion for the Authority. Pipes were laid out to follow existing roads and drainage corridors, where feasible. In undeveloped areas, pipes were laid out following county roads or existing property lines where feasible (*Exhibits 8 and 9*). Loops were also added to increase the overall reliability and redundancy of the system.

A compliance assurance factor of 1.3, identified in Section 5.1, was used to model the average day system demand for each district. It was assumed that all demand above this level will be met using the district's groundwater wells, storage, and booster pump facilities. Transmission pipes were conservatively sized such that resulting head losses were no more

than 2 ft per 1,000 feet of pipe and velocities in the pipe were not greater than 5 feet per second.

Surface water was supplied to all water plants within the MUD or Master MUD. The assumption was made that individual districts would provide water throughout their service areas utilizing their internal distribution systems. System interconnects were not utilized for water distribution in this study but may be utilized in future study and detailed design. Utilizing existing interconnects during the winter (low demand) months may provide additional conversion area at minimum capital expense. Elevation data obtained from Fort Bend County LIDAR was used to determine ground elevations for input to the hydraulic model. Tank elevations of 25 feet were added at each end point to determine residual pressure at the tops of the tanks. A minimum residual pressure of 10 psi at the tops of the tanks was used as a guideline for system sizing. Transmission pipes were first sized for the 2025 system (2055 demand) and then the system was scaled back to meet the needs of the 2013 (2024 demand) system.

5.3 Sizing of Plant Facilities

For planning purposes, booster pumps at plant facilities were generally phased in 10 mgd increments and sized to deliver a firm capacity adequate to meet the Authority's surface water demand with the compliance assurance factor applied. An exception to this is the sizing for ground storage facilities which are phased in 5 mgd modules and sized to one-half of the firm pumping capacity. The Authority anticipates the construction of facilities to meet 2020 needs to begin in 2010 and to be in operation by 2013. A second phase of plant facilities will expand capacity to carry through to the year 2025 when the second stage of conversion begins. *Table 7* outlines the projected expansion schedule for plant facilities.

Table 7

Incremental and Total Facility Expansion Schedule for Total Water Plant Capacity

Component	Incremental / Total Capacity					
	2013	2020	2025	2035	2040	2050
Booster Pumps* (total mgd)	30 / 30	10 / 40	40 / 80	10 / 90	10 / 100	10 / 110
Clearwell Storage (mg)	10 / 10	5 / 15	15 / 30	5 / 35	5 / 40	5 / 45

*Assumes one backup pump

5.4 Costs of Facilities

Aerial photography was used to determine the relative degree of development along transmission main corridors. Sections of pipe in heavily developed areas were considered to require urban construction methods and pipelines in minimally developed areas were assumed to use less costly methods. Pipeline costs were determined from a review of recent bid tab information for urban or rural construction as well as planning numbers developed for the Region H planning process. The proper cost was applied to each pipe section recommended in the various alternatives. Easement widths varied from 20 feet for pipelines up to 36 inches, 30 feet for pipes up to 72 inches and 40 feet for larger pipelines. An easement cost of \$1 per square foot was used for all pipe segments.

In addition, a cost of \$200,000 was included for costs associated with the connection of the Authority’s transmission system to each plant facility. Connection costs include costs associated with flow meters, control valves, and modifications to disinfection systems of each plant. As plants are connected, the connection cost was added to the economic analysis in the appropriate year.

An effort was also made to identify special pipe segments that would result in added construction cost. It was assumed that crossings of major state-maintained highway rights-of-way, drainage features, and pipeline easements would require special construction methods, such as extensive trenchless construction. Locations where the line layout intersected a road, ditch or pipeline easement were identified using GIS. Aerial photography was used to estimate the length of the pipe in each easement that would require special construction methods. Once the lengths of the special pipe segments had been estimated for the entire transmission system, the cost was calculated using an average unit cost per linear foot based on a review of recent bid tabs provided by the NHCRWA and WHCRWA.

Costs for the booster pump stations were assembled from various sources including review of regional planning numbers and WHCRWA bid tabs. Included in the capital costs is a provision for standby power, which may be a second electric power feed or backup generators, estimated at 13.5% of the ultimate construction cost for the facility. Half of the standby power cost was assigned to the initial construction and the rest was spread throughout the expansion phasing.

Costs for ground storage tanks were determined by obtaining vendor quotes and review of recent bid tabs for the WHCRWA. The concrete tanks were assumed to be built in 5 MG units.

The estimated amount of land required was determined from a conceptual layout plan of facilities including buffer areas as well as a review of other planning references. Land costs were determined by identifying available large parcels of land from aerial photo and reviewing property values from information obtained from the Fort Bend and Harris County Appraisal Districts. A conceptual pump station site plan was developed as part of the planning and is included as *Exhibit 11*.

Costs were adjusted to present value using the Engineering News Record (ENR) cost index when appropriate. Project costs include standby power, permitting, land, a contingency amount of 20%, and a factor of 15% of the total construction cost of the facilities for engineering, legal and administrative fees.

Table 8 summarizes the development of infrastructure for the two phases as well as today’s capital costs of the system including purchased COH water costs and infrastructure. The 2013 system data is associated with the system shown in *Exhibit 8* and the 2025 system data is associated with the system shown in *Exhibit 9*. Additional information regarding the development of capital costs can be found in the *Alternative Analysis* contained within *Appendix E*.

Table 8 – Schedule of Facility Expansion and Capital Costs

Conversion Phase	Pipeline Length (Miles)	Pump Station ¹		Today’s Cost ² (\$ millions)
		Booster Pumps (MGD)	Clearwell Storage (MG)	
2013	37.8	40	15	\$337
2025	94.2	110	45	\$588

¹ Represents ultimate required capacity for each phase of development, i.e. 2013 booster pump capacity is the capacity required through the year 2024. Includes COH payments for purchased water and infrastructure.

5.5 Operation and Maintenance Costs

In addition to the capital costs identified above, the cost of facility operation and maintenance have been considered. This includes the cost of raw and treated water purchased from the COH, the operation of the Authority, the power needed to operate the Authority’s plant facilities, and the cost to maintain Authority facilities.

The cost of treated water from the COH is a function of growth in the Authority’s demands and the capacity reservation schedule for obtaining water. *Table 9* below outlines the treated water capacity reservations projected for the Authority through 2050. This includes water obtained directly from the COH system as well as water received through participation with the WHCRWA.

Table 9
Preliminary Treated Water Reservation Schedule

Year	Additional Treated Water Reservation (mgd)	Total Treated Water Reservation (mgd)
2008		19.5
2015	+7.5	27.0
2020	+36.7	63.7
2025	+6.2	69.9
2040	+5.4	75.3

Additional information regarding the development of operation and maintenance costs can be found in the *Alternative Analysis* contained within *Appendix E*.

5.6 Anticipated Construction Schedule

The cost factors described in *Section 5.4* were analyzed to determine the total cost of the project and to schedule the costs associated with infrastructure upgrades as time progresses. *Table 10* provides a general schedule for major tasks over the planning period and describes the objective of each phase of construction. The Authority is currently conducting a pipeline routing and pump station siting study to identify the final pipeline routes and pump station locations. Easement acquisition for some pipeline segments will begin in 2008.

Table 10
Preliminary Schedule for Major Construction Tasks

Task	Begin	End
Routing Studies and Pump Station Siting	2007	2009
Easement / Land Acquisition	2008	
Design and Construct Pump Station at COH Take Point	2009	2012
Design and Construct 2013 System	2009	2012
Design and Construct Pump Station at WHCRWA Take Point	2018	2024
Design and Construct 2025 System	2018	2024

Section 6 Groundwater Reduction Plan Management

6.1 General Powers of the Authority

The general powers of the Authority are outlined in Subchapter C, Section 8813.101 of Senate Bill 1798 of the 79th Texas Legislature. In this section, the Authority is granted the following powers:

- 1) *provide for the conservation, preservation, protection, recharge, and prevention of waste of groundwater, and for the reduction of groundwater withdrawals as necessary to develop, implement, or enforce a groundwater reduction plan, in a manner consistent with the purposes of Section 59, Article XVI, Texas Constitution, and facilitate compliance with Fort Bend Subsidence District or Harris-Galveston Coastal Subsidence District, as applicable, rules, orders, regulations, or requirements;*
- 2) *acquire or develop surface water and groundwater supplies from sources inside or outside the boundaries of the authority, conserve, store, transport, treat, purify, distribute, sell, and deliver water to or among persons inside and outside the boundaries of the authority, and allocate water among persons participating in the authority's groundwater reduction plan whether they are located inside or outside the authority's boundaries;*
- 3) *enter into contracts with persons inside or outside the authority on terms and conditions the board considers desirable, fair, and advantageous for the performance of its rights, powers, and authority under this chapter;*
- 4) *coordinate water services provided inside, outside, or into the authority;*
- 5) *provide wholesale and retail water services to any users or customers within the authority's boundaries without being required to execute contracts with those users or customers;*
- 6) *adopt policies establishing whether, when, and the manner in which the authority uses requests for proposals in obtaining services, including professional services;*
- 7) *determine whether to adopt administrative policies in addition to those required by Section 49.199, Water Code*

Section 8813.102 authorizes the Authority to adopt and enforce rules to reach its goals.

Additionally, Section 8813.103 describes specific mechanisms through which the Authority may fund its efforts through fees, rates, and charges:

- a) *The authority may establish fees, user fees, rates, and charges and classifications of payers of fees and rates as necessary to enable the authority to fulfill the authority's*

- purposes and regulatory functions provided by this chapter. The authority may impose fees, user fees, rates, and charges on any person within the authority.*
- b) *The authority may charge the owner of a well located within the authority's boundaries a fee or user fee according to the amount of water pumped from the well. If ownership of a well changes, both the prior and subsequent well owners are liable to the authority, jointly and severally, for all fees and user fees imposed by the authority under this subsection, and any related penalties and interest, for water pumped from that well before the change in well ownership.*
- c) *The board shall make reasonable efforts to send districts and municipalities written notice of the date, time, and location of the meeting at which the board intends to adopt a proposed charge under Subsection (b) and the amount of the proposed charge. The board's failure to comply with this subsection does not invalidate a charge adopted by the board under Subsection (b).*
- d) *For wells located in Harris County or Fort Bend County, the board shall exempt from the charge under Subsection (b) classes of wells that are not subject to any groundwater reduction requirement imposed by the Harris-Galveston Coastal Subsidence District or the Fort Bend Subsidence District, as applicable. If any of those classes of wells become subject to a groundwater reduction requirement imposed by the applicable subsidence district, the authority may impose the charge under Subsection (b) on those classes. The board by rule may exempt any other classes of wells from the charge under Subsection (b). The board may not apply the charge under Subsection (b) to a well:*
- (1) with a casing diameter of less than five inches that serves only a single-family dwelling; or*
 - (2) regulated under Chapter 27, Water Code.*
- e) *For purposes of Subsection (d), a well is subject to a groundwater reduction requirement if the applicable subsidence district has adopted or adopts a requirement or rule that groundwater withdrawals from the well, or from the well and other wells collectively, be reduced, including a groundwater reduction that is not required until a future date.*
- f) *The authority may establish fees, user fees, rates, and charges that are sufficient to:*
- (1) achieve water conservation;*
 - (2) prevent waste of water;*
 - (3) serve as a disincentive to pumping groundwater;*
 - (4) develop, implement, or enforce a groundwater reduction plan;*
 - (5) accomplish the purposes of this chapter, including making available alternative water supplies;*

- (6) *enable the authority to meet operation and maintenance expenses;*
- (7) *pay the principal of and interest on notes, bonds, and other obligations issued in connection with the exercise of the authority's general powers and duties; and*
- (8) *satisfy all rate covenants relating to the issuance of notes, bonds, and other obligations.*
- g) *The authority may charge rates established by the authority for water purchased from the authority.*
- h) *The authority may impose fees, user fees, or charges for the importation of water into the authority's boundaries from a source located outside the authority's boundaries.*

Currently the Authority has adopted Groundwater Reduction Plan Fee Order (Rate Order). The original fee, \$0.19 per 1,000 gallons, was adopted in October 2005. The rate has since been increased to \$0.30 per 1,000 gallons. Copies of the rate order can be found in *Appendix G*.

Section 8813.116 also provides for the Authority's acceptance of money through gift or grant from FBSD.

Sections 8813.104 and 8813.113 specifically grant the Authority power to purchase water from another entity and sell or reuse water or any byproduct of operation, respectively.

Approval for the Authority to acquire, construct, and operate a water system is outlined in Section 8813.112. Section 8813.114 allows the Authority to enter into contract with a person for the sake of receiving professional, construction, or operational services and may also contract for water.

Sections 8813.110 and 8813.111 grant the Authority the ability to produce water supply or drought contingency plans and groundwater reduction plans, respectively. This allows the Authority to meet State and local regulatory agency requirements that require these documents.

The Authority is granted the power of eminent domain in Section 8813.119. This power extends to the acquisition of land and easements through condemnation. This power also extends outside of the Authority for purposes of pumping, storing, treating, or transporting water.

6.2 Permit Aggregation

It is the intent of the Authority that FBSD permitted wells operated within the Authority will be associated with the Authority to enable the greatest flexibility in operation and to ensure that the required groundwater reduction is achieved for the Authority as a whole. This is consistent with the Authority's plan that some districts will be over-converted while others will not be connected to the surface water delivery system. Currently, it is estimated that the Authority would be named as a 'co-permittee' beginning with the September 2011 permit

renewals. Permits for wells will be associated with both the current owner as well as the Authority to provide the greatest flexibility in operation of the Authority's surface water and groundwater production capacity.

6.3 Monthly Groundwater Pumpage Reports

The Authority will monitor groundwater pumpage on a monthly basis. The Rate Order requires a monthly self-reporting system of groundwater pumpage by each well owner. This activity will be essential for monitoring compliance with the GRP and to allow corrective action to be taken as early as possible. This information is also essential to the business operations of the Authority as pumpage fees are an essential component of the infrastructure and operations funding. By monitoring pumpage in this way, the Authority will have the opportunity to fully monitor its performance.

Monthly groundwater monitoring will be streamlined with the use of an online data collection system, called 'PRO' for Pumpage Reports Online. Well permit holders will be able to enter information regarding monthly pumpage online and provide the Authority with a database of pumpage information that will improve the ease with which reports may be generated for the Authority and FBSD.

6.4 Flow Monitoring of Surface Water

Surface water will be metered at the Authority's take points with the COH and WHCRWA to establish the volume of water entering the Authority's system. This will be a requirement of the Authority's contracts with the respective water providers. Additionally, water consumption by individual districts will be metered for use in billing the individual utilities for water usage. All of these measurements will aid in determining the Authority's compliance with FBSD regulation as well as the accountability of water within the transmission system.

Section 7 Other Considerations

7.1 Water Conservation

Water conservation is aimed at reducing long-term water demands. The Authority has produced a Water Conservation Plan to address the opportunities within the Authority to reduce overall demand. A copy of the draft plan is provided in *Appendix H*.

The Authority is pursuing several opportunities for acquiring conversion credits through water conservation initiatives and sees this as an opportunity to secure a sound groundwater reduction schedule by allowing for unanticipated pumping during dry years as well as a way of reducing per capita demands through education.

Currently, none of these water conservation measures are factored into the GRP as a way of meeting FBSD regulation and serve only as a “buffer” or margin of safety in the overall plan for conversion. As the 2025 conversion phase approaches, additional knowledge and experience may encourage the Authority to factor these credits into the timing of the next phase of surface water conversion.

7.2 Reclaimed Water Reuse

The Authority has studied the potential to use reclaimed water to meet non-potable demands, such as landscape irrigation. The use of this water already has an intrinsic advantage to the reuser because of reduced costs associated with lower groundwater pumpage fees and reduced well O&M. Additionally, the Authority has moved to further encourage reuse through an incentive of \$0.39 per 1,000 gallons of reuse. This rate was set after reviewing previous reuse studies and analyzing the costs of various reuse incentives.

Although the use of reclaimed water represents an opportunity for the Authority to reduce their surface water demands, this is not included as part of the Authority’s GRP. Surface water delivery systems were sized and water supplies were planned without assuming any demand reduction through reclaimed water reuse. While the reuse of wastewater provides many benefits including conserving water and reducing potable demands, there is neither certainty as to the acceptability of this practice to the general public, nor that reuse projects will continue to be implemented in the future. Therefore, reuse was not included in developing projected surface water needs which results in a conservative estimate of the surface water needs for the Authority. Any reclaimed water reuse program initiated in the Authority will generate over-conversion credits under the program sponsored by FBSD. These credits will be accumulated and used during years of unexpectedly high demand or to adjust the conversion schedule as the second phase of conversion approaches. More detailed plans for these credits will be made as the surface water delivery system comes online and more is known about its operation and the growth trends within the Authority.

7.3 Early or Over Conversion

Over-conversion involves the acquisition of conversion credits from the FBSD through the conversion of water demand in excess of the required minimum conversion level. In effect, these credits can be used in exchange for surface water conversion at a later time. One gallon of over-conversion credit earned in one year can then be used in lieu of one gallon of surface water conversion in a subsequent year. By acquiring significant over-conversion credits, it may be possible to delay the second phase of conversion in 2025 by some period of time. This analysis examines over-conversion strategies and estimates their impact on the cost of water. Two strategies were considered that require minimal additional infrastructure; both strategies assume surface water delivery starting in 2013.

Strategy 1 limits the amount of over-conversion by limiting the number of districts converted in the surface water conversion plan and limiting the amount of water introduced to the system to the amount contracted from the COH. This strategy uses excess capacity that already exists in the planned system to provide water to districts at a conversion rate greater than 90%. Therefore, the water demand that could be converted in any year is the smallest of 100% of the connected districts demands or the amount of water contracted from the COH. This level of over-conversion will require the least adjustment to capital or operational plans and, therefore, represents a base case that could easily be implemented with no change except the cost of additional pumping.

Strategy 2 considers the addition of more pipelines to serve additional districts. In this strategy, districts were added to the conversion schedule until 90% of all district demands exceeded the 2013 water purchase. It was found that the connection to the Cinco MUD 1 East and West water plants, in addition to the districts planned for connection in 2013, would provide more than sufficient capacity to carry out this strategy. This scenario is only limited by the amount of water contracted from the COH. This strategy has a higher capital cost because it requires the installation of nearly 28,000 feet of additional pipelines to connect to the Cinco MUD 1 water plants.

The two over-conversion strategies were evaluated using the same demand projections used throughout this report to determine their impact on delaying the need for converting to 60% surface water in 2025. *Table 11* shows the results of this analysis and indicates the time in years that the 2025 conversion could be delayed as a result of over-conversion credits.

Table 11
Impact of Over-Conversion Strategies

Strategy	Description	Years Delayed
1	Currently planned districts	1
2	Connection to Cinco MUD 1 water plants	4

These two strategies take advantage of minor changes that could be incorporated into the Authority's GRP that may positively impact the conversion schedule. Much of this potential

exists because of excess capacity provided in early phases of construction in anticipation of future demands.

Another factor that may delay the need for conversion is the development schedule for the George Foundation properties. If development proceeds at a rate slower than that projected by The George Foundation, the additional capacity planned to meet the needs of this contract participant may instead be used to produce over-conversion credits within the Authority. The analysis for Strategies 1 and 2 was repeated assuming that the George Ranch would not develop and the additional capacity would be used, where possible, to meet additional demands within the Authority.

These Strategies were called Strategies 1A and 2A, which correspond to Strategies 1 and 2, respectively. *Table 12* shows the result of this analysis. Based on this analysis, Strategy 2A would be capable of delaying the 2025 conversion beyond 2030. However, the Subsidence District’s current Over-Conversion Credit Policy indicates that “over-conversion credits will not be honored or accepted by the District ... on or after January 1, 2030,” meaning that Strategy 2A is only capable of delaying the second phase of conversion through the year 2030 under the current regulations.

Table 12
Impact of Over-Conversion Strategies Without the Development of George Ranch

Strategy	Description	Years Delayed
1A	Currently planned districts	2
2A	Connection to Cinco MUD 1 water plants and additional districts	5+

The potential for early conversion is another possibility the Authority faces. The delivery of surface water before the 2013 deadline for conversion will allow the Authority to acquire FBSD credits for each gallon of surface water delivered to customers. The possibility of over-conversion will be dependent upon the construction schedule for water supply infrastructure and may account for substantial credits.

Another option for over-conversion lies in the water system interconnects between districts. These interconnects may allow surface water, in some limited amount, to reach districts that have not yet been connected directly through the Authority’s system. Opportunities for conversion through existing interconnects will be examined further as the beginning of surface water delivery approaches.

Section 8 Financing Mechanism

8.1 Authority Powers

Senate Bill 1798 provides that the Authority may issue bonds or notes payable from tolls, charges, rates, fees, user fees, and special assessments imposed by the Authority, the sale of water, grants or gifts, operation of the Authority's facilities, or contracts to outside parties.

The Authority has a fee structure in place to receive payment based on production from non-exempt wells within the Authority boundary and other contract GRP participants (see *Appendix G*). This fee is based on pumped groundwater reported directly to the Authority and checked against pumpage reported to FBSD. This pumpage fee was initially set at \$0.19 per 1,000 gallons, but was increased to \$0.30 per 1,000 gallons on January 1, 2008.

Once surface water delivery commences, the Authority will also receive payment from its customers in return for surface water supplied to those customers connected to the transmission system. When surface water is introduced to the Authority, it is intended that the rate for surface water will cost \$0.35 per 1,000 gallons more than the rate for groundwater at present value. This difference in rates is intended to offset the cost of well operation. In this way customers connected to the transmission system and those relying on their own groundwater wells will effectively pay the same rate for water.

8.2 Financial Plans

The authority will sell bonds to finance construction. Groundwater pumpage fees and surface water rates will pay the debt service, O&M costs, and any other Authority expenses. As indicated above, the current rate for groundwater is \$0.30 per 1,000 gallons. *Table 13* shows the preliminary plan for financing the cost of surface water infrastructure and water through the year 2030, including preliminary rates for surface and ground water.

Table 13
Estimated Water Rates

Revenue, Cash Flow, and Cash Balance									
Year	Sources		Revenue (\$M)			TOTAL ANNUAL REVENUE from Sale of Water	TOTAL ANNUAL COST	Revenue Less Expenses	Cash Balance
	Cost of Surface Water (\$ / 1000)	Cost of Ground Water (\$ / 1000)	Surface Water	Ground Water					
2007		\$0.19		\$1.45	\$1.45	\$1.00	\$0.45	\$0.45	
2008		\$0.30		\$2.47	\$2.47	\$1.00	\$1.47	\$1.92	
2009		\$0.50		\$4.42	\$4.42	\$6.31	(\$1.89)	\$0.08	
2010		\$0.80		\$7.57	\$7.57	\$6.81	\$0.77	\$0.84	
2011		\$1.10		\$11.10	\$11.10	\$6.81	\$4.29	\$5.15	
2012		\$1.30		\$13.92	\$13.92	\$17.68	(\$3.76)	\$1.49	
2013	\$1.95	\$1.60	\$6.63	\$12.69	\$19.32	\$20.74	(\$1.42)	\$0.10	
2014	\$2.15	\$1.80	\$7.71	\$15.06	\$22.76	\$20.85	\$1.92	\$2.02	
2015	\$2.30	\$1.95	\$8.67	\$17.16	\$25.83	\$25.64	\$0.20	\$2.26	
2016	\$2.30	\$1.95	\$9.04	\$17.88	\$26.92	\$26.89	\$0.03	\$2.33	
2017	\$2.30	\$1.95	\$9.40	\$18.60	\$28.00	\$26.98	\$1.02	\$3.40	
2018	\$2.30	\$1.95	\$9.77	\$19.32	\$29.09	\$28.49	\$0.61	\$4.07	
2019	\$2.30	\$1.95	\$10.13	\$20.04	\$30.18	\$28.70	\$1.47	\$5.62	
2020	\$2.30	\$1.95	\$10.50	\$20.77	\$31.26	\$29.24	\$2.02	\$7.76	
2021	\$2.60	\$2.25	\$12.85	\$25.94	\$38.79	\$38.59	\$0.20	\$8.11	
2022	\$2.60	\$2.25	\$13.83	\$27.93	\$41.76	\$38.81	\$2.95	\$11.22	
2023	\$2.60	\$2.25	\$14.81	\$29.91	\$44.72	\$39.68	\$5.05	\$16.49	
2024	\$2.75	\$2.40	\$16.71	\$34.02	\$50.73	\$54.71	(\$3.98)	\$12.85	
2025	\$2.75	\$2.40	\$35.49	\$20.65	\$56.14	\$60.47	(\$4.33)	\$8.77	
2026	\$2.70	\$2.35	\$36.19	\$21.00	\$57.19	\$60.83	(\$3.63)	\$5.31	
2027	\$2.65	\$2.30	\$36.85	\$21.32	\$58.17	\$61.19	(\$3.02)	\$2.40	
2028	\$2.65	\$2.30	\$38.17	\$22.09	\$60.26	\$61.54	(\$1.29)	\$1.16	
2029	\$2.65	\$2.30	\$39.49	\$22.85	\$62.34	\$61.90	\$0.44	\$1.63	
2030	\$2.65	\$2.30	\$40.82	\$23.62	\$64.43	\$63.53	\$0.91	\$2.57	

Section 9 Summary

This GRP summarizes the approach through which the Authority will meet FBSD regulatory requirements. The area served by the Authority is expected to undergo substantial growth over the planning period. As these water demands develop over time, the Authority is committed to adjusting its strategy to meet the regulations set forth by FBSD. This process will be a dynamic process that will evolve over the course of the first conversion phase in order to meet the emerging demands that will confront the Authority in 2025.

The Authority is in the process of securing a long-term supply of water adequate for meeting projected demands based on an agreement with the City of Houston. The Authority is also working with the WHCRWA to share facilities where possible to save costs for both parties. The GRP outlines the proposed infrastructure to deliver the required volumes of surface water for the two phases of conversion beginning in 2013 and 2025.

The Authority has considered the variation in seasonal demands in outlining its plans for surface water delivery and will have the capacity to provide water at a maximum rate of 1.3 times average daily demand to connected districts. In this way, 90% of the connected customers' annual water demand can be met. This level of conversion will allow FBSD regulations to be met by providing surface water to only some districts while others continue using groundwater exclusively. This is essential to the Authority's plan to provide contractual GRP inclusion to customers that are well outside of the Authority's boundary, such as the George Ranch.

Extensive planning for the 2013 system has already been completed. This system will receive water from the COH by way of a proposed pump station in the vicinity of Bellaire Boulevard and South Dairy Ashford Street where it will be boosted into the Authority's transmission system. This will carry water through a looped system of pipelines in the southeast corner of the Authority and to the vicinity of SH 99 and FM 1093.

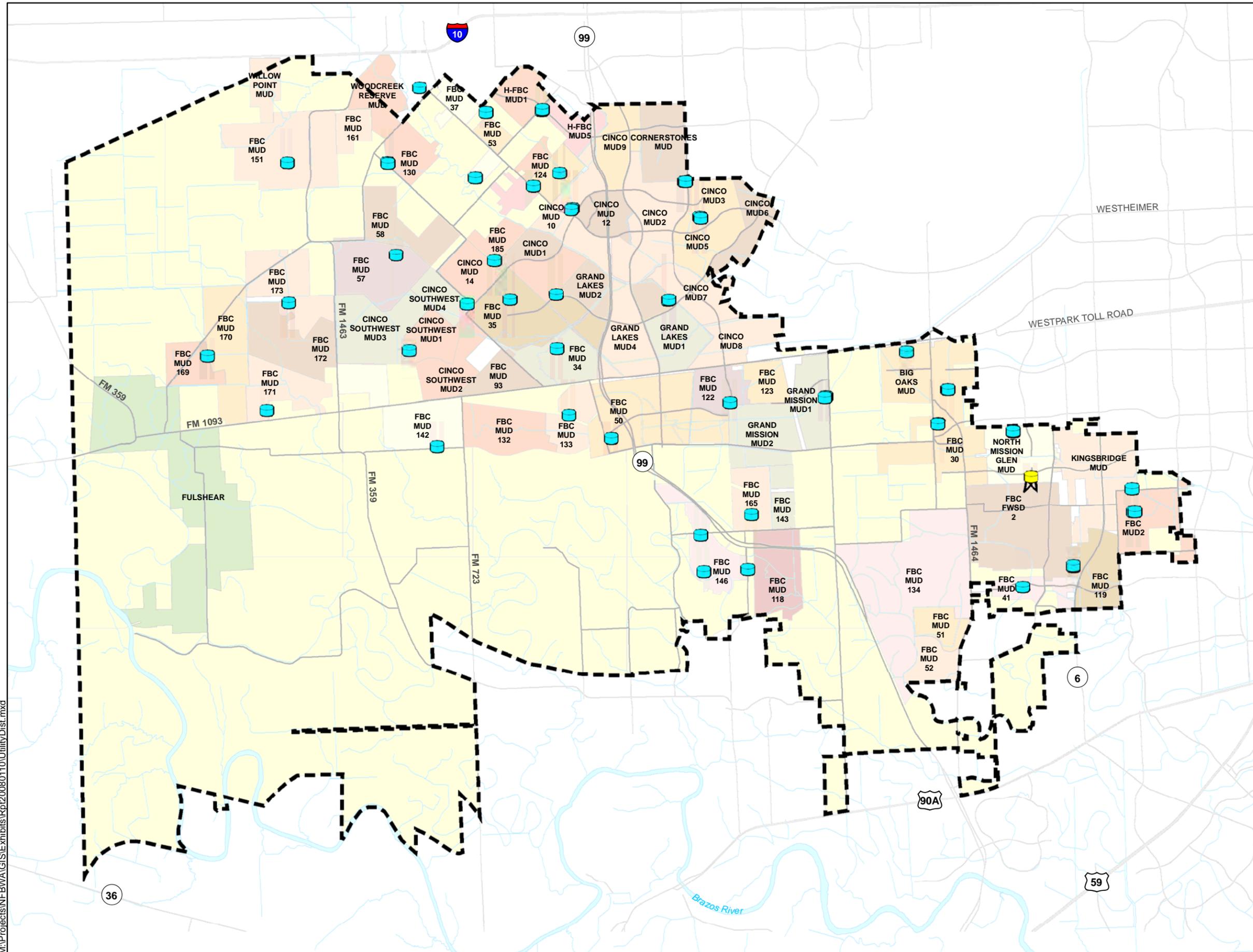
The second phase of the system will add a connection to a joint project by the Authority and the WHCRWA to deliver water from north of the Authority's boundary. This second COH supply will augment the initial COH supply point and allow for the connection of the North and northeast portions of the Authority by 2025.

The Authority will finance construction through bond sales. Debt service will be repaid through rates for surface water and groundwater use within the Authority and by contract GRP participants. The Authority has also considered alternative means for reaching its conversion goals. Reclaimed water reuse, conservation, and early or over conversion credits have been considered. It is the intent of the Authority to pursue and provide incentives for these strategies for use in meeting conversion requirements in years of high demand or to potentially delay the second phase of conversion. However, these options are not considered within this GRP but will continue to be evaluated as alternatives as the Authority begins surface water conversion in 2013.

EXHIBITS

Exhibit 1

NFBWA Territory, Utility Districts, and Municipalities



Water Plants

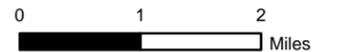
- Elevated Storage Tank
- Ground Storage Tank

City of Fulshear

- Undeveloped Area
- NFBWA

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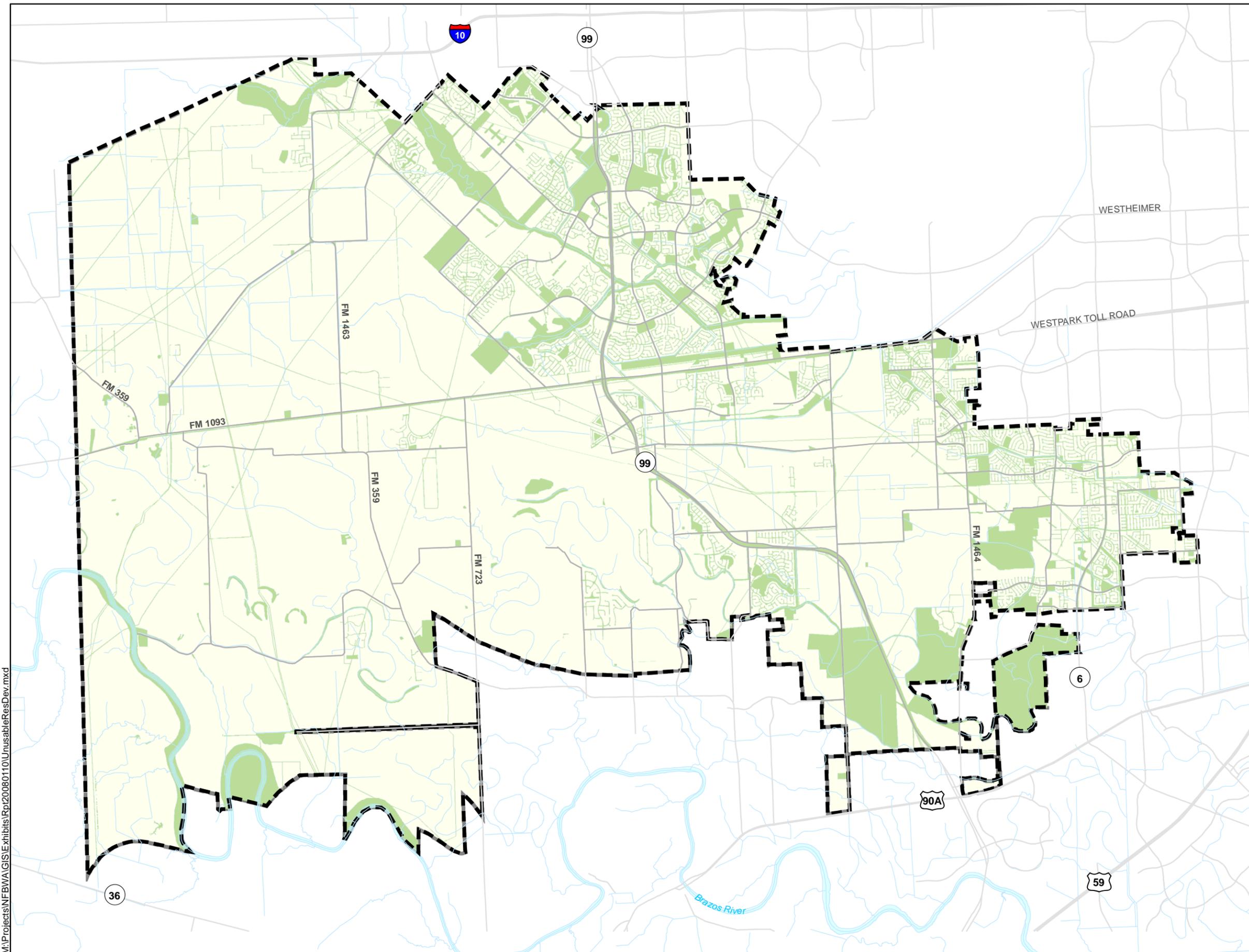
Information regarding utility districts may be incomplete. For illustration purposes only.



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Exhibit 2

Areas Unusable for Residential Development



Unusable Area
NFBWA

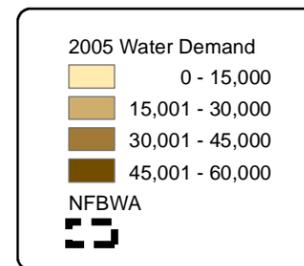
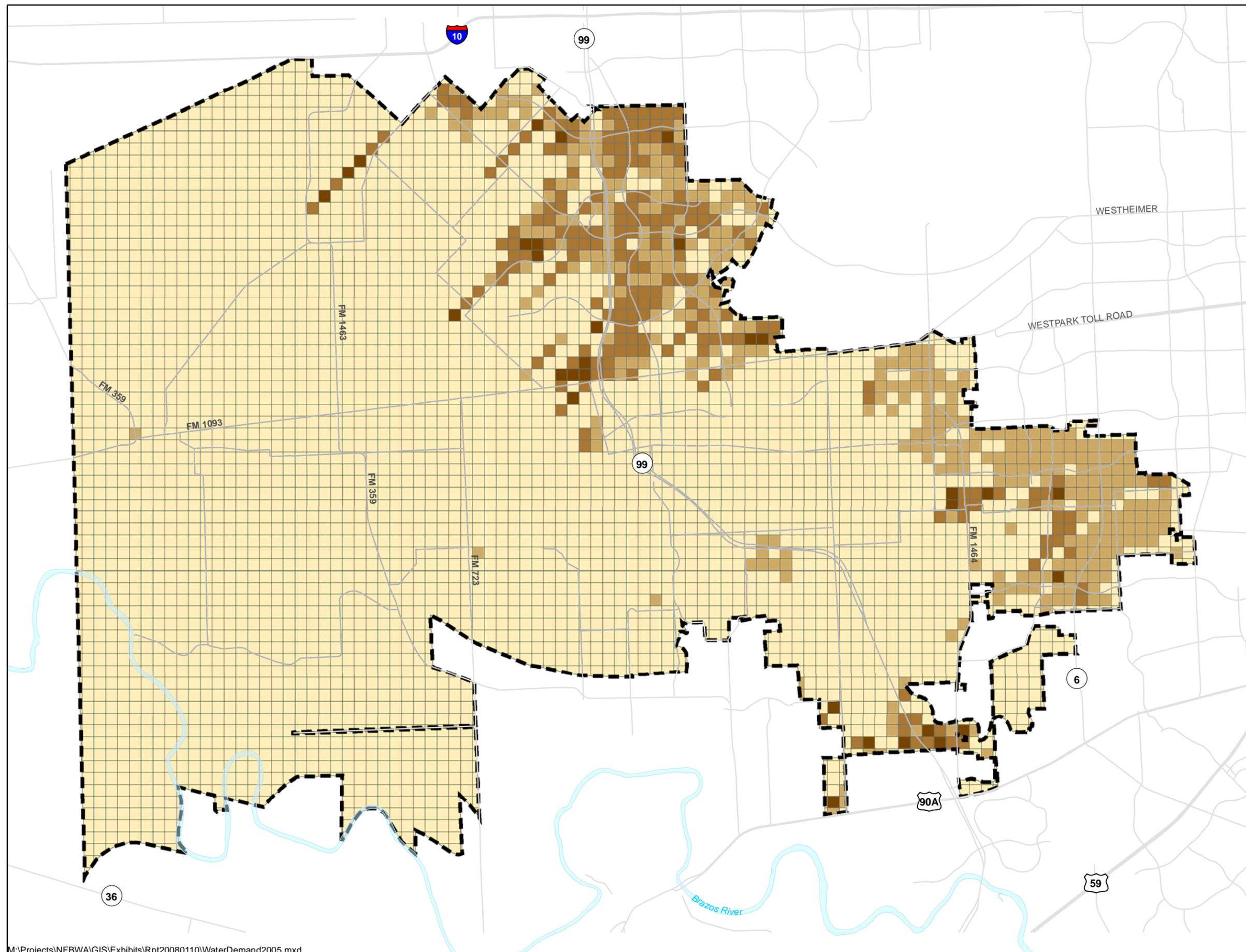
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Exhibit 3

Water Demand by Grid Cell for 2005



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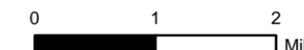
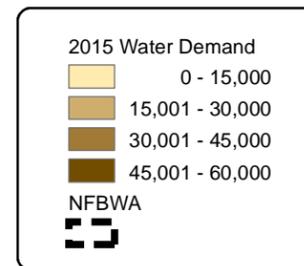
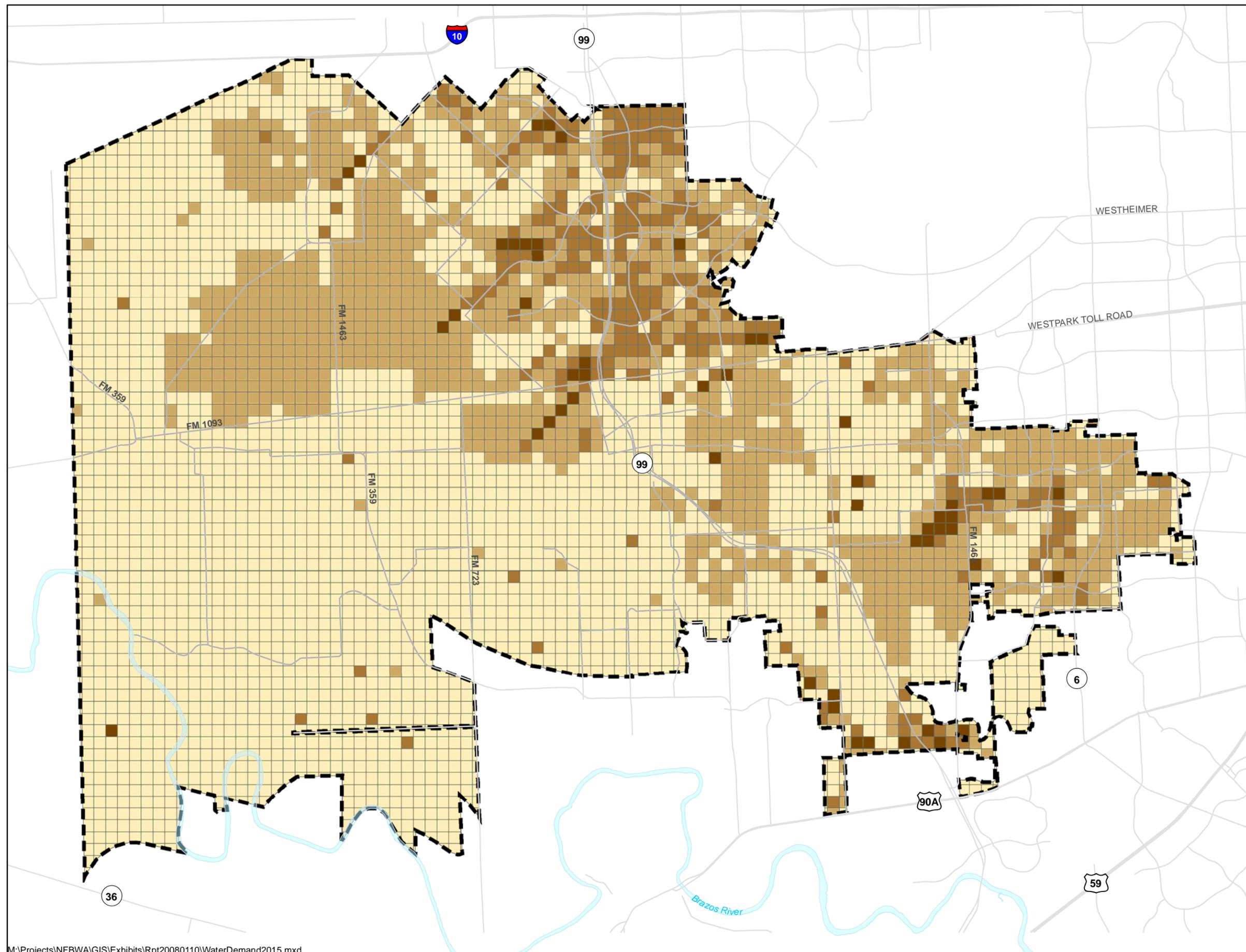


Exhibit 4

Water Demand by Grid Cell for 2015



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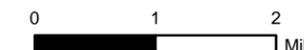
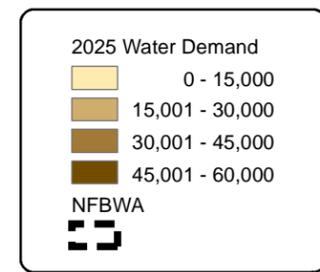
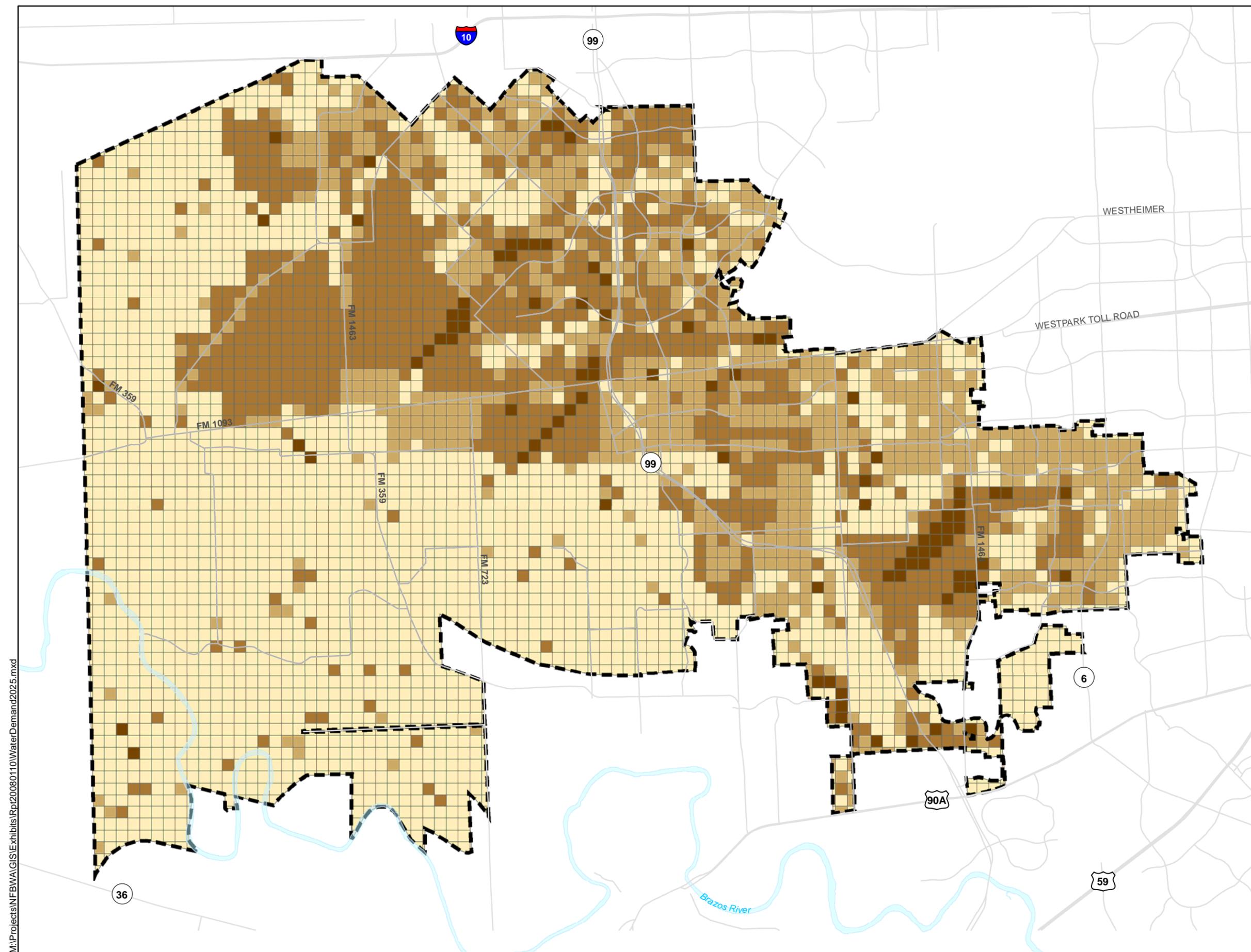


Exhibit 5

Water Demand by Grid Cell for 2025



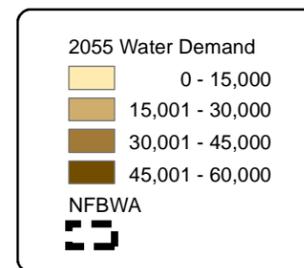
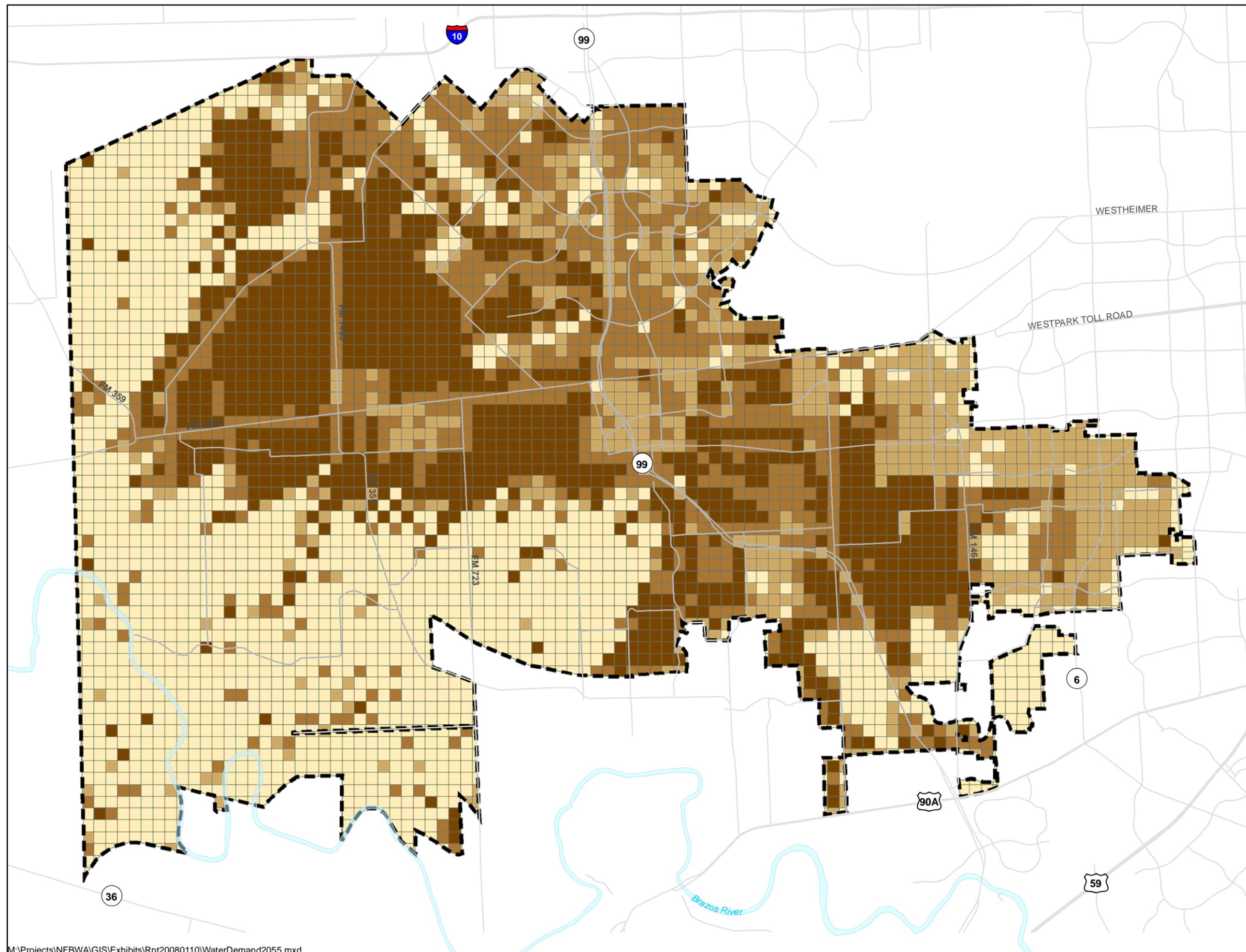
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Exhibit 6

Water Demand by Grid Cell for 2055



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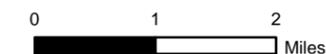
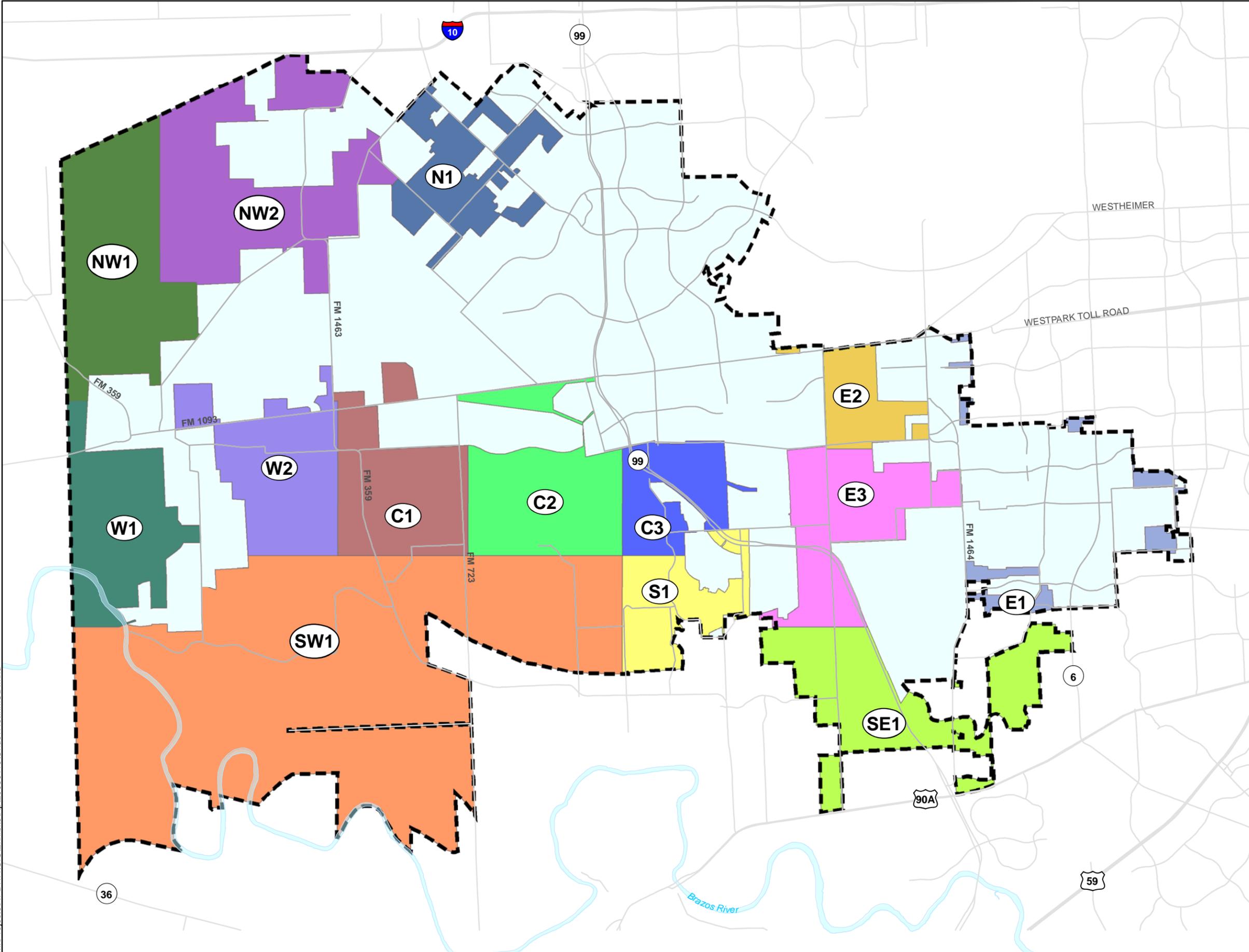


Exhibit 7

Undeveloped Areas Not Within Existing MUDs

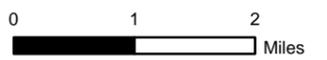


Undeveloped Areas

- C1 - Central 1
- C2 - Central 2
- C3 - Central 3
- E1 - East 1
- E2 - East 2
- E3 - East 3
- N1 - North 1
- NW1 - Northwest 1
- NW2 - Northwest 2
- S1 - South 1
- SE1 - Southeast 1
- SW1 - Southwest 1
- W1 - West 1
- W2 - West 2

NFBWA

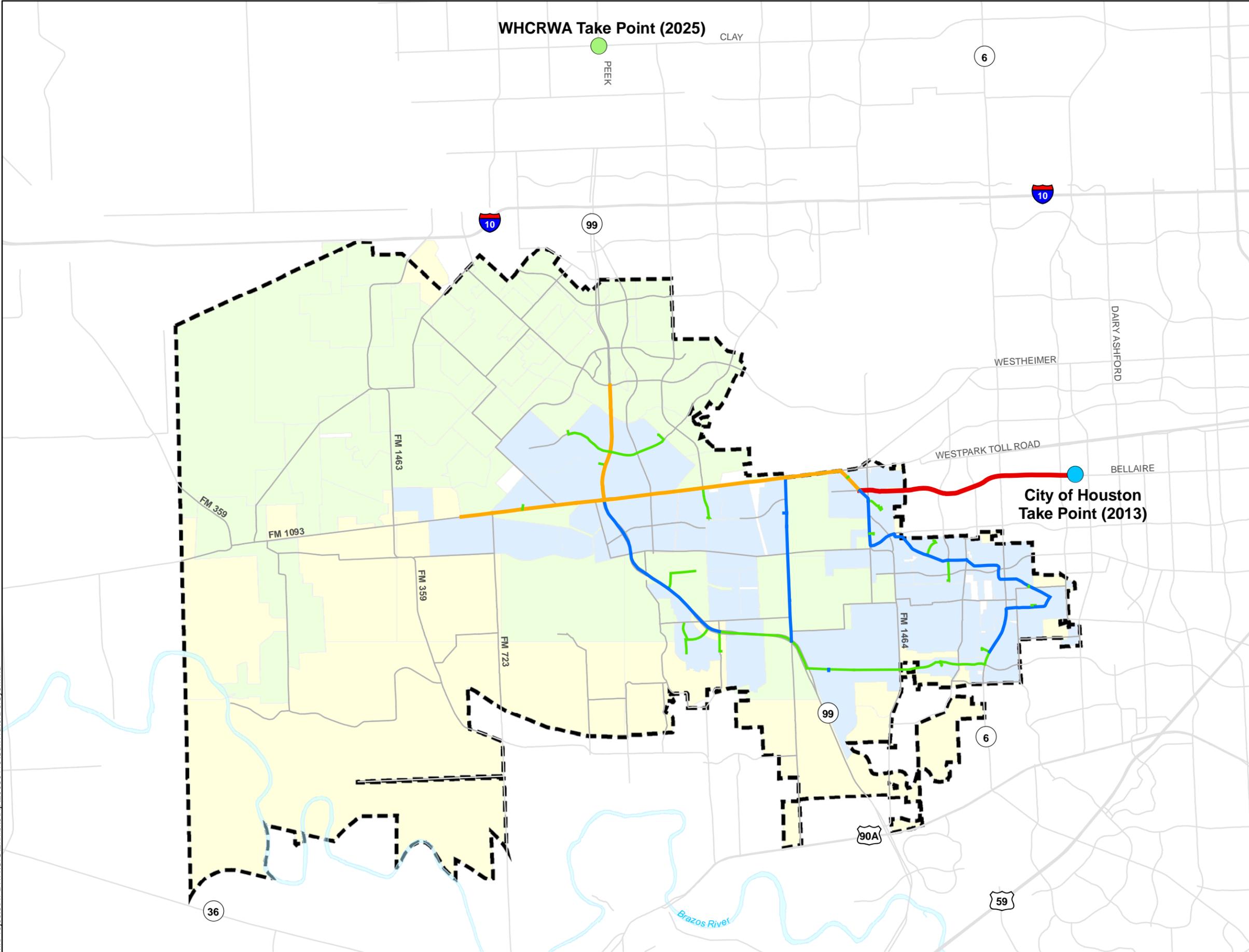
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Exhibit 8

Surface Water Delivery System for 2013



City of Houston Take Point
●

WHCROWA Take Point
●

Pipeline
Diameter in Inches
— ≤ 20
— 24 - 36
— 42 - 54
— ≥ 60

Conversion Phase
■ 2013 Conversion
■ 2025 Conversion
■ No Conversion

NFBWA

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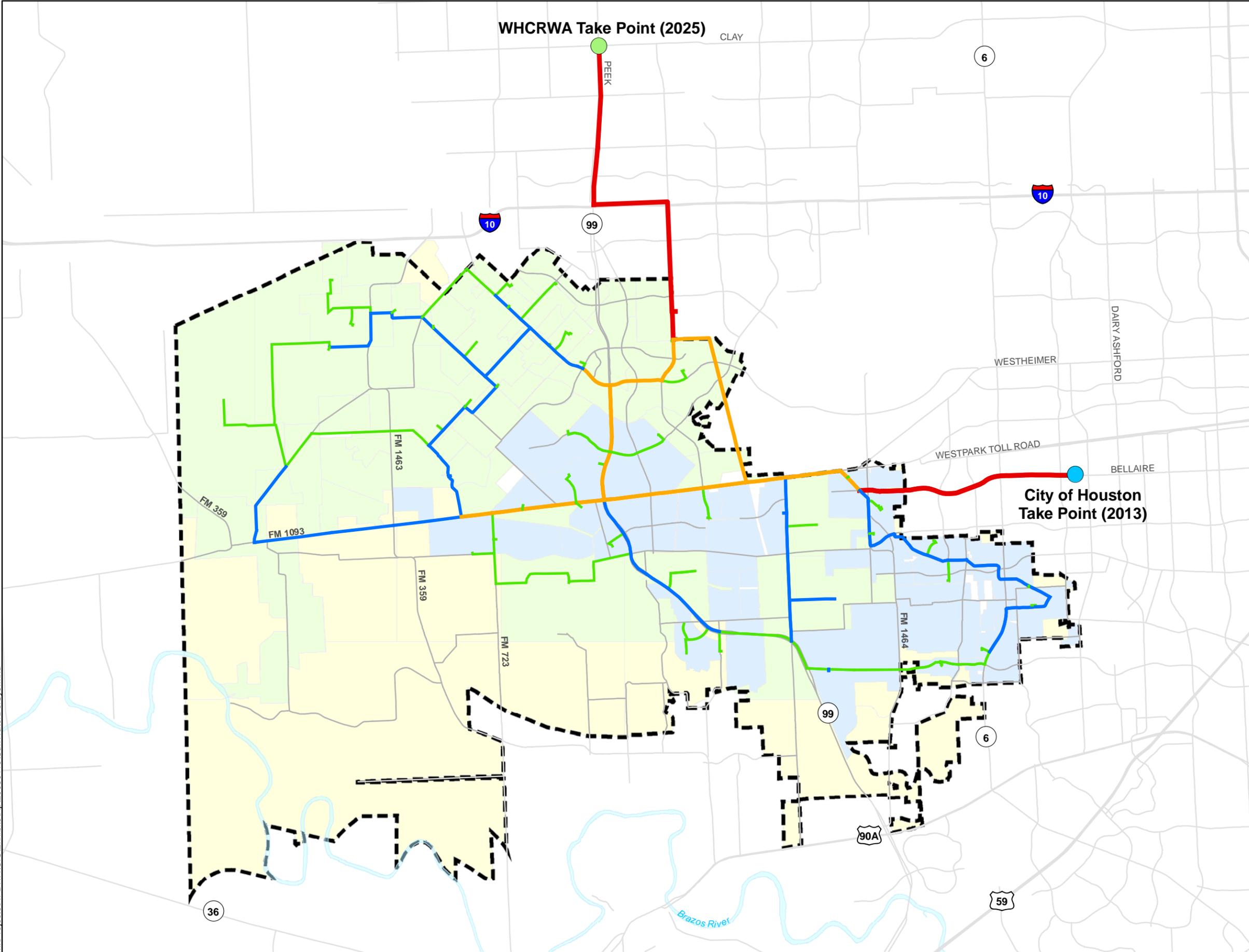
0 1 2 Miles



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Exhibit 9

Surface Water Delivery System for 2025



City of Houston Take Point
 City of Houston Take Point (2013)

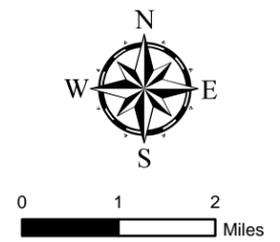
WHCRWA Take Point
 WHCRWA Take Point (2025)

Pipeline
 Diameter in Inches
 <= 20
 24 - 36
 42 - 54
 >= 60

Conversion Phase
 2013 Conversion
 2025 Conversion
 No Conversion

NFBWA

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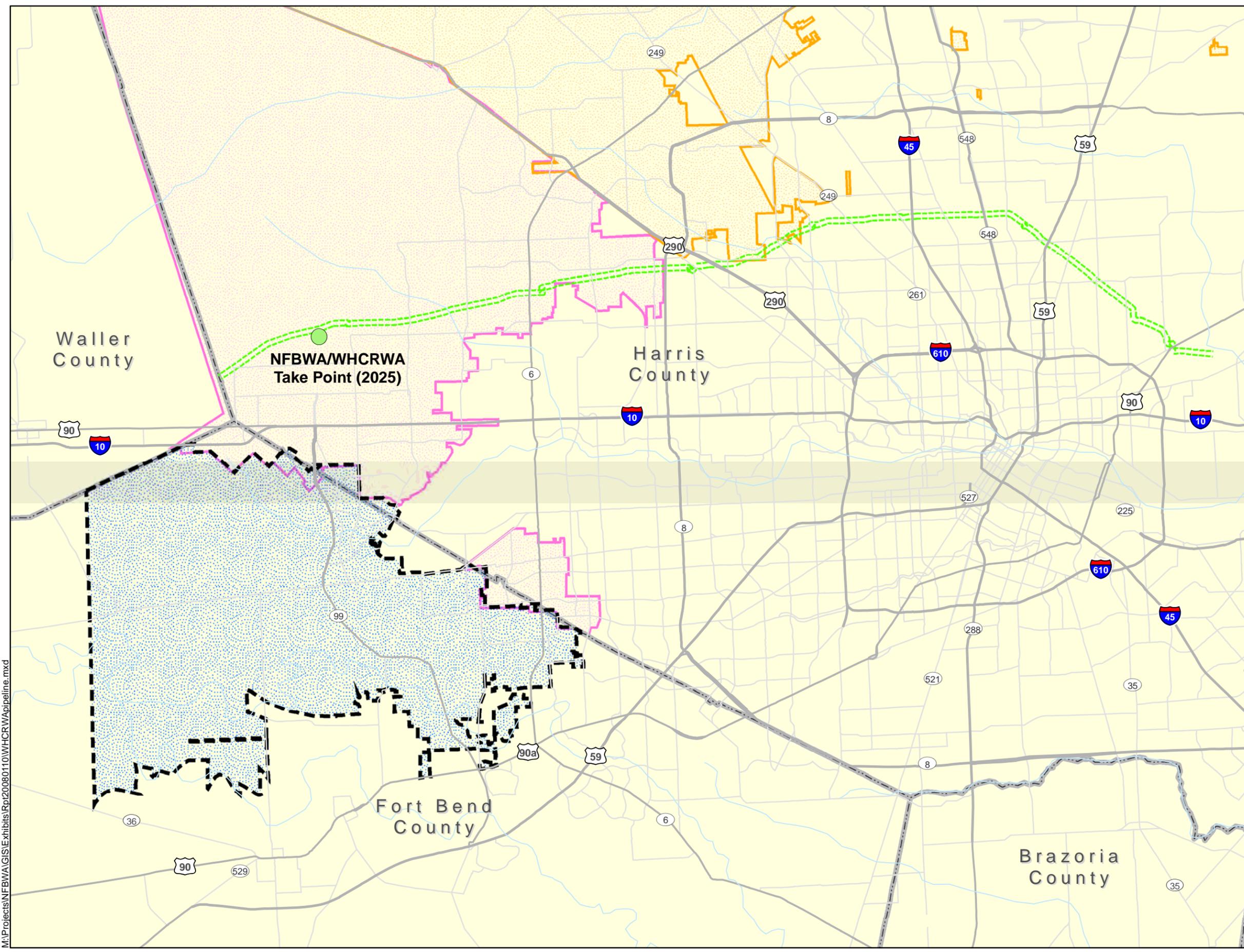


Logos for North Fort Bend Water Authority, Brown & Gay Engineers, Inc., TCB, and AECOM.

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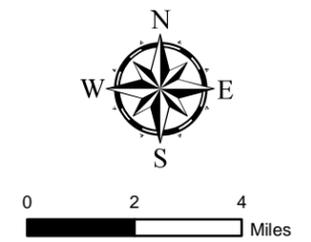
Exhibit 10

WHCRWA Pipeline Corridor



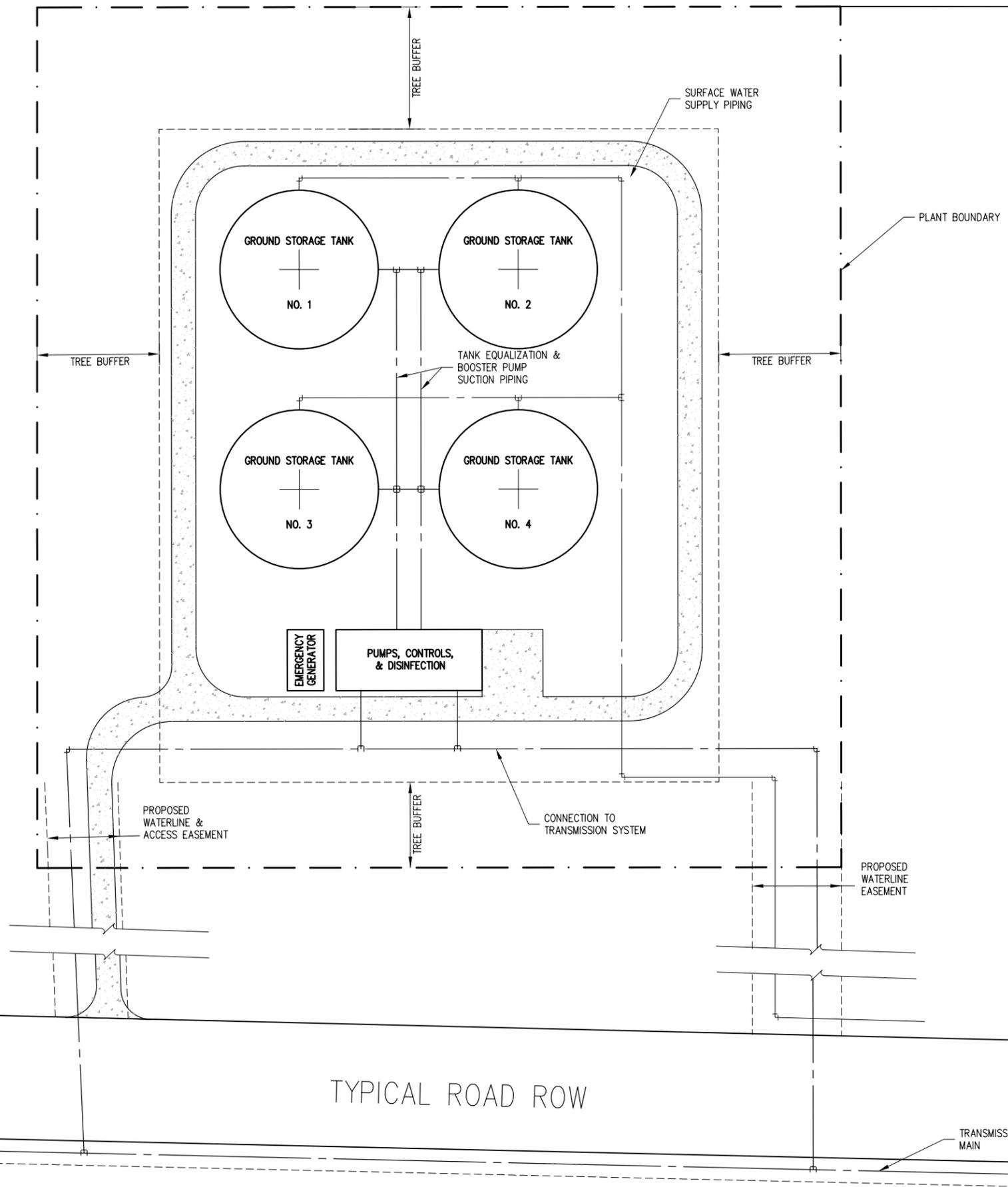
● WHCRWA Take Point
--- WHCRWA Easement Segment
--- NFBWA
--- NHCRA
--- WHCRWA

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Logos for the North Fort Bend Water Authority, Brown & Gay Engineers, Inc., TCB, and AECOM.

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BROWN & GAY ENGINEERS, INC.
 10777 Westheimer, Suite 400, Houston, TX 77042
 Tel: 281-558-8700 Fax: 281-558-9701
 — Civil engineers and surveyors —

BROWN & GAY
 ENGINEERS, INC.

Brown & Gay Engineers, Inc.
 10777 Westheimer, Suite 400, Houston, TX 77042
 Tel: 281-558-8700 Fax: 281-558-9701
 — Civil engineers and surveyors —

**NFBWA
 TYPICAL WATER PLANT
 LAYOUT**

SCALE: N.T.S.	JOB #: NFB06	DATE: JAN. 2008	EXHIBIT: 11
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APPENDIX A

Appendix A
Groundwater Reduction Plan Participants

Owner (Inside Authority)	Well	Aggrin	Comments
AVALON	1138	1137	
AVALON	1137	1137	
BIG OAKS MUD	235	235	
BIG OAKS MUD	825	235	
CINCO GOLF CLUB	693	693	
CINCO GOLF CLUB	1295	693	
CINCO GOLF CLUB	1296	693	
CINCO RANCH	827	827	
CINCO RANCH	828	827	
Cinco Ranch Southwest LP,	353	353	
Cinco Ranch Southwest LP,	1291	1291	
CINCO RES HOA	925	925	
CINCO RES HOA	926	926	
CINCO RES HOA	927	926	
CINCO RES HOA	1046	926	
CINCO RES HOA	1101	926	
CINCO RES HOA	1238	926	
CINCO1	147	147	
CINCO1	823	147	
CINCO1	938	147	
CINCO1	939	147	
CINCO1	976	147	
CINCO1	1014	147	
CINCO1	1022	147	
CINCO1	1074	147	
CINCO1	1075	147	
CINCO1	1175	147	
CINCO1	1274	147	
CINCO1	1307	147	
CINCOSW1	1127	1127	
CINCOSW1	1142	1127	
CINCOSW1	1143	1127	
CORNERSTONE MUD	738	738	
FALCON PT	505	505	
FB 118	865	865	
FB 118	1047	865	
FB 118	1088	865	
FB 119	884	884	
FB 122	1052	1052	
FB 122	1252	1052	
FB 123			Water supplied from FB122, no well.
FB 124	1019	1019	
FB 124	1020	1019	
FB 124	1153	1019	
FB 130	918	918	
FB 130	932	918	
FB 130	1130	918	
FB 132	1032	1032	
FB 133	1148	1148	
FB 142	1106	1106	
FB 142	1107	1106	Undeveloped/inactive
FB 143			
FB 146	1116	1116	
FB 146	1128	1116	
FB 151	1157	1157	

Appendix A
Groundwater Reduction Plan Participants

Owner (Inside Authority)	Well	Aggln	Comments
FB 151 FB 169 FB 169 FB 182 FB 185	1158 1286 1306 1301 1263	1157 1286 1286	Master Mud, supplies FB 170, 171, 172, 173. Master Mud, supplies FB 170, 171, 172, 173.
FB 2 FB 2 FB 30 FB 30 FB 34	107 108 243 1187 244	107 107 243 243 244	
FB 34 FB 34 FB 35 FB 37 FB 41	717 1304 148 245	244 244 148 245	Water supplied from FB 34, no well.
FB 50 FB 51 FB 52 FB 53 FB 57	171 1178	171 1178	Part of the Golf Course. Former golf course. Undeveloped/inactive.
FB 58 FB 93 FB MUD 170 FB MUD 171 FB MUD 172	1171 	1171 	Undeveloped/inactive. In master mud with FB 169, all water thru 169. In master mud with FB 169, all water thru 169. In master mud with FB 169, all water thru 169.
FB MUD 173 Ft. Bend I.S.D. FULSHEAR FULSHEAR GL 1	1191 493 999	1191 493 493	In master mud with FB 169, all water thru 169. Water supplied from GL4, no well.
GL 2 GL4 GL4 GL4 GLAKES CAI	251 1060 1236 910	251 251 251 910	Water supplied from GL4, no well.
GLAKES CAI GLAKES CAI GLAKES CAI GLAKES CAI GLAKES CAI	911 1027 1028 1029 1114	910 910 910 910 910	
GLAKES CAI GLAKES CAI GLAKES CAI GLWCID GM1	1115 1118 1150 247	910 910 910 247	Undeveloped/inactive. Supplies GM2 and FBC MUD 143.
GM1 GR SW EQUESTRIAN / Grand Mission HOA GRAYSON LAKES GRAYSON LAKES	1226 146 1245 1037 1038	247 146 1245 1037 1037	Supplies GM2 and FBC MUD 143. Beginning Dec 2007, water supplied by Cinco MUD
HARRISON HFB 1 HFB5 HFB5 HST GOLF	511 716 1239 866	511 716 716 866	Undeveloped/inactive. Supplies HFB1. Supplies HFB1.

Appendix A
Groundwater Reduction Plan Participants

Owner (Inside Authority)	Well	AggIn	Comments
HST GOLF	881	866	
Katy ISD	824	824	
Katy ISD	937	937	
Katy ISD	1122	1122	
Katy ISD	1213	824	
KINGSBRIDGE	248	248	
KINGSBRIDGE	718	248	
KINGSBRIDGE	1222	248	
LAKE POINTE	929	929	
Lakes of Bella Terra	1276	1276	
LAKESMG	980	980	
Leaman Building Materials,	839	839	
LONG MEADOW FARMS	1188	1188	
LONG MEADOW FARMS	1231	1188	
MEADOWBROOK FARMS	886	886	
MGROVE	971	971	
MGROVE	1124	971	
NMISSION GLEN	250	250	
NMISSION GLEN	1154	250	
PARKWAY LAKES HOA	1166	1166	
PARKWAY LAKES HOA	1167	1166	
PARKWAY LAKES HOA	1168	1166	
TDCJ	538	538	TDCJ wells 540-542 are outside the Authority.
TDCJ	686	538	
TDCJ	723	538	
TDCJ	724	538	
The George Foundation			No non-exempt wells as of December, 2007.
TXI	382	382	Property has been sold to a developer.
TXI	1024	382	
WESTHEIMER LAKES POA	1181	1181	
WESTHEIMER LAKES POA	1237	1181	
WESTHEIMER LAKES POA	1242	1181	Undeveloped/inactive.
WILLOW PT			
WOODBIDGE C.A.	954	954	
WOODBIDGE ESTATES	956	956	
Woodlake Estates HOA	885	885	
WSG WILLOW FORK IV, LP	780	780	
Owner (Outside Authority)	Well	AggIn	Comments
The George Foundation			See Agreement with the George Foundation for specific terms.

APPENDIX B

ORDER EXCLUDING CERTAIN LANDS FROM
NORTH FORT BEND WATER AUTHORITY

WHEREAS, the North Fort Bend Water Authority (the "Authority") was created pursuant to S.B. 1798, Act of the 79th Legislature 2005, Regular Session (the "Act"); and

WHEREAS, on this 24th day of October, 2007, the Board of Directors of the Authority held a hearing, pursuant to Sections 49.303(b), 49.304, and 49.307 of the Texas Water Code, as amended, on the exclusion of land described by metes and bounds in Exhibits "A," "B," and "C" (the "Land"), which is attached hereto and incorporated herein for all purposes; and

WHEREAS, pursuant to Section 49.303(b), Texas Water Code, as amended, the Authority's Board of Directors called a hearing on the exclusion of Land (the "Hearing"); and

WHEREAS, proper notice of the time and place of said Hearing was published in accordance with the requirements of Section 49.304, Texas Water Code; and

WHEREAS, the Authority's Board of Directors received evidence regarding the exclusion of the Land from the Authority; and

WHEREAS, the Hearing has been completed, and every person who desired to be heard was given a full opportunity to present evidence on the advantages or disadvantages of such exclusion; and

WHEREAS, after hearing the evidence presented at the Hearing, the Authority's Board of Directors found that to exclude the Land from the Authority would be practicable, just, and desirable, and that: (1) the retention of the Land and extending to it, either presently or in the future, the benefits, service, or protection of the Authority's facilities would create an undue and uneconomical burden on the remainder of the Authority, and (2) the Land cannot be bettered as to conditions of living and health, provided with water service, or otherwise benefited by the Authority's proposed improvements; NOW, THEREFORE,

BE IT ORDERED BY THE BOARD OF DIRECTORS OF NORTH FORT BEND WATER AUTHORITY:

Section 1: The facts recited in the preamble hereto are hereby found to be true and correct.

Section 2. The proposed exclusion of the Land, as described in Exhibits "A," "B," and "C", from the Authority is practicable, just, and desirable and will be of benefit to the Land proposed to be excluded and to the Authority. The retention of the Land and extending to it, either presently or in the future, the benefits, service, or protection of the Authority's facilities would create an undue and uneconomical burden on the remainder of the Authority. The Land cannot be bettered as to conditions of living and health, provided with water service, or otherwise benefited by the Authority's proposed improvements.

Section 3: The boundaries of the Authority are hereby redefined to be the boundaries and legal description of the Authority as provided in the Act, **SAVE AND EXCEPT:** (1) the land excluded by the Authority in its Order Excluding Land dated September 2, 2005, as recorded in the Official Public Records of Real Property of Harris County, Texas, on September 8, 2005, under Clerk's File Number Y751841, and as recorded in the Official Public Records of Fort Bend County, Texas, on September 6, 2005, under Clerk's File Number 2005109139; and (2) the land excluded by the Authority in its Order Excluding Land dated July 24, 2006, as recorded in the Official Public Records of Real Property of Harris County, Texas, on July 26, 2006, under Clerk's File Number Z479804, and as recorded in the Official Public Records of Fort Bend County, Texas, on July 26, 2006, under Clerk's File Number 2006090011; and (3) the land described in Exhibits "A," "B," and "C", attached hereto.

Section 4: The Authority's Board of Directors hereby determines by rule that the Land and the current owner of the Land owe no fees or charges to the Authority and that all water wells located on the Land are exempt from any and all fees or charges imposed by the Authority.

Section 5: With the adoption of this Order, the Board of Directors hereby authorizes the Authority's attorneys and engineers to do any and all things necessary in connection with the redefinition of the Authority's boundaries, including filing a certified copy of this Order in the deed records of Harris County, Texas and Fort Bend County, Texas.

[EXECUTION PAGE FOLLOWS]

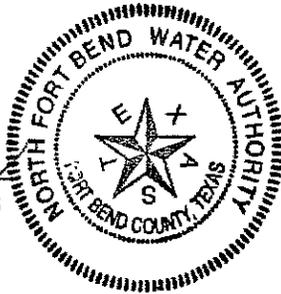
PASSED AND APPROVED this 24th day of October, 2007.

NORTH FORT BEND WATER AUTHORITY

By: *Robert Patton*
V, President, Board of Directors

ATTEST:

By: *Melony Gay*
Secretary, Board of Directors



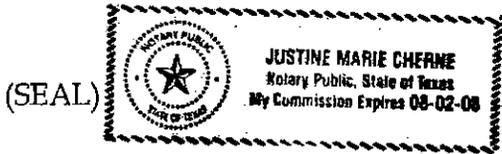
(SEAL)

THE STATE OF TEXAS §

COUNTIES OF HARRIS AND FORT BEND §

BEFORE ME, the undersigned, a Notary Public, on this day personally appeared *Robert Patton* as *Vice President* and *Melony Gay* as *Secretary* of the North Fort Bend Water Authority known to me to be the persons and officers whose names are subscribed to the foregoing instrument and affirmed and acknowledged that said instrument is correct and accurate to the best of their knowledge and belief, and that they executed the same for the purposes and in the capacity therein stated.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this 24th day of October, 2007.



Justine Marie Cherne
Notary Public, State of Texas

After recording, return to: North Fort Bend Water Authority, c/o Allen Boone Humphries Robinson LLP, 3200 Southwest Freeway, Suite 2600, Houston, Texas 77027, Attn: Justine M. Cherne.

July 17, 2007

FIELD NOTES
1.315 ACRES OF LAND
WATER PLANT SITE NO. 3
IN THE J.H. CARTWRIGHT LEAGUE, A-16
FORT BEND COUNTY, TEXAS

Being 1.315 acres of land out of the 179.5 acre tract described in the deed from Paul E. Schumann to Robert Schumann, recorded in Volume 507, Page 281, Fort Bend County Deed Records, Fort Bend County, Texas and the 84.127 acre tract described in the deed from Schumann - Muth Parties to the Estate of Herbert Paul Schumann, Sr. recorded in Volume 1563, Page 343, in the Fort Bend County Deed Records, Fort Bend County, Texas, in the J.H. Cartwright League, A-16, Fort Bend County, Texas, and being more particularly described as follows:

Commencing at a found $\frac{3}{4}$ " iron pipe in the East right-of-way line of F.M. 1464 for the Northwest corner of a 18.7504 acre tract of land described as Tract 13, Official Records of Fort Bend County, Texas;

THENCE, continuing along said East right-of-way of F.M. 1464, the following courses and distances:

- N 02° 27' 36" W, a distance of 980.72 feet to a point;
- N 02° 25' 36" W, a distance of 533.27 feet to a point on the East right-of-way line of F.M. 1464 for the Southwestern corner of an Access Easement;

THENCE, departing the East right-of-way line of F.M. 1464, the following courses and distances;

- S 85° 37' 11" E, a distance of 8.27 feet to an angle point;
- S 68° 28' 45" E, a distance of 648.42 feet to a point on an existing fence line;
- N 02° 25' 28" W, along the existing fence line, a distance of 24.38 feet to a fence post for the Northwest corner and being the Point of Beginning of the herein described Water Plant Site No. 3;

THENCE, along the perimeter of the Water Plant Site No. 3. The following courses and distances;

- S 68° 46' 58" E, a distance of 302.77 feet to a fence post for the Northeast corner of the Plant Site No. 3;
- S 02° 39' 34" E, a distance of 145.26 feet to a fence post for the Southeast corner of the Plant Site;
- S 87° 23' 56" W, a distance of 277.95 feet to a fence post for the Southwest corner of the Plant Site;
- N 02° 25' 28" W, a distance of 267.53 feet to the Point of Beginning and containing 1.315 acres of land.

(Note: All bearings herein have been rotated to conform to existing Fort Bend County Municipal Utility District No. 25 Bearing Basis)



George Ozuna Jr.
George Ozuna, Jr. R.P.L.S.
Registered Professional Land Surveyor

July 23, 2007

FIELD NOTES
1.043 ACRES OF LAND
ACCESS EASEMENT TO WATER PLANT SITE NO. 3
IN THE J.H. CARTWRIGHT LEAGUE, A-16
FORT BEND COUNTY, TEXAS

Being 1.043 acres of land out of the 179.5 acre tract described in the deed from Paul E. Schumann to Robert Schumann, recorded in Volume 507, Page 281, Fort Bend County Deed Records, Fort Bend County, Texas and the 84.127 acre tract described in the deed from Schumann - Murth Parties to the Estate of Herbert Paul Schumann, Sr. recorded in Volume 1563, Page 343, in the Fort Bend County Deed Records, Fort Bend County, Texas, in the J.H. Cartwright League, A-16, Fort Bend County, Texas, and being more particularly described as follows:

Commencing at a found $\frac{3}{4}$ " iron pipe in the East right-of-way line of F.M. 1464 for the northwest corner of a 18.7504 acre tract of land described as Tract 13, Official Records of Fort Bend County, Texas;

THENCE, continuing along said East right-of-way of F.M. 1464, the following courses and distances:

- N 02° 27' 36" W, a distance of 980.72 feet to a point;
- N 02° 25' 36" W, a distance of 533.27 feet to a point; for the Southwestern corner and the Point of Beginning of the herein described access easement;

THENCE, continuing along the East right-of-way line of F.M. 1464, N 02° 25' 36" W, a distance of 60.43 feet to a point for the Northwestern corner of the access easement;

THENCE, departing the East right-of-way line of F.M. 1464; S 85° 37' 11" E, a distance of 24.48 feet to a point for a corner;

THENCE, S 68° 28' 45" E, a distance of 793.29 feet to a point for the Northeast corner of the herein described access easement;

THENCE, S 02° 39' 56" E, a distance of 40.40 feet to a point on a fence line for the Southeast corner of the herein described access easement;

THENCE, along an existing fence line, N 68° 46' 58" W, a distance of 162.29 feet to a fence post for a corner;

THENCE, along the existing fence line, S 02° 25' 28" E, a distance of 24.38 feet to a point on the fence line for a corner;

THENCE, N 68° 28' 45" W, a distance of 648.42 feet to an angle point for a corner;

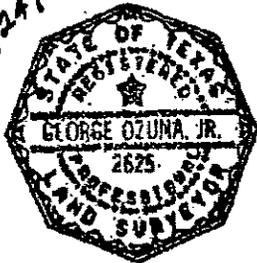


THENCE, N 85° 37' 11" W, a distance of 8.27 feet to the Point of Beginning containing 1.043 acres of land, and subject to the following easements recorded within the herein described access easement:

- 16' Utility Easement: File No. 9463207 Official Records Fort Bend County, Texas
- 16' HL&P Easement: File No. 9115386 Official Records Fort Bend County, Texas
- 20' Access Easement: File No. 9463207 Official Records Fort Bend County, Texas

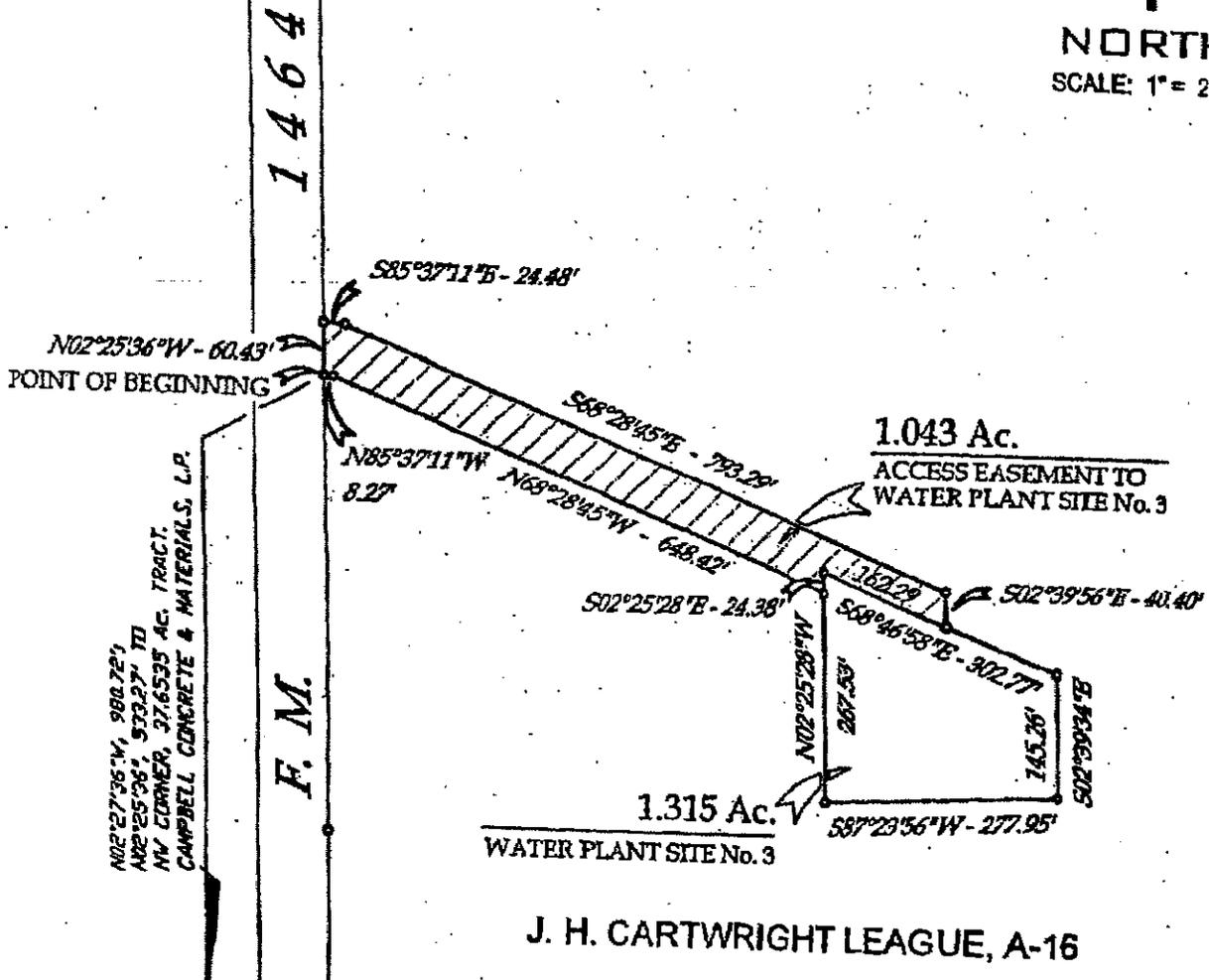
(Note: All bearings herein have been rotated to conform to existing Fort Bend County Municipal Utility District No. 25 Bearing Basis)

07/24/07



George Ozuna Jr.
George Ozuna, Jr. R.P.L.S.
Registered Professional Land Surveyor

↑
NORTH
 SCALE: 1" = 200'



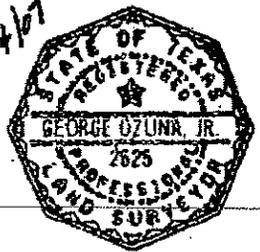
N02°27'36"V, 980.72'
 AN2°25'36", 533.27' TO
 NW CORNER, 37.6535 AC. TRACT,
 CAMPBELL CONCRETE & MATERIALS, L.P.

J. H. CARTWRIGHT LEAGUE, A-16

 ACCESS EASEMENT TO WATER PLANT SITE No. 3

PLAT OF:
 1.043 acres & 1.315 acres of land out of the 179.5 acre tract described in the deed from Paul E. Schumann to Robert Schumann, recorded in Volume 507, Page 281, Fort Bend County Deed Records, Fort Bend County, Texas and the 64.127 acre tract described in the deed from Schumann - Muth Parties to the Estate of Herbert Paul Schumann, Sr. recorded in Volume 1583, Page 343, in the Fort Bend County Deed Records, Fort Bend County, Texas, in the J.H. Cartwright League, A-16, Fort Bend County, Texas. (Note: All bearings herein have been rotated to conform to existing Fort Bend County Municipal Utility District No. 26 Bearing Beels)

Prepared by
BRIONES
 CONSULTING & ENGINEERING LTD.
 8111 BRADWAY HOUSTON, TX 77061 281 848 7208 281 848 7204



STATE OF TEXAS
 COUNTY of BEXAR
 I, hereby certify that this survey conforms to the current Texas Surveyors Association Standards and Specifications for a category
 I B condition II survey.

This 23 day of JULY, 2007 A.D.
George Ozuna, Jr.

Reference:
 Being a 1.043 & 1.315 acres out of the J.H. Cartwright Survey A-16, Fort Bend County, Texas.

APPENDIX C

THIS CONTRACT WILL BE PROVIDED WHEN IT IS AVAILABLE.

APPENDIX D

North Fort Bend
Water Authority

Potential Water Source Study

March 2006

Brown & Gay Engineers, Inc.



March 3, 2006

Mr. Peter C. Houghton, President
North Fort Bend Water Authority
c/o Allen Boone Humphries Robinson, L.L.P.
3200 Southwest Freeway, Suite 2600
Houston, TX 77027

Re: Potential Water Source Study
BGE Project No. NFB03-60

Dear Mr. Houghton:

Submitted herewith is the report of Brown & Gay Engineers, Inc. and Turner Collie & Braden (TCB) addressing Potential Water Sources to meet the Authority's future water supply needs. This report provides recommendations to the Board for evaluating potential water sources and supplies.

1. INTRODUCTION

Like other early efforts of the Authority, this report builds upon and updates efforts that began with the Fort Bend County Surface Water Supply Corporation. Based on the work of the Water Supply Corporation, the preliminary estimate of water demand and future surface water needs of the Authority is approximately 30 mgd (33,607 AF/yr) total. Of that, 9 mgd (10,082 AF/yr) of surface water is required to meet the Fort Bend Subsidence District (FBSD) 2013 goal for 30% reduction in groundwater use. The anticipated demand increases to approximately 50 mgd (56,011 AF/yr) in 2025, requiring 30 mgd (33,607 AF/yr) of surface water to meet the 60% conversion requirement. By 2050, total water demand is expected to approach 70 mgd (78,415 AF/yr), which will require 42 mgd (47,049 AF/yr) of surface water at a 60% conversion requirement. Additional surface water will be needed if the conversion requirements are increased beyond 60%.

The purpose of the Potential Water Source Study (Study) is to identify sources of surface water that may be available to the North Fort Bend Water Authority (Authority) for its use to meet the conversion goals of the Fort Bend Subsidence District and to recommend sources for further study during the Alternative Analysis Study. To accomplish this purpose, the Study included the following major tasks:

1. Review of available information, models, reports & TCEQ data to identify potential water supply entities.
2. Evaluation of identified water supply entities to determine available water.
3. Evaluation of potential water rights acquisitions including reliability.

This report presents the Study.

2. REVIEW OF AVAILABLE INFORMATION

To identify potential water supply entities, team members reviewed information from previous studies and reports. The most current and pertinent documents include:

1. Draft Feasibility Study
West Fort Bend County Regional Surface Water System
Brazos River Authority
October 2005
2. City Of Sugar Land
Evaluation Of Surface Water Supply Options
June 2005
3. Initially Prepared 2006 Regional Water Plan
Region H Water Planning Group
4. Fort Bend County Surface Water Supply Corporation
Analysis Of Available Water
Brown & Gay Engineers, Inc.
December 2004
5. Tri-Entity Surface Water Study
Fort Bend County W.C.&I.D. No. 2, The City Of Missouri City, The City Of Sugar Land
October 2004
6. Fort Bend County Surface Water Supply Corporation
Fort Bend County Water Needs Evaluation
Brown & Gay Engineers, Inc.
June 2002

Based on review of these documents, a number of entities were identified as potential providers of surface water to meet the Authority's needs. In alphabetical order, those entities are:

- Brazos River Authority (BRA)
- Chocolate Bayou Water Company (CBWC)
- City of Houston (COH)
- City of Missouri City (COMC)
- City of Sugar Land (COSL)
- Coastal Water Authority (CWA)
- Gulf Coast Water Authority (GCWA)
- Texas Genco
- TXU Power (TXU)
- West Harris County Regional Water Authority (WHCRWA)

Mr. Peter C. Houghton, President
North Fort Bend Water Authority
March 3, 2006
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Each entity was contacted to further investigate their interest and ability to work with the Authority to supply surface water. Dates, times, attendees, and notes from those initial discussions are included with this letter as Attachment B.

3. EVALUATION OF ENTITIES TO DETERMINE AVAILABLE WATER

The following sections summarize the existing and potential available supplies for each potential surface water supplier and the opportunities that may exist between each supplier and the Authority. The information summarized below provides a basis for this preliminary evaluation and for the recommendations for further study of potential supply entities.

3.1. Brazos River Authority (BRA)

The Brazos River Authority (BRA) appears to have sufficient and available supplies to meet both the Authority's short-term and long-term needs. The BRA currently has approximately 45,000 acre-feet of water available for contract out of their existing basin supplies. In addition, the BRA expects that an additional 15,000 to 20,000 acre-feet of currently contracted water will be returned to the BRA as a result of unused contract water from existing customers. The BRA is also pursuing a System Operations Permit from the Texas Commission on Environmental Quality (TCEQ). The System Operations Permit develops additional water supplies in the basin through the permitting of wastewater return flows as well as the permitting of unappropriated water developed as a result of operating their water supply facilities as a managed system. The System Operations Permit, if granted by the TCEQ, would develop an additional supply of water in the basin of over 400,000 acre-feet. However, it is not known, at present, how much of this supply will be ultimately permitted by the TCEQ.

All BRA supply in the lower basin is available on the main stem of the Brazos River. Therefore, intake structures and transmission systems would need to be constructed to deliver water from the Brazos River to the point of need in the Authority. Based on discussions with BRA personnel, the BRA is willing to work with the Authority in a number of alternative arrangements to meet their water needs including:

- a.* The Authority could contract with the BRA for raw water only.
- b.* The Authority could contract with the BRA for raw water and facility operations.
- c.* The Authority could participate in the West Fort Bend County Regional Surface Water System.
- d.* The BRA is willing to build, own, operate and contract with the Authority for treated water.

The above alternatives represent various degrees of contractual relationship between the Authority and the BRA as well as various levels of autonomy for the Authority. In addition, each of the above alternatives has different short-term and long-term economic impacts to the Authority. Alternative (a) represents the least complex contractual relationship between the Authority and the BRA while providing the Authority the most autonomy. This alternative would only involve the long-term contract of raw water supply from the BRA by the Authority. The Authority would be responsible for the planning, design, construction, financing, and operations of the surface water treatment plant and transmission facilities required to deliver water from the Brazos River to the Authority. It is recommended that the Authority evaluate this alternative further during the Alternative Analysis Study.

Alternative (b) represents a slightly more complex contractual relationship with the BRA with only slightly less autonomy for the Authority. Alternative (b) requires the Authority to contract raw water supplies from the BRA and also makes the Authority responsible for the planning, design, construction, and financing of water related infrastructure. However, the Authority would enter into an additional contract with the BRA for operations of the water treatment plant and other water related facilities. This alternative allows the Authority greater autonomy in making decisions related to infrastructure construction and financing, while also providing for a mechanism for long-term operations support. It is recommended that the Authority evaluate this alternative further during the Alternative Analysis Study.

Alternative (c) requires the Authority to participate in the West Fort Bend Regional Surface Water System along with several other stakeholder entities including the Cities of Richmond and Rosenberg and the communities of Greatwood, New Territory, Plantation, and Pecan Grove. This alternative is still being developed by BRA and the associated stakeholders. While this alternative may be feasible for the Authority, the reduced autonomy due to the significant number of parties involved, the lack of specific information as it relates to the Authority, and the planning schedule and commitment required at this time Alternative (c) is less attractive than other alternatives associated with the West Fort Bend Regional Surface Water System for further analysis. It is recommended that the Authority continue to monitor the status and development of this alternative but only evaluate this alternative further during the Alternative Analysis Study if plans develop in a way that makes Alternative (c) more attractive to the Authority.

Alternative (d) is representative of a more contractually complex agreement between the Authority and the BRA while providing a lesser degree of autonomy for the Authority. In Alternative (d), the BRA would take responsibility for the planning, design, construction, financing, and operations of all water related infrastructure for the Authority. The Authority would pay-back the BRA in the form of long-term revenues from the sale of treated water supply contracts. Based on discussions with BRA personnel, the BRA is prepared to present a detailed proposal to the Authority to describe the specifics related to such an agreement. It is expected that this proposal will be submitted to the Authority in 2006 and available for inclusion in the Alternative Analysis Study.

Based on the above discussions, it is recommended that further evaluation of the feasibility of utilizing this water supply as well as the economic advantages/disadvantages associated with this alternative be considered by the Authority during the Alternatives Analysis Study.

3.2. Chocolate Bayou Water Company (CBWC)

The Chocolate Bayou Water Company (CBWC), owned by International Paper (IP), currently has water rights on the Brazos River totaling 155,000 acre-feet for annual diversion. These water rights are diverted from their existing Juliff Pump Station into canals serving irrigation demands in central and southern Brazoria County. In addition, the CBWC owns 57,500 acre-feet of water rights in their Chocolate Bayou system. These water rights are diverted from their existing Chocolate Bayou, Mustang Bayou, and Halls Bayou pump stations into canals that serve irrigation and industrial demands in eastern Brazoria County.

Approximately 60,000 acre-feet of the 155,000 acre-feet of rights on the Brazos River are available on an annual firm diversion basis. Approximately 12,000 acre-feet of the 57,500 acre-feet of rights in the Chocolate Bayou system are available on an annual firm diversion basis.

The TCEQ issued the CBWC a Draft Permit Amendment to include an additional diversion point near Hempstead, Texas. This permit amendment, if granted, would allow for the diversion of up to 80,000 acre-feet annually out of the 155,000 acre-feet currently permitted at Juliff. The firm diversion for this additional diversion point is significantly less (approximately 12,000 acre-feet) than the 80,000 acre-feet that may be permitted. A hearing at the TCEQ has been completed for this permit amendment. However, prior to final action by the TCEQ, the permit amendment was withdrawn by the applicant.

The CBWC sells raw water through its existing canal systems to irrigation and industrial customers in Brazoria and Galveston counties. CBWC has an existing take-or-pay contract with BP Amoco for the sale of 17,400 acre-feet annually. According to IP, this is a ten year contract with an expiration date of 2015. In addition, the CBWC sells approximately 75,000 to 100,000 acre-feet of water annually to irrigation customers. These irrigation water sales are not based on take-or-pay contracts, but instead are provided on as-needed basis determined by individual customer needs. Therefore, the sale of irrigation water varies each year based on the agricultural market conditions and seasonal needs.

IP has been considering the sale of CBWC for several years, beginning in 2000 with the potential purchase by the North Harris County Regional Water Authority. Based on discussions with IP, it appears that they would prefer to sell the CBWC in whole including the water rights, physical assets, and any existing contracts (See Attached Meeting Minutes).

The existing diversion points of the CBWC permits are located at significant distance from the primary needs for the Authority. The closest diversion point of the CBWC (Juliff Pump Station on the Brazos River) is approximately 25 miles from the northern portion of the Authority, where the demands for water are the greatest. The construction of transmission facilities to convey water from the existing Juliff Pump Station to the Authority may be cost prohibitive, depending on the economics associated with other alternatives. The ability to utilize the permitted water from the CBWC at a location further upstream and closer to the Authority would increase the feasibility and economic advantage of this water supply.

Based on the above discussions, it is recommended that further evaluation of the feasibility of utilizing this water supply as well as the economic advantages/disadvantages associated with this alternative be considered by the Authority during the Alternatives Analysis Study.

3.3. City of Houston (COH)

The City of Houston (COH) is the largest holder of surface water rights and the largest supplier of surface water in the region. The COH has a long history of securing and developing surface water supplies to meet the needs of its existing and potential customers. To distribute surface water in response to Harris-Galveston Subsidence District mandates, the COH has developed treatment facilities and an extensive system of large diameter raw and treated water transmission mains.

Mr. Peter C. Houghton, President
North Fort Bend Water Authority
March 3, 2006
Page 6 of 13

The COH has existing agreements to supply surface water to numerous governmental entities including the North Harris County Regional Water Authority (NHCRWA) and the West Harris County Regional Water Authority (WHCRWA). These existing agreements provide an example of the type of agreement the COH might enter into with the Authority.

In the short term, COH Groundwater Reduction Plan (GRP) credits may be available to the Authority. In lieu of credits, the COH may be able to supply water to the Authority from excess capacity at existing facilities on the west side of its system. These include approximately 16 mgd (17,924 AF/yr) at the COH's Jersey Village Pump Station located in the vicinity of US Hwy 290 and FM 529. The WHCRWA is also interested in this potential supply. Also, there may be limited capacity available at the COH's Katy-Addicks Surface Water Pump Station located in the vicinity of IH 10 and the W. Sam Houston Tollway North. This limited capacity is unproven and relies on transmission mains currently under construction. Additional transmission mains will be required to convey the water from the Katy-Addicks Pump Station.

In the long term, the Authority's increasing needs, estimated to be approximately 30 mgd (33,607 AF/yr) in 2025 and more than 40 mgd (44,809 AF/yr) by 2050, will require that surface water be conveyed from the COH's treatment plants on the east side of the city. The COH's East Water Purification Plant (EWPP) and Southeast Water Purification Plant (SEWPP) have excess capacity available. However, the Northeast Water Purification Plant (NEWPP) will require capacity improvements including construction of the Luce Bayou Interbasin Transfer to import Trinity River water to Lake Houston.

In summary, to obtain a long-term supply of surface water from the COH, the Authority must eventually purchase a share of capacity in the COH's raw water facilities, treatment plant(s), and transmission mains, and also construct additional mains for the Authority's use. In addition to the capital investment, the Authority would pay a pro-rata share of audited operation and maintenance costs.

Based on the above discussions, it is recommended that further evaluation of the feasibility of utilizing this water supply as well as the economic advantages/disadvantages associated with this alternative be considered by the Authority during the Alternatives Analysis Study.

3.4. City of Missouri City (COMC)

The COMC is comprised of several in-City MUD's, each with their own separate water systems. This creates additional challenges for the COMC in terms of developing consensus among parties for developing plans for meeting their future surface water needs.

The City of Missouri City (COMC) currently has approximately 15 mgd (16,803 AF/yr) of surface water supply in the form of option agreements with the Gulf Coast Water Authority (GCWA). These option agreements will convert to take-or-pay contracts in 2009. The COMC continues to explore alternatives to meet FBSD groundwater reduction requirements. The City of Missouri City (COMC) is preparing a Utility Business Plan (Plan) reviewing the City's existing and future needs for surface

water, the timing of that need, and the alternatives available to meet requirements of the FBSD for groundwater reduction.

The Plan includes two primary options. The first option emphasizes conversion of the more developed northern portion of the City. The main benefit of this option is that it allows greater conversion and reduces the total area to which surface water must ultimately be delivered. The drawback of this option is that the cost of constructing water lines will be greater due to the high level of development.

The second option emphasizes conversion of the less developed southern portion of the City including Sienna Plantation outside the current corporate limits. The main benefit of this option is that it allows construction at less cost due to the low level of development. The drawback of this option is that the population may be insufficient to achieve surface water conversion requirements if actual development is slower than currently projected. In that case, surface water lines would have to be extended into the more heavily developed northern portion of the City.

Both scenarios are based on a Groundwater Reduction Plan (GRP) in which all participants share the capital and operation and maintenance costs regardless whether they receive surface water. The ultimate plan for groundwater reduction in the COMC will need to be coordinated and consensus developed between the COMC and the MUDs. The plan is currently in draft form for comment by City staff. It is anticipated that the plan will be submitted for adoption in the next couple of months.

The Authority may potentially be able to purchase some or all of the COMC's existing surface water supply on a short-term or long-term basis depending on the COMC's long-term plans. In addition, an opportunity may also exist for the Authority to purchase over-conversion credits from the COMC if the COMC's plans are able to over-convert a portion of their service area. The relatively small amount of surface water that the COMC owns (approximately 15 mgd (16,803 AF/yr)) versus the amount of water needed by the Authority (approximately 10 mgd (11,202 AF/yr) in 2015 and 30 mgd (33,607 AF/yr) in 2030) makes this supply source difficult to consider at this time. Therefore, it is not recommended that this water source receive significant attention in the Alternative Analysis Study. The Authority should continue to monitor the status of the COMC's plans to assess if and when these supplies may become available for purchase.

3.5. City of Sugar Land (COSL)

The City of Sugar Land (COSL) is located southeast of the Authority between the cities of Richmond and Missouri City. The COSL has actively investigated its surface water options in recent years, participating in a number of studies with various neighboring water suppliers. The COSL currently holds a Contract Option with GCWA for 20 mgd (22,404 AF/yr) of raw water. This option must be exercised and an agreement executed by 2015.

Based on their investigations, the COSL plans to construct a treatment plant to meet their future surface water demand of approximately 20 mgd (22,404 AF/yr). The COSL is currently acquiring property for the treatment plant in the vicinity of Burney Road and W. Airport Boulevard. It is estimated the proposed site would accommodate a maximum of 30 mgd (33,607 AF/yr) of treatment capacity unless additional property is acquired. The COSL has indicated that in any cooperative effort with the

Mr. Peter C. Houghton, President
North Fort Bend Water Authority
March 3, 2006
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Authority, it prefers to sell treated water on a retail basis rather than partnering in construction and operation of the treatment plant.

In the short term, the Authority could purchase up to 10 mgd (11,202 AF/yr) of treated surface water from the COSL. Such an agreement would allow the COSL to construct the maximum treatment capacity and in return the Authority should realize a lower retail cost of water due to the project's greater economy of scale. However, the Authority's 10 mgd (11,202 AF/yr) share would be returned to the COSL as needed, and entirely by 2025 at which time the Authority must have secured an alternative surface water supply.

This approach relies on being able to economically distribute the 10 mgd (11,202 AF/yr) to districts within the Authority. A significant consideration is properly sizing water lines from the treatment plant to Authority customers. Careful planning to incorporate those lines into the ultimate system is required to ensure that they continue to be used at the maximum capacity possible.

In the long term, cooperation with the COSL makes the most sense if the Authority secures a 10 mgd (11,202 AF/yr) (or greater) supply of raw water to allow construction of a 30 mgd (33,607 AF/yr) (or greater) treatment plant. In this way, the Authority may continue to use its 10 mgd (11,202 AF/yr) share and the COSL may expand treatment plant capacity to meet its needs. Ten mgd is not sufficient to meet all of the Authority's surface water needs but, a supply from the COSL could prove to be more economical for the eastern portion of the Authority where it may not otherwise be cost effective to deliver surface water.

In summary, although willing to work cooperatively with the Authority, by itself the COSL can only meet short-term Authority surface water needs. The Authority must still identify a long-term supply significantly larger than the COSL is able to provide. With the necessary supply, the Authority may continue to look to the COSL as a potential provider of surface water to meet Authority needs in the southeast portion of the Authority.

Based on the above discussions, it is recommended that this water supply be considered by the Authority for further evaluation during the Alternative Analysis Study. The short-term opportunities, coupled with the identification of another long-term supply of water, may offer advantages in the overall planning of the Authority's GRP. The feasibility of utilizing this water supply will be evaluated further as well as the economic advantages/disadvantages associated with this alternative.

3.6. Coastal Water Authority (CWA)

The Coastal Water Authority (CWA) was created during the 60th session of the Texas Legislature in 1967. The City of Houston appoints a majority of CWA Board members, but CWA has broad powers to supply water in the larger region. Traditionally, CWA has primarily supplied raw water to industry, especially industries located along the Houston Ship Channel.

Currently, CWA has approximately 33 million dollars (\$33M) available from past bond sales that CWA has been directed to put to use. CWA desires to identify the best possible uses for available funds in the near future (but not necessarily to commit funds) in order to satisfy the directive that has been

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given. Use of the money includes numerous restrictions, but does not require City of Houston approval. Unless a more compelling use is found, a portion of the money is expected to be used to purchase the City of Houston's 70% interest in Allen's Creek Reservoir. The Brazos River Authority (BRA) holds the remaining 30% interest in Allen's Creek.

In the short term, CWA may replace the City of Houston as majority shareholder in the future Allen's Creek Reservoir project. However at this time, there does not appear to be sufficient need or interest to develop Allen's Creek in the foreseeable future. At present, CWA appears to be a willing partner in projects with the ability to help finance engineering design and/or construction costs. For example, CWA is primarily interested in the design/construction phases of treatment plants (including raw water intake structures, if necessary) and not in the operation of plants since O&M services may be readily obtained. If necessary, CWA would participate in pipeline projects, but that is not CWA's primary interest. There may be significant benefit to the Authority in CWA's participating in larger projects that would otherwise be difficult economically, while deferring repayment until water is delivered and the associated revenue is available to finance the debt service.

In the long term, if CWA purchases the COH's share of the Allen's Creek Reservoir project, it will play a significant role in developing that approximately 90-mgd (100,820 AF/yr) water supply project. In addition, CWA will have a role in the City's Luce Bayou Interbasin Transfer when water demands trigger the need for that project. However, once currently available funds are committed to specific purposes, it is likely that CWA will be less able to participate in future projects.

In summary, at the present time, CWA desires to identify projects that benefit the public in order to put available funds to use. To satisfy that charge, CWA is prepared to participate in Authority projects, especially the engineering design and construction phases of treatment works, but preferably not their long-term operation and maintenance. It is assumed that these funds will not be available very far into the future. Because CWA does not currently have surface water to offer, the Authority must still identify a long-term water supply to meet future needs.

Based on the considerations presented above, it is recommended that the Authority continue to include CWA in the Alternative Analysis Study. Short-term opportunities in combination with long-term water supply strategy may benefit the Authority's overall GRP planning. The economic advantages / disadvantages associated with CWA should continue to be evaluated.

3.7. Gulf Coast Water Authority (GCWA)

The Gulf Coast Water Authority (GCWA) is a major supplier of raw surface water throughout Fort Bend and Brazoria Counties. The GCWA also supplies treated surface water to industrial and municipal customers in Galveston County. In addition to surface water rights in the Brazos River, the GCWA owns and operates a system of lift stations and canals to convey water from its supplies in the Brazos River to the majority of water demand in the east. The GCWA indicated that it has a limited amount of reliable water available, but is willing to work with the Authority to obtain additional water. GCWA indicated that other supplies of water are available from Oyster Creek. However, the reliability of these run-of-river supplies are unacceptable for most purposes.

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In general, GCWA operates on a component cost of service basis that allocates to each customer only those costs directly attributable to that customer. The benefit of this manner of financing is that it provides customers a fixed debt service that predictably decreases with time. However, due to the constraints inherent with this type of rate structure, difficulties can be experienced in developing the financing mechanism for new water sources and new water infrastructure projects.

There appear to be two scenarios that would positively enhance GCWA's opportunities to work with the Authority by making water available in Fort Bend County. The first scenario is to make Trinity River water available to GCWA customers in the east, thereby allowing existing supplies to remain in Fort Bend County for Authority's use. This scenario requires construction of the City of Houston's Luce Bayou Interbasin Transfer project and additional raw water transfer from the San Jacinto River down to the Texas City area.

The second scenario relies on acquiring water rights from the Chocolate Bayou Water Company that could be transferred to the Texas City area to meet customers' needs. This would free up water from the Brazos River that would be available in Fort Bend County for the Authority's use.

In the short term, GCWA does not have the immediate need for water, nor the financing in place, to acquire additional water rights on its own. In the long term, providing an alternative supply of water to GCWA customers in the east may allow GCWA to become an important partner in the Authority's efforts to meet its customers' needs and the requirements of the Fort Bend Subsidence District.

In summary, the GCWA has wide-ranging operations including its water rights, and system of lift stations and canals within reach of the Authority. Based on this, the Authority should continue to include GCWA in future planning despite the absence of a clear role at this time.

Based on the above discussions, it is recommended that this water supply be considered by the Authority for further evaluation during the Alternative Analysis Study. The feasibility of utilizing this water supply will be evaluated further as well as the economic advantages/disadvantages associated with this alternative.

3.8. Texas Genco

Texas Genco owns and operates the W.H. Parrish Power Plant in Fort Bend County, Texas. Texas Genco owns water rights in the Brazos River totaling 40,000 acre-feet for industrial and irrigation use as well as 83,000 acre-feet in contract water from the Brazos River Authority (BRA). This water is diverted and conveyed via canal system to Smithers Lake, also owned and operated by Texas Genco, for use as cooling water at the power plant. In addition, Texas Genco also contracts approximately 24,000 acre-feet to the Richmond Irrigation Company and 4,000 acre-feet to Brazos Valley Energy.

The water rights, BRA contract water, and storage within Smithers Lake represent a significant water holding that could meet the needs of the Authority. The amount of water Texas Genco currently contracts to other entities alone (28,000 acre-feet) represents a large percentage of the total surface water needs for the Authority. The contract to Richmond Irrigation Company will expire in 2008 and the contract to Brazos Valley Energy will expire in 2026.

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However, based on discussions with Texas Genco personnel (See Meeting Minutes dated November 29, 2005), Texas Genco is not considering contracting these supplies to any other entity as these contracts expire and will instead hold these rights for Texas Genco use. In addition, Texas Genco is currently not considering any additional contract or sale of their water rights and have made the decision not to convert any of their water rights to municipal use.

Texas Genco personnel indicated that Texas Genco is currently in the process of being acquired by another energy company and therefore no sale of water rights or contracts are being contemplated at this time. In addition, Texas Genco personnel indicated that the water rights holdings of Texas Genco may, at some point in the future, be available for purchase or contract by the Authority or any other entity. However, the availability of these water rights would be dependent on the ultimate plans for the W.A. Parish Power Plant in Fort Bend County, which at present is not known.

Based on the above discussions, it is recommended that this water supply not be considered by the Authority for further evaluation during the Alternative Analysis Study. However, it is recommended that monitoring of the status of these water rights continue in order to assess if and when these holdings may become available for purchase in the future.

3.9. TXU Power (TXU)

TXU Power (TXU) is the largest manufacturer of electricity in Texas. TXU's operations include the Twin Oak Reservoir in Robertson County on a tributary of the Navasota River. Twin Oak Reservoir was constructed approximately 25 years ago, but was never filled or placed in operation due to the economics of the power generating industry.

However, economic conditions have changed and TXU is now constructing two generating units that will utilize Twin Oak Reservoir. Therefore, Twin Oak Reservoir is no longer a viable water supply option for the Authority. In addition to Twin Oak Reservoir, TXU has contracted with BRA for water from Lake Limestone on the Navasota River. TXU offered that the Authority may be able to purchase Lake Limestone water from BRA including, potentially, any amount TXU has contracted for that TXU may not require for their operations. However, BRA water is available much closer to the Authority. Neither TXU Twin Oak Reservoir, nor any portion of Lake Limestone water which TXU has under contract should be considered for further study during the Alternative Analysis Study.

3.10. West Harris County Regional Water Authority (WHCRWA)

The West Harris County Regional Water Authority (WHCRWA) was created by the Texas Legislature to address subsidence in western Harris County outside the City of Houston. The WHCRWA encompasses more than 200 square miles and more than 70 active utility districts. To meet its 2010 surface water needs, the WHCRWA has contracted with the City of Houston (COH) for approximately 18 mgd (20,164 AF/yr) of surface water. The WHCRWA continues to investigate the purchase of additional capacity available at the COH's East Water Purification Plant (EWPP) in preparation to meet future surface water demand estimated to be approximately 50 mgd (56,011 AF/yr) in 2020.

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The WHCRWA is interested in cooperative efforts that make supplying surface water to an isolated area within its boundaries more economical. This isolated area, Precinct 1, includes the Mission Bend area south of Barker Reservoir and west of the COH. A neighboring provider such as the Authority or the COH may best serve this isolated portion of the WHCRWA. However, it is unclear whether the COH has adequate capacity in the region to supply Precinct 1.

In the short term, the WHCRWA's existing or planned projects meet their 2010 conversion requirements. To cooperate in future efforts, the WHCRWA and the Authority must identify projects that address surface water needs for WHCRWA's 2020 conversion. Potential cooperative projects will face additional challenges because the Authority's conversion dates in 2013 and 2025 don't coincide with the WHCRWA's conversion dates of 2010, 2020, and 2030.

In summary, while currently joined with the COH to supply its immediate surface water needs, the WHCRWA is interested in working with the Authority to identify viable alternative sources of supply, especially to reduce the cost to deliver surface water to Precinct 1 of the WHCRWA. In addition, the WHCRWA is willing to consider opportunities to develop larger projects that offer reduced cost through increased economy of scale.

Based on the above discussions, it is recommended that this water supply be considered by the Authority for further evaluation during the Alternative Analysis Study. The feasibility of utilizing this water supply will be evaluated further as well as the economic advantages/disadvantages associated with this alternative.

4. SUMMARY AND CONCLUSIONS

Ten entities were identified and contacted to determine their ability and willingness to supply surface water to the North Fort Bend Water Authority. Four entities do not have surface water available. Two of those four entities, TXU Power and Texas Genco, can be eliminated from consideration in the Authority's Alternatives Analysis Study. Due to the current economics of the power industry, TXU and Texas Genco are not willing to make any of their water supplies available at this time.

The remaining two of the four entities, the Coastal Water Authority and West Harris County Regional Water Authority, although they don't have surface water available, merit some consideration in on-going planning efforts based on their location, ability to provide funding, their assets, and future needs.

Three of the ten entities, the Gulf Coast Water Authority, the City of Sugar Land, and the City of Missouri City, should be considered for further study and analysis during the Alternative Analysis Study. None of these three have sufficient water immediately available to the Authority to address long-term needs. However, they have the potential to address short-term needs or the possibility to provide for a portion of long-term needs if combined with other long-term strategies and should be considered for further study.

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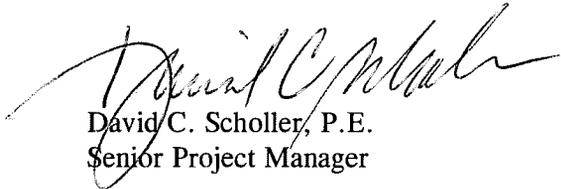
Finally, there are three entities that have existing supplies available to meet the long-term needs of the Authority. Those three entities are: the Brazos River Authority, the Chocolate Bayou Water Company, and the City of Houston.

The Alternatives Analysis Study will evaluate the advantages and disadvantages associated with the alternative supplies, assess various transmission options, including joint planning efforts with other entities, to best utilize each supply source, and estimate the cost of each alternative to the Authority.

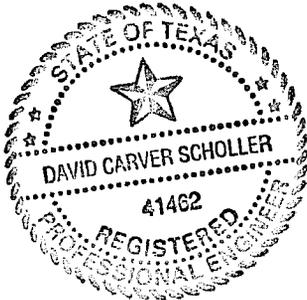
If you have any questions or need additional information, please contact me at (281) 558-8700.

Sincerely,

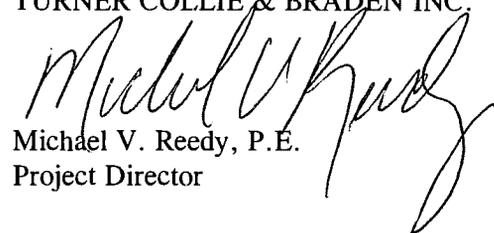
BROWN & GAY ENGINEERS, INC.



David C. Scholler, P.E.
Senior Project Manager



TURNER COLLIE & BRADEN INC.



Michael V. Reedy, P.E.
Project Director



Attachments

- A - Summary Table
- B - Notes of Meetings with Potential Providers (in alphabetical order as presented in the report)
- C - Exhibit 1

**North Fort Bend Water Authority
Potential Source Study
Summary Table of Potential Source Information**

Provider	Raw or Treated	Project	Source	Quantity ⁽¹⁾ mgd (AF/yr) Contracts	Distance ⁽²⁾ (miles)	Availability	Notes	Rec'd for Add'l Study
1 Brazos River Authority (BRA)	Raw	BRA System	Brazos River	40.2 (45,000) Contracts	10	Currently Available		
	Treated	Proposed WTP	Brazos River	40.2 (45,000) Contracts	10	Water Is Available WTP Not Available	Specifics of purchasing treated water from BRA have not been established.	Yes, Primary
2 Chocolate Bayou Water Company (CBWC)	Raw	CBWC System	Brazos River	64.8 (72,542)	25	Currently Available		Yes, Primary
3 City of Houston (COH)	Treated	NEWPP	Lk Houston and Trinity R.	To Meet NFBWA's Needs	40	Requires WPP Expansion	Requires Luce Bayou Interbasin Transfer Project	Yes, Primary
	Treated	EWPP and SEWPP	Lk Houston and Trinity R.	To Meet NFBWA's Needs	35 from EWPP 38 from SEWPP	Yes. at the WPP		
4 City of Missouri City (COMC)	Raw	To Be Identified	Brazos River, GCWA	15.0 (16,803)	10	Not Currently Available	Short-term possibilities.	Yes, Secondary
5 City of Sugar Land (COSL)	Treated	Proposed WTP	GCWA	20.0 (22,400)	12	Short-term	Capacity must be returned as COSL's needs increase.	Yes, Secondary
6 Coastal Water Authority (CWA)	To Be Identified	To Be Identified	To Be Identified	To Be Identified	To Be Identified	Not Available	CWA participation in engineering design and construction phases. Funds repaid once delivery of water begins.	Yes, Secondary
7 Gulf Coast Water Authority (GCWA)	Raw	GCWA System	Brazos River, Oyster Creek	8.0 (8,960) Contracts	10	Small quantity currently available.		Yes, Secondary
8 Texas Genco	Raw	W.H. Parish Plant	Brazos River	26.7 (29,920) Rights 74.1 (83,000) Contracts	10	Not Available	Monitor for possible future availability.	No
	Raw	Twin Oak Res., Lake Limestone	Duck Creek, Navasota R.	22.3 (25,000)	10	Not Available		No
10 West Harris County Regional Water Authority (WHCRWA)	Treated	To Be Identified	COH EWPP	0.0 (0.0)	TBD	Not Available		Yes, Secondary

Notes:
 (1) Firm Yield of permitted water rights or quantity available to contract.
 (2) Approximate distance from indicated Project or likely take-point to area of greatest current development in the NFBWA.

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Meeting Minutes

Subject Meeting with Brazos River Authority (BRA)

Project reference Potential Source Water Supply Study

Place BRA Sugar Land Offices

Meeting date November 18, 2005

Attendees John Baker (BRA)
Cathy Dominguez (BRA)
Warren Davis (BRA)
David Scholler (BGE)
Charles Shumate (BGE)
Michael Reedy (TCB)

Date prepared November 21, 2005

Prepared by Michael Reedy

Distribution All Attendees

The purpose of this meeting was to discuss the potential opportunities to obtain surface water supplies from the BRA as part of the NFBWA's requirements for groundwater reduction in Fort Bend County. A summary of this meeting is provided below. Please respond in writing to Turner Collie & Braden within 5 days with any comments, revisions, or additions to these notes.

1. The BRA feels comfortable that it has sufficient water to meet the needs of the NFBWA currently and in the future. The BRA currently has approximately 45,000 acre-feet of water available for contract. In addition, it is expected that an additional 15,000 to 20,000 acre-feet will be coming back to BRA as a result of unused contract water.
2. The BRA's System Operations permit, if granted by the TCEQ, would develop an additional supply of water in the basin of over 400,000 acre-feet. It is not known, at present, how much of this supply will be ultimately permitted by the TCEQ.
3. All BRA supply in the lower basin is available on the main stem of the Brazos River. Intake structures and transmission systems would need to be constructed to deliver water from the Brazos River to the point of need in the NFBWA.
4. The current cost of raw water from the BRA is \$49.65 per acre-foot. The BRA operates on a system cost for water in which all customers of BRA pay the same unit cost for raw water as a function of the cost of service for the system as a whole. It is expected that the system rate will increase approximately 8 to 9 percent for the next 5 years. Ultimately the system

rate is expected to increase to approximately \$70 to \$80 per acre-foot and then begin to level off. A large factor in rates leveling off is the gradual conversion of existing, large contracts to system rate contracts.

5. The BRA currently sells raw water using the System Water Availability Agreement (see attached). The length of the contract is negotiable, but is typically 20 years or longer with renewal provisions
6. The BRA is willing to work with the NFBWA in a number of alternative arrangements to meet their water needs including:
 - a. BRA Contract for raw water only
 - b. BRA Contract for raw water and facility operations
 - c. Participation in the West Fort Bend County Regional Surface Water System
 - d. BRA builds, owns, operates and contracts with the NFBWA for treated water
7. BGE/TCB stated that the NFBWA is currently conducting studies to evaluate the various alternatives available to the Authority for conversion. These studies are expected to be completed around the end of 2006. The NFBWA is not in a position, currently, to commit to any single alternative including the BRA's West Fort Bend County program. The BRA understands that position.
8. Discussed the administrative complexity of the current intent of the West Fort Bend County Regional Surface Water System. As described in the Draft Feasibility Study, this system would require a coordinated effort among stakeholders for the implementation and management of a GRP to meet needs of all stakeholders. This would include decisions related to where surface water would be transmitted, who ultimately converts, and how much they convert and when. It is the opinion of BGE/TCB that developing a GRP with a large number of stakeholders would be very complex and difficult to ensure that decisions were made in the best interest of the constituents of the NFBWA.
9. BRA presented an alternative proposal NFBWA's consideration. The main concepts of the proposal are summarized below:
 - a. The BRA proposes to build and operate a water treatment plant and intake structure funded by the BRA.
 - b. The BRA will provide a treated water contract to the NFBWA.
 - c. Treated water contract rate will be constant for 5-year periods.
 - d. Cost of water will be adjusted based on raw and treated water consumption, capital expenses, O&M costs, debt service, and cost for delivery.
 - e. BRA will finance the system and the NFBWA will reimburse costs through contract revenue.
 - f. The NFBWA will only repay for that debt associated with the capacity required for the NFBWA.
 - g. The BRA will create a Customer Advisory Committee allowing the NFBWA direct input toward the determination of operations, water rates, and expansions.
 - h. The BRA will look for new customers to expand the regional system and improve the economy of scale for the facility.
10. The BRA agreed to develop a formal proposal to the NFBWA for the above described treated water contract arrangement in order to compare this alternative to other alternatives the NFBWA is considering. It was agreed that BGE/TCB would let the BRA know when this information was needed in order to include in the Alternatives Analysis for NFBWA.

**SYSTEM WATER AVAILABILITY AGREEMENT
BETWEEN
BRAZOS RIVER AUTHORITY
AND
COMPANY**

AGREEMENT made and entered into this the ___ day of _____ 2005, by and between **BRAZOS RIVER AUTHORITY** ("BRA"), a river authority of the State of Texas, and **COMPANY** ("Purchaser") of _County County, Texas.

1. RECITALS. BRA owns and operates various lakes in the Brazos River Basin. BRA also has entered into contracts with the United States of America by virtue of which it has obtained the right to utilize for water supply purposes a portion of the usable storage space in various lakes owned and operated by the United States Army Corps of Engineers. BRA is authorized by the State of Texas to store State waters in the lakes owned by BRA and various lakes owned and operated by the United States Army Corps of Engineers in the Brazos River Basin, hereinafter collectively called the "System", and to make such stored waters available for beneficial use.

BRA is authorized to operate the System as a hydrologic unit pursuant to an order of the Texas Water Commission (formerly, Texas Natural Resource Conservation Commission "TNRCC", now Texas Commission on Environmental Quality "TCEQ") issued on July 23, 1964 ("System Operation Order"). The Final Determination of All Claims of Water Rights in the Brazos River Basin and the San Jacinto-Brazos Coastal Basin Maintained by the Brazos River Authority, Fort Bend County W.C.I.D. No. 1 and Galveston County Water Authority ("Final Determination") issued on June 26, 1985, by TCEQ clarified and amplified the System Operation Order. Under the System Operation Order as adjudicated by the Final Determination, BRA is authorized to operate the System as a hydrologic unit to more efficiently utilize the reservoirs that make up the System to make water available to meet the needs of BRA's customers.

If canceling a contract, identify such contract here. Purchaser is presently a party in an existing raw water agreement with BRA: System Water Supply Agreement by and between Brazos River Authority and **COMPANY with an effective date of **DATE for **_AF of water per Calendar Year which is hereby cancelled. Upon cancellation of the **YEAR agreement as provided herein, BRA agrees to make available to purchaser a total of **_NEW AF of water per Fiscal Year pursuant to the terms and conditions herein provided.

Purchaser wishes to contract for BRA to make available **_AF acre-feet of water per Fiscal Year under the terms of this Agreement pursuant to the System-wide pricing methodology, and BRA agrees to make water available to Purchaser pursuant to the terms and conditions herein provided.

2. DEFINITIONS.

- a) The term "Agreement" means this agreement.
- b) The term "Annual Contracted Amount" shall mean the total volume, expressed in acre-feet per Fiscal Year, which BRA agrees to make available and Purchaser agrees to purchase. For this Agreement, the amount is _AF.
- c) The term "BRA" shall mean Brazos River Authority.
- d) The term "Board" shall mean the Board of Directors of Brazos River Authority.
- e) The term "Budgeted Cost of Service" shall mean all reasonable economic requirements to develop, operate, maintain, protect and/or expand the System. Specific costs include, but are not limited to, personnel, operations, capital, infrastructure, financing, administration and overhead.
- f) The term "Fiscal Year" shall mean BRA's fiscal year from September 1 through August 31, or such other annual fiscal year period as BRA may later determine.
- g) The term "Industrial Use" shall mean the use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, including commercial feedlot operations, commercial fish production, and the development of power by means other than hydroelectric.
- h) The term "Irrigation Use" shall mean the use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water through a municipal distribution system.
- i) The term "Mining Use" shall mean the use of water for mining processes including hydraulic use, drilling, washing sand and gravel, and oil field repressuring.
- j) The term "Municipal Use" shall mean the use of potable water within a community or municipality and its environs for domestic, recreational, commercial, or industrial purposes or for the watering of golf courses, parks and parkways.
- k) The term "Overuse" shall mean withdrawal or release of water in excess of the amount contracted.
- l) The term "Purchaser" shall mean **_company.
- m) The term "Reuse" shall mean the use of any portion of any of the water sold hereunder that remains unconsumed after the water is used for the purpose authorized herein.
- n) The term "System" shall mean BRA's Water Supply System and shall include the BRA's facilities, infrastructure and properties insofar as they are related to making water available from the BRA together with all future extensions, improvements, enlargements, and additions to and replacements of the System, and all replacements thereof whether from surface water supplies, groundwater, or a combination thereof, unless specifically excluded from the System by resolution of the Board.
- o) The term "System Operation Order" shall mean that certain order of the TCEQ or its predecessor dated July 23, 1964, as adjudicated by order of the TCEQ or its predecessor on June 26, 1985, in the Final Determination of all Claims of Water Rights in the Brazos River Basin and the San Jacinto-Brazos Coastal Basin Maintained by the Brazos River Authority, Fort Bend County W.C.I.D. No. 1 and Galveston County Water Authority.
- p) The term "System Rate" shall mean the rate per acre-foot of water established by BRA from time to time under the system-wide pricing methodology for water made available to Purchaser from the System under this Agreement.

3. EFFECTIVE DATE. The effective date of this Agreement is ****_begindate.**

or

3. CANCELLATION OF _____ AGREEMENT AND EFFECTIVE DATE. The ****date** Agreement is cancelled as of the effective date of this Agreement. The effective date of this Agreement is ****begindate.**

4. AVAILABILITY OF WATER. While this Agreement remains in force, BRA agrees to make available to Purchaser for withdrawal from the System an amount of water not to exceed the Annual Contracted Amount. Such water will be withdrawn from the System and accounted for by BRA as provided by the System Operation Order, as modified by the Final Determination. Purchaser agrees that it is contracting to have water made available to it in amounts and at such times and locations as are provided for herein and that the water to be provided under this Agreement is subject to local availability. Purchaser acquires no property right in the water made available to it under this Agreement beyond the right to have the water made available to it for diversion and use under the terms of this Agreement. BRA agrees to make water available from the System, and Purchaser acquires no rights or interests in any of the water supply sources that comprise the System above and beyond those rights that accrue to it as a customer of the System under this Agreement. Purchaser represents, and BRA relies on such representation, that all water to be made available by BRA under this Agreement to Purchaser shall be used solely for ****typeuse** purposes. Utilization of water supplied under this agreement for other purposes shall be deemed a breach of contract and grounds for termination of contract.

5. DATE AND PLACE OF PAYMENTS. Payments to be made hereunder shall be made at BRA's office in Waco, McLennan County, Texas. BRA contemplates that by the first day of each Fiscal Year (currently September 1) it will have adopted budgets for BRA for said Fiscal Year and established the System Rate for said Fiscal Year. Payments for water made available each Fiscal Year may be made under one of three payment options from which Purchaser will select at the beginning of each Fiscal Year. Annual payments shall be made on or before September 15 of each year, Quarterly payments shall be made on or before September 15, December 15, March 15, and June 15 of each year. Monthly payments shall be made on or before the fifteenth of each month each year. Quarterly payments or monthly payments shall include a multiplier to be applied to the annual payment to allow BRA to recover interest lost on any unpaid balance plus a service charge for administrative costs, including but not limited to costs involving the billing, accounting, and collecting for the quarterly or monthly payments. The multiplier to recover lost interest revenue and the service charge for administrative costs shall be determined on an annual basis using the method approved by the Board and shall be just and reasonable. Because the effective date of this Agreement is ****begindate**, the amount of water available to Purchaser and the payment owed by Purchaser will be prorated for the remaining ****_# () months** of Fiscal Year _____.

If, in accordance with Section 6b) of this Agreement, BRA increases the payment due from Purchaser during a Fiscal Year, it shall notify Purchaser of any increased amount of payment due for the remainder of the Fiscal Year and the increased amount

shall be paid by Purchaser (i) within 30 days after receipt of notice of the increase if Purchaser has already paid all amounts otherwise due to BRA for such Fiscal Year, or (ii) in approximately equal installments added to any further installment amounts owed by Purchaser for the remainder of such Fiscal Year if Purchaser has selected a payment option which resulted in Purchaser still having payments due to BRA during the remainder of such Fiscal Year.

6. UNCONDITIONAL NATURE OF PAYMENT OBLIGATION; PRICE.

a) Purchaser unconditionally agrees to pay BRA annually for the water agreed to be made available to Purchaser hereunder at a price equal to the product of multiplying the System Rate times the Annual Contracted Amount regardless of whether the full Annual Contracted Amount of water is diverted and used by Purchaser.

b) The System Rate shall be established annually by the Board; it shall be calculated by utilizing a Budgeted Cost of Service basis considering the water supply System costs and the acre-feet of long term water sold under contract; and it shall be just reasonable and non-discriminatory. Purchaser shall be provided 15 days notice of the proposed amount and the meeting date at which the System Rate shall be established and shall be provided an invoice before the payment is due and payable. The System Rate has been established by the Board at a rate of **\$____ per acre-foot of water agreed to be made available annually to Purchaser for the current Fiscal Year. BRA shall not increase the System Rate other than on a Fiscal Year basis, which determines the system rate for the following Fiscal Year under this Agreement, except for unforeseeable reasons of a serious or substantial nature. Such reasons include Force Majeure, government legislation or regulations, or permit requirements.

7. SOURCE OF PAYMENTS. [**For Municipal use - If for Irrigation, Industrial, delete this section and renumber - change "Sections" to correlate]. The payments to be made hereunder by Purchaser shall constitute operating expenses of Purchaser's water works system or Purchaser's combined water works and sewer system. Purchaser shall charge rates for services of its water works system or its combined water works and sewer systems that will be sufficient to pay the operating and maintenance expenses thereof, including the payments provided for hereunder, and the interest on and principal of, as the same come due and mature, obligations issued by Purchaser now or hereafter payable from the revenues of said system or systems.

8. INTEREST ON PAST DUE PAYMENT. In the event of failure of Purchaser to make any payment to BRA provided to be made in this Agreement at the time when same shall be due, the past due payment shall bear interest at the lesser of the highest rate allowed by applicable law or 18 percent per year.

9. REMEDIES FOR NONPAYMENT OR DEFAULT. Should Purchaser fail to make any payment to BRA when due hereunder or otherwise be in default under this Agreement, BRA at its sole option and in addition to and without impairing any other remedy available to it on account of the default, may elect to either (i) suspend its duty to make available water to Purchaser under this Agreement or (ii) terminate this Agreement, by providing written notice of such termination delivered to Purchaser on or before 30 days before the date specified in said notice of termination, provided that the nonpayment or other default with respect to which notice of termination of this

Agreement has been given, shall not be cured by the date specified in such notice. Nothing in this Agreement shall be construed in any manner so as to abridge, limit, or deprive either party hereunto of any means which it would otherwise have of enforcing any right or remedy either in law or in equity for breach of any of the provisions hereof.

10. REMEDIES FOR OVERUSE. Purchaser recognizes that any diversion of water in excess of its Annual Contracted Amount may impact BRA's ability to make available water to BRA's other raw water customers. Purchaser agrees that if for any reason it needs to exceed the Annual Contracted Amount, Purchaser will give written notice to BRA 30 days in advance of the need for such additional water and in such notice will state the reason for the additional need, the amount of water needed to be made available, and the duration of the need. BRA, in its sole discretion, may make all or a portion of the requested water available. Nothing contained herein shall obligate the BRA to provide water in excess of the Annual Contracted Amount nor should Purchaser rely on additional water being made available in excess of the Annual Contracted Amount except as approved by BRA under the terms stated herein.

In the event that BRA determines that it can make all or a portion of the requested water available without adversely impacting its ability to make water available to its other customers, Purchaser shall pay for such water to be made available in advance of diversion at a rate that is equal to twice the current System Rate.

In the event Purchaser fails to notify BRA of its need for additional water to be made available, and exceeds the Annual Contracted Amount or should Purchaser, after notification of BRA and BRA's determination that additional water is not available for Purchaser's use, nonetheless exceeds the Annual Contracted Amount, BRA may, at its option, charge the Purchaser for the overuse at a rate of three times the System Rate and/or cancel this Agreement by providing written notice of such cancellation delivered to Purchaser on or before thirty (30) days before the date specified in said notice of cancellation.

In the event Purchaser uses water in excess of its Annual Contracted Amount twice in any five-year period, BRA may, if such additional water can be made available on a long-term basis, cause this Agreement to be amended to increase the Annual Contracted Amount to the maximum total annual amount requested by Purchaser in any one Fiscal Year. Such Amendment shall not excuse Purchaser from paying for any water used in excess of the amount agreed to be made available under this Agreement prior to amendment of this Agreement at the appropriate rate under the paragraph above. Following any such amendment, Purchaser shall pay for all water to be made available to Purchaser under this Agreement and such amendment at the System Rate.

Nothing in this Agreement shall be construed in any manner so as to abridge, limit, or deprive either party hereunto of any means which it would otherwise have of enforcing any right or remedy either in law or in equity for breach of any of the provisions hereof.

11. DIVERSION RATE. **[**Lakeside]** The water to be made available to Purchaser under this Agreement may be diverted from System at daily rates desired by Purchaser provided that BRA shall not be required to make water available for diversion

by Purchaser at a daily rate in excess of five times the average daily rate which would result in diversion during a Fiscal Year of the total number of acre-feet of water per year then agreed to be made available for diversion by Purchaser.

11. DIVERSION RATE. [**Upstream] [**copied from Torch's contract-per sllf's approval] The water to be made available to Purchaser under this Agreement may be diverted from the flow or underflow of the **Brazos River** at daily rates as may be available from the flow or underflow, as desired by Purchaser or as may be approved by the applicable agency of the State of Texas.

11. DIVERSION RATE. [**Downstream]

a) At least ****# ()** working days before it shall desire to divert water agreed to be made available pursuant to this Agreement, Purchaser shall notify BRA of the date on which it desires to start pumping water at the diversion point, the minimum number of days it will continue pumping, and the rate at which it desires to pump. BRA shall make releases of water from System at such times and in such amounts as will make water available for Purchaser to pump water continuously at the diversion point(s) at the rate thus specified without violation of water rights of others. When Purchaser shall desire to discontinue pumping or to change the rates at which it shall be able to pump water continuously at the diversion point(s), it shall notify BRA at least ****# ()** working days in advance of the date on which pumping is to be discontinued or on which the rate at which it is to be able to pump is to be changed, specifying in said notice the rate at which it desires to be able to pump continuously thereafter, and BRA shall discontinue releases or appropriately modify the releases made by it so as to make water available for Purchaser to pump continuously at the new rate, beginning on the date specified in said notice. Notices under this ****Section 11.a, Diversion Rate**, may be given by telephone but must be confirmed in writing within two (2) days.

b) The pumping rates specified in the notices given under provisions of ****Section 11.a, above**, shall be expressed in cubic feet per second (cfs).

c) The number of days for which pumping will continue, as specified in notices given under provisions of ****Section 11.a, above**, shall be at least five (5) days.

d) The quantities of water agreed to be made available by BRA to Purchaser under this Agreement shall be determined as follows: convert the release rate from System made to allow Purchaser to pump at the rate requested under ****Section 11.a, above**, from cfs to acre-feet per day (by multiplying the number of cfs by 1.9835), then multiply the converted release rate by the number of days for which Purchaser shall have indicated in notices given under ****Section 11.a, above**, that it desires to pump continuously at such rates. When the total quantity of water released from System for pumping by Purchaser during any Fiscal Year, as computed in accordance with the preceding sentence, equals the Annual Contracted Amount, except as allowed by BRA pursuant to Section 10 of this Agreement, Purchaser shall have no further right hereunder to call on BRA to make water available and BRA shall have no further obligation hereunder to make water available to Purchaser during the remainder of such Fiscal Year.

12. WITHDRAWAL FACILITIES. The provision of facilities for diversion of the water agreed to be made available by BRA to Purchaser hereunder shall be solely the responsibility of Purchaser. Where applicable, BRA may allow the construction of

such facilities on and across BRA land, subject to the conditions that the design and location of such facilities are approved by BRA, that Purchaser prepare and furnish all documents necessary for approving the easement, and that Purchaser operate the facilities located on BRA land in a manner acceptable to BRA. At the termination of this Agreement, all facilities must be removed and the land restored to its original condition in a manner acceptable to BRA. For all new diversion facilities, Purchaser shall provide a map of convenient size locating the point of diversion by course and distance from a survey corner or other identifiable point, which map is to be made a part of this Agreement and attached hereto as Exhibit.

13. METERING. Purchaser agrees that, at its sole cost and expense, it shall own, install, operate and maintain meters for the accurate measuring of all water diverted by Purchaser under this Agreement in order to aid BRA in accurately reporting water usage to the TCEQ as required by applicable law or regulation. Such meter or meters shall be tested and calibrated for accuracy by and at the expense of Purchaser once each Fiscal Year at intervals of approximately 12 months, and a report of such test and calibration shall be furnished to BRA. BRA shall be given at least two prior days notice of the time of any test and calibration of Purchaser's meters, or any of them, and BRA shall have the right to have a representative present at each test to observe the test and any adjustments found thereby to be necessary. BRA shall have the right to inspect and check the accuracy of Purchaser's meter or meters at any time during usual business hours after not less than one nor more than five (5) days notice. In the event any question arises at any time as to the accuracy of any such meter, such meter shall be tested promptly upon demand of BRA, the expense of such test to be borne by BRA if the meter is found to be correct and by Purchaser if it is found to be incorrect. Readings within 5% of accuracy, plus or minus, shall be considered correct. If, as a result of any test, any meter is found to be registering inaccurately (i.e., in excess of 5% of accuracy, plus or minus), the readings of such meter shall be corrected at the rate of its inaccuracy for any period which is definitely known and agreed upon, but in case the period is not definitely known and agreed upon, the period shall be extended back 180 days from the date of the initial BRA demand for meter testing, and the records of readings shall be adjusted accordingly. Following each test of a meter, Purchaser shall cause the same to be calibrated to register accurately.

14. REPORTING. Purchaser agrees that it will keep accurate records of the daily readings from the meter or meters installed pursuant to **Section 13., Metering, above. These records shall be subject to inspection by BRA at reasonable times and places. Purchaser shall submit reports to BRA by the 10th day of each month showing the amount of water diverted under this Agreement each day during the preceding month. Failure to comply with this reporting requirement will be deemed a breach of this Agreement and may result in termination of Agreement.

15. SYSTEM EXPANSION. Purchaser and BRA understand that BRA may desire to make water available to other customers in a manner or in an amount which may necessitate expansion or enlargement of or additions to the System and that in connection with any such expansion, enlargement or addition, BRA will incur additional costs. The reasonable costs incurred by BRA related to such expansion, enlargement, or

addition shall be costs of the System.

16. CONSERVATION OF WATER. It is the intent of the parties to this Agreement to provide to the maximum extent practicable for the conservation of water, and Purchaser agrees that it is a condition of this Agreement that it shall maintain and operate its facilities in a manner that will prevent unnecessary waste of water. BRA, in accordance with applicable law or regulation, may from time to time adopt reasonable rules and regulations relating to water conservation. Purchaser agrees to abide by the "Brazos River Authority Drought Contingency Policy" adopted by the Board on January 16, 1989, or any subsequent Drought Contingency Policy duly adopted by the Board and any Drought Contingency Plans developed under the Drought Contingency Policy. If required by applicable law or regulation or by BRA, Purchaser agrees to implement a water conservation and drought management program in accordance with a water conservation plan and that the water made available and diverted by Purchaser pursuant to this Agreement will be used in accordance with such conservation plan. If required by applicable law or regulation Purchaser agrees that, in the event Purchaser furnishes water or water services to a third party that in turn will furnish the water or services to the ultimate consumer, the requirements relative to water conservation shall be met through contractual agreements between Purchaser and the third party providing for the establishment and implementation of a water conservation program in compliance with such applicable law or regulation.

17. WATER QUALITY. As a further condition of this Agreement, Purchaser also agrees that it will comply with applicable water quality standards of the State in the diversion, use, or discharge of water made available hereunder. Should Purchaser be determined by any competent legal authority to have degraded the quality of water of the State or to have violated any water quality standard established by law or lawfully adopted regulation, and subsequently fail to take action with reasonable diligence to correct such deficiency as directed by competent legal authority, such failure shall constitute breach under this Agreement and may result in termination of this Agreement.

BRA, in accordance with applicable law or regulation, may from time to time adopt reasonable rules and regulations relating to water quality protection. If required by applicable law or regulation, Purchaser agrees to implement appropriate water quality protection measures including, without limitation, a non-point source water pollution abatement program in accordance with a non-point source water pollution abatement plan.

18. WATER SURPLUS TO PURCHASER'S NEEDS. Purchaser may not unilaterally cancel this Agreement or reduce the amounts of water agreed to be made available to it and for which availability it is obligated to pay under the terms of Sections 4., 6., and 10. above. Purchaser may not sell or make available to others the water agreed to be made available to it under this Agreement, except in the case of municipal uses, as potable treated water. However, should Purchaser determine that it has water surplus to its anticipated needs from the water to be made available by BRA under this Agreement, Purchaser may notify BRA as to the amount of water no longer needed to be made available to it. BRA will use reasonable efforts to find a third party who is able

and willing to pay for such availability for a period to the end of or beyond the term of this Agreement. If BRA is successful in finding such a third party suitable to it to acquire Purchaser's interest in its available surplus for a period of time to the end of or beyond the term of this Agreement, this Agreement will be amended to reduce the amount of water to be made available to Purchaser by the amount of availability paid for by such third party, and Purchaser will be relieved of the obligation to make payments for such availability of water.

19. REUSE. All rights to reuse treated wastewater effluent or untreated water made available under this Agreement that is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water ("Reuse Water") shall remain with the BRA. Purchaser may not use, sell, or make available to others, any form of Reuse Water without the express written consent of the BRA. However, Purchaser may directly reuse treated wastewater effluent or untreated water provided that such water has not been previously disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water.

20. INTERBASIN TRANSFER. Water made available under this Agreement shall not be transferred or used outside of the Brazos River Basin unless Purchaser obtains the express written consent of BRA and obtains all required governmental approvals.

21. SHORTAGES AND YEARLY REPORTS. BRA makes no guarantee that any lakes or other sources of supply in the System will be maintained at any specific level at any particular time. Purchaser bears all transportation losses prior to final diversion. It is fully understood by the parties hereto that the level of lakes or other sources of supply in the System will vary as a result of weather conditions beyond the control of BRA, the use of water from the System by other water customers of BRA, and in Federal Reservoirs, as a result of releases made by the U.S. Army Corps of Engineers and that this instrument is merely an agreement to require BRA to make available water when and if water is present in the System, and to allow Purchaser to make withdrawals of the water subject to the general law on distribution and allocation of water during shortages of supply and in conformity with BRA's water rights from the TCEQ and the System Order.

BRA covenants that it will use its best reasonable efforts in accordance with accepted hydrological engineering practices to provide the quantities of water agreed to be provided herein. In the event of a drought of greater severity than that previously experienced, or if for any other reason water in the System becomes in short supply, BRA agrees, and Purchaser covenants, that BRA may fairly and equitably apportion and ration the available water supply from the System among all its several customers, including Purchaser. Purchaser herein acknowledges that it shall hold BRA harmless from any and all liability, damages, claims or actions which may exist as a result of shortages of water to be made available.

22. OPERATION OF SYSTEM; BRA'S OTHER CONTRACTS. The right of BRA to maintain and operate the System and at any and all times in the future to impound, release and make available waters therefrom in any lawful manner and to any

lawful extent BRA may see fit is recognized by Purchaser; and, except as otherwise provided herein, there shall be no obligation hereunder upon BRA to pump or not pump, store or not to store, or to release and make available or not to release or make available any waters at any time or to maintain any waters at any specified level or to operate the System in any manner not in compliance with applicable laws or regulations, BRA's water rights and System Operation Order. BRA may enter into agreements with other parties regarding the System, including its operation and maintenance and the storage, release and making available water therefrom. BRA makes no representation as to the quality of the water in the System.

23. FORCE MAJEURE. Notwithstanding anything herein to the contrary, neither party hereto shall be under any liability or be deemed in default with respect to its obligations under this Agreement for any failure to perform or for delay in performing such party's obligations hereunder (except for the obligation to pay money) where such failure or delay is due to force majeure, while and to the extent that such performance is prevented by such cause. The term force majeure means acts of God, fire, storm, flood, war, terrorist activity, riots, sabotage, drought, lack of availability of water due to sedimentation, low inflows of water to, or lack of water supply in the System, strikes or other differences with labor (whether or not within the power of the parties to settle same), decrees or orders of the courts or other governmental authority, or other similar or dissimilar causes not within the reasonable control of such party and not due to negligence of such party. Each party shall use due diligence to resume performance of any obligation suspended by force majeure at the earliest practicable time.

24. WAIVER. Any waiver at any time by any party of its rights with respect to default or any right granted under this Agreement shall not be deemed a waiver of such rights with respect to any subsequent default or matter.

25. NOTICES AND CERTIFICATIONS. Notices and certifications provided for in this Agreement shall be in writing. The same shall be delivered by mailing certified mail, postage paid, return receipt requested, or hand delivered, to the respective parties at the following addresses:

BRA:

Brazos River Authority
P.O. Box 7555
Waco, Texas 76714-7555
Telephone: (254) 761-3100
Fax: (254) 761-3207

Purchaser:

__company
__address1
__address2
Telephone: __phone
Fax: __fax

Either party may change its address as shown above by written notice to the other party.

26. OTHER REQUIREMENTS. This Agreement is subject to all conditions, provisions, and limitations included in BRA's water rights from the applicable State agency and the System Operation Order. Further, this Agreement is subject to all applicable Federal, State and local laws, and any applicable ordinances, rules, orders and regulations of any local, State or Federal governmental authority having jurisdiction. However, nothing contained in this Agreement shall be construed as a waiver of any right to question or contest any law, ordinance, order, rule, or regulation of any governmental authority.

27. SEVERABILITY. The provisions of this Agreement are severable, and if for any reason any one or more of the provisions contained in this Agreement shall be held to be invalid, illegal, or unenforceable in any respect, the invalidity, illegality, or unenforceability shall not affect any other provisions of this Agreement and this Agreement shall remain in effect and be construed as if the invalid, illegal, or unenforceable provision had never been contained in the Agreement.

28. TERMINATION. This Agreement may be terminated by either party for material breach of the terms of this Agreement or as provided herein. Upon receipt of notice of termination by BRA, the Purchaser shall immediately discontinue all diversions of use of water made available hereunder.

29. INDEMNITY/HOLD HARMLESS CLAUSE. The Purchaser shall comply with the requirements of all applicable laws, rules and regulations and shall exonerate, indemnify and hold BRA harmless from any and all liability or damages resulting from failure to do so. In addition, the Purchaser agrees to keep, save and hold BRA harmless from any and all actions, liabilities, damages, judgments, costs and expenses including reasonable attorney's fees, in case an action is filed or does in any way accrue against BRA, its' officials, officers, and employees in consequence of this Agreement or for any negligent act or omission of the Purchaser related to the provision of water made available under this Agreement or that may result from the carelessness or lack of skill of the Purchaser or the Purchaser's agents, subconsultant, or employees.

****✓** desired "Assignment/Term of Agreement – 30/31/32 or 30/31/32 (FHA)".

30. ASSIGNMENT. This Agreement may be assigned by BRA at its discretion. This Agreement may be assigned by Purchaser only with the written consent of BRA. Assignment of a portion of the water made available to Purchaser, or any assignment which requires change in diversion location, type of use or change in the service area must be authorized under ****Section 18., Water Surplus to Purchaser's Needs,** or as stated above.

31. CANCELLATION OF NONPAYMENT. Should Purchaser fail to make any payment to BRA when due hereunder, BRA may cancel this Agreement by written notice of such nonpayment and statement of BRA's election to cancel this Agreement by reason thereof delivered to Purchaser on or before 30 days before the date specified in said notice for cancellation, provided that the nonpayment with respect to which notice has been given shall not be cured by the date thus specified in such notice.

32. TERM OF AGREEMENT. The term of this Agreement shall begin on the Effective Date, Section 3., and shall end on ****_mm _dd, _yy.** **(For municipal, add the following).** This Agreement shall be extended thereafter at the written request of Purchaser under the terms and conditions of BRA's standard long-term water availability contract at that time for so long as, and to the extent that, BRA continues to have the right and ability to make available the amount of water to be made available to Purchaser hereunder. The amount of water to be made available under any extension of this Agreement may be pro rated to account for loss of System yield over time.

or

30. ASSIGNMENT. **[**FHA]** This Agreement may be assigned by Purchaser only with the written consent of BRA, except that, this Agreement is assignable, in its entirety, to the United States of America (acting through the USDA Rural Development, Rural Utilities Service, or successor agency and Assigns) as security for any loan made to Purchaser by that agency for financing the construction of facilities which will be utilized by Purchaser for treatment or distribution of the water supply which is the subject of this Agreement. Assignment of a portion of the water made available to Purchaser other than to the United States of America as referenced in the preceding sentence, or any assignment which requires a change in diversion location or type of use or change in the service area must be authorized under Section 18., Water Surplus to Purchaser's Needs, or as stated above.

31. CANCELLATION FOR NONPAYMENT. **[**FHA]** Should Purchaser fail to make any payment to BRA when due hereunder, BRA may cancel this Agreement by written notice of such nonpayment and statement of BRA's election to cancel this Agreement by reason thereof delivered to Purchaser and the United States of America (acting through the USDA Rural Development, Rural Utilities Service, or successor agency and Assigns) on or before 30 days before the date specified in said notice for cancellation, provided that the nonpayment with respect to which notice has been given shall not be cured by the date thus specified in such notice.

32. TERM OF AGREEMENT. ****[FHA]** The term of this Agreement shall begin on the Effective Date and shall end on the **_**dd** day of **_**mm, _**yy.** This Agreement shall be extended thereafter at the written request of Purchaser under the terms and conditions of BRA's standard long-term water availability contract at that time for so long as, and to the extent that, BRA continues to have the right and ability to make available the amount of water to be made available to Purchaser hereunder. The amount of water to be made available under any extension of this Agreement may be pro rated to account for loss of System yield over time.

_COMPANY

BRAZOS RIVER AUTHORITY

By _____
_Name

By _____
Phillip J. Ford

_Title
ATTEST:

General Manager/CEO
ATTEST:

SALE

Turner Collie & Braden
5757 Woodway Drive, Suite 101W, Houston, Texas 77057-1599
T 713.780.4100 F 713 780 0838 www tcb.aecom.com

Meeting Minutes

Subject	Conference Call with International Paper
Project reference	Potential Source Water Supply Study
Place	Offices of Brown & Gay Engineers
Meeting date	December 1, 2005
Attendees	Sabina Finnegan (IP), David Scholler (BGE) Charles Shumate (BGE) Michael Reedy (TCB)
Date prepared	December 1, 2005
Prepared by	Michael Reedy

Distribution	All Attendees
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The purpose of this meeting was to discuss the potential opportunities to obtain surface water supplies from the Chocolate Bayou Water Company (CBWC) as part of the NFBWA's requirements for groundwater reduction in Fort Bend County. A summary of this meeting is provided below. Please respond in writing to Turner Collie & Braden within 5 days with any comments, revisions, or additions to these notes.

1. The Chocolate Bayou Water Company (CBWC), owned by International Paper (IP), currently owns water rights on the Brazos River totaling 155,000 acre-feet for annual diversion. These water rights are diverted from their existing Juliff Pump Station into canals that serve irrigation demands in central and southern Brazoria County.
2. The CBWC also owns water rights totaling 57,500 acre-feet for annual diversion in their Chocolate Bayou system. These water rights are diverted from their existing Chocolate Bayou, Mustang Bayou, and Halls Bayou pump stations into canals that serve irrigation and industrial demands in eastern Brazoria County.
3. Approximately 60,000 to 65,000 acre-feet of the 155,000 acre-feet of rights on the Brazos River are available on an annual firm diversion basis. Approximately 12,000 acre-feet of the 57,500 acre-feet of rights in the Chocolate Bayou system are available on an annual firm diversion basis.
4. The TCEQ has issued the CBWC a Draft Permit Amendment to include an additional diversion point near Hempstead, Texas allowing the diversion of up to 80,000 acre-feet annually out of the 155,000 acre-feet currently permitted at Juliff. The firm diversion for this

additional diversion point is significantly less than the 80,000 acre-feet that may be permitted. A hearing at the TCEQ has been completed for this permit amendment and it is the belief of the CBWC that this permit will be finalized in the very near future.

5. CBWC has an existing take-or-pay contract with BP Amoco for the sale of 17,400 acre-feet annually. This is a ten year contract with an expiration date of 2015. In addition, the CBWC sells approximately 75,000 to 100,000 acre-feet of water annually to irrigation customers in their system. These irrigation water sales are not based on take-or-pay contracts but instead are provided on as-needed basis determined by individual customer needs. Therefore, the sale of irrigation water varies each year based on the agricultural market and needs.
6. CBWC has been in discussions with several other entities for the sale of their assets, but are currently not in a negotiation that would preclude them from discussing and negotiating with the North Fort Bend Water Authority (Authority).
7. IP would prefer to sell the CBWC in whole including the water rights, physical assets, and any existing contracts. However, they would be willing to listen to alternative proposals for the sale of only the water rights assets if an agreement could be worked out that benefited both parties.
8. The issue was brought up that one of the challenges that entities, such as the Authority, are facing is that while they need significant surface water supplies to meet groundwater reduction requirements, they do not need it right now. IP was asked if they would entertain an alternative procurement that would allow the Authority to contract for purchase of the company without having to pay the total purchase price up-front. Instead, the Authority would pay some amount annually to IP with the agreement to close the sale at some specified future date. IP stated that they would not likely be interested in this sort of agreement.
9. Discussed the potential opportunities that may exist between the Authority and the Gulf Coast Water Authority (GCWA) for the joint cooperation and purchase of the CBWC. Given the close proximity of the GCWA facilities to the CBWC facilities, as well as the existing GCWA conveyance systems within the Authority, there exists possible synergies and cooperative opportunities between the Authority and GCWA. IP was interested in this concept and it was agreed that this alternative potentially merited further consideration.
10. IP agreed to send Dave Scholler a confidentiality agreement for the Board's consideration and possible approval. IP would provide additional information to the Authority, if requested, following execution of this agreement.



North Fort Bend Water Authority
Potential Source Study
City of Houston

Meeting Notes

Meeting Date: Tuesday, November 8, 2005
Meeting Time: 3:00 p.m.
Meeting Location: 611 Walker, 21st Floor, Houston, Texas
Attendees: See Attached List

The purpose of the meeting was to discuss the potential of obtaining surface water from the City of Houston (COH). Below is a summary of the discussions of the meeting. Please respond in writing to Brown & Gay Engineers, Inc. within 5 days with any comments, revisions or additions to these notes.

1. COH surface water is currently supplied by three major plants located on the east side of Houston. New transmission lines would be required to get the water from these plants to the point of need. The East Water Purification Plant (East Plant) and the Southeast Water Purification Plant (Southeast Plant) currently have capacity available. A completed contract is the only means to reserve available capacity whether at the plants or other City facilities or to potential projects mentioned below.
2. To expand the Northeast Water Purification Plant (Northeast Plant) beyond 80 mgd, the Luce Bayou Interbasin Transfer Project (Luce Bayou Project) will be required to get more surface water from the Trinity River to Lake Houston for treatment.
3. There is approximately 16 mgd of available capacity at the Jersey Village Pump Station without constructing additional transmission lines. However, the West Harris County Regional Water Authority is also interested in this capacity.
4. There may be additional capacity available at the Katy-Addicks Pump Station with the construction of a surface water line from a line along the North Belt (currently under construction) to the Acres Homes Pump Station. This would supply additional surface water to Acres Homes PS for re-pumping to Katy-Addicks PS. Additional transmission lines not currently in the City's CIP will be also required to convey and discharge surface water to and from the City's Katy Addicks Repump Station.
5. It is anticipated that the COH would structure a contract with the NFBWA similar to the contracts with the NHCRWA and the WHCRWA. This would involve purchasing a share of capacity in the COH's raw water facilities, treatment plant, and transmission mains. Additional transmission lines to get the water to where the Authority needs it would be the responsibility of the Authority. In addition, the Authority would pay for a pro-rata share of the audited annual operation and maintenance costs. Note, such agreements are subject to approval by the administration and council and the specific

terms and conditions established in them may differ from those entered into with the other Authorities.

6. Ground Water Reduction Plan (GRP) credits may be available to the Authority in the short term.
7. COH will work with the Authority if surface water is available.

END OF MEMORANDUM

Meeting Attendees

City of Houston

Carol Ellinger
Josie Sun
Tarun Gill
Lisa Lattu
Janet McKinney
Kate Bechtold
Jack Sakolosky
Jun Chang
Paul Nelson

NFBWA/Brown & Gay Engineers, Inc.

Dave Scholler

Turner Collie & Braden, Inc./NFBWA

Michael Reedy



North Fort Bend Water Authority
Potential Source Study
City of Missouri City (COMC)

Phone Conversation Notes

Meeting Date: Tuesday, February 7, 2006
Meeting Time: 12:00 p.m.
Meeting Location: 11490 Westheimer, Houston, Texas
Attendees: Millie Holifield, COMC
Charles Shumate, BGE

The purpose of the meeting was to discuss the potential to obtain surface water or otherwise cooperate with COMC. Below is a summary of the discussions of the meeting. Please respond in writing to Brown & Gay Engineers, Inc. within 5 days with any comments, revisions or additions to these notes.

1. The City of Missouri City (COMC) currently is preparing a Utility Business Plan (Plan) reviewing the City's existing position and stakeholders, the Fort Bend Subsidence District (FBSD) Groundwater Reduction Plan (GRP) requirements, and general scenarios for meeting requirements of the FBSD for groundwater reduction. The Plan includes water demand projections.
2. The plan includes two primary options:
 - a. The first option emphasizes conversion of the more developed northern portion of the City. The main benefit of this option is that it allows greater conversion and reduces the total area to which surface water must ultimately be delivered. The drawback of this option is that the cost of constructing water lines will be greater due to the high level of development.
 - b. The second option emphasizes conversion of the less developed southern portion of the City. The main benefit of this option is that it allows construction at less cost due to the low level of development. The drawback of this option is that the population may be insufficient to achieve surface water conversion requirements if actual development is slower than currently projected. In that case, surface water lines would have to be extended into the more heavily developed northern portion of the City.
3. The plan is based on a Groundwater Reduction Plan (GRP) in which all participants would share in the capital and operation and maintenance costs regardless whether they receive surface water.
4. The plan is currently in draft form for comment by City staff. It is anticipated that the plan will be submitted for Council approval/adoption in the next couple of months.

END OF MEMORANDUM

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Meeting Minutes

Subject	Meeting with City of Missouri City
Project reference	Potential Source Water Supply Study
Place	Missouri City Public Works Office
Meeting date	November 14, 2005
Attendees	Lee Dorger (City of Missouri City) David Scholler (BGE) Michael Reedy (TCB)
Date prepared	November 21, 2005
Prepared by	Michael Reedy

Distribution	All Attendees
--------------	---------------

The purpose of this meeting was to discuss the potential opportunities to obtain surface water supplies from the City of Missouri City as part of the NFBWA's requirements for groundwater reduction in Fort Bend County. A summary of this meeting is provided below. Please respond in writing to Turner Collie & Braden within 5 days with any comments, revisions, or additions to these notes.

1. The City of Missouri City (City) currently has approximately 15 mgd of surface water supply in the form of option agreements with the Gulf Coast Water Authority (GCWA). These option agreements will convert to take or pay contracts in 2009.
2. The City has not made a determination on how they intend to comply with the Fort Bend Subsidence District groundwater reduction regulations and is currently exploring their alternatives.
3. The City is currently undertaking a study to determine their future needs for surface water, the timing of that need, and the alternatives available to them to meet the groundwater reduction requirements.
4. The City is comprised of several in-City MUD's, each with their own separate water systems. The ultimate plan for groundwater reduction in the City will need to be coordinated with the MUD's.
5. The City is still in discussions with WCID # 2 regarding potential coordination for a GRP and water treatment plant options.

6. Depending on what direction the City selects to move forward, there may be a potential to purchase some or all of their existing surface water options, either on a short-term basis or permanent basis.
7. A potential may also exist to purchase over-conversion credits from the City, depending on their ultimate plans for conversion.



North Fort Bend Water Authority
Potential Source Study
City of Sugar Land

Meeting Notes

Meeting Date: Wednesday, November 9, 2005

Meeting Time: 11:00 a.m.

Meeting Location: 111 Gillingham, Sugar Land, Texas

Attendees: SuEllen Staggs, Sugar Land
Justin Bower, Sugar Land
Chad Nesvadba, Sugar Land
Dave Scholler, BGE
Mike Reedy, TCB

The purpose of the meeting was to discuss the potential of obtaining surface water from the City of Sugar Land (COSL). Below is a summary of the discussions of the meeting. Please respond in writing to Brown & Gay Engineers, Inc. within 5 days with any comments, revisions or additions to these notes.

1. COSL provided a copy of their most recent report entitled "Evaluation of Surface Water Supply Options" dated June 2005.
2. COSL is planning for a surface water treatment plant located on the north side within their city limits. This facility would be located near Ganaway Lake adjacent to the southeast boundary of FBC MUD 2 and the COSL has already begun the process of acquiring the site.
3. Proposed surface water treatment plant site will accommodate a maximum of approximately 30 mgd in facilities unless additional land is acquired. The COSL requires 20 mgd to meet their internal demands, leaving approximately 10 mgd available for excess capacity.
4. COSL has a Contract Option with the Gulf Coast Water Authority (GCWA) for 20 mgd of untreated surface water. This option must be converted to a take or pay Contract by 2015.
5. Since COSL does not require the entire 20 mgd until 2025 conversion they are willing to work with the Authority to provide early surface water in an amount approximately equal to 10 mgd. However, this would then be taken back when COSL needs the full 20 mgd in 2025.
6. The COSL study included Fort Bend County MUD No. 2, No. 41, No. 119 and Kingsbridge MUD in their planning. These MUD's are in the Authority.

NFBWA Potential Source Study
Meeting with City of Sugar Land

November 9, 2005

7. The COSL is not looking for a partner in the construction and operation of the surface water treatment plant, but would prefer to sell water to the Authority on a retail basis.

END OF MEMORANDUM

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North Fort Bend Water Authority
Potential Source Study
Coastal Water Authority (CWA)

Meeting Notes

Meeting Date: Monday, January 9, 2006

Meeting Time: 8:00 a.m.

Meeting Location: 11490 Westheimer, Houston, Texas

Attendees: Gary Oradat, CWA Chief Engineer
Dave Scholler, BGE
Charles Shumate, BGE
Mike Reedy, TCB

The purpose of the meeting was to discuss the potential to obtain surface water or otherwise cooperate with CWA. Below is a summary of the discussions of the meeting. Please respond in writing to Brown & Gay Engineers, Inc. within 5 days with any comments, revisions or additions to these notes.

1. The Coastal Water Authority (CWA) has approximately 33 million dollars (\$33M) available from refinancing debt in the early 1990s that CWA has been directed to put to use. CWA desires to identify the best possible uses for available funds (but not necessarily to commit funds) in the next few weeks in order to meet the direction it's been given.
2. Use of the money includes numerous restrictions, but does not require City of Houston approval.
3. Unless a more compelling use is found, a portion of the money is expected to be used to purchase the City of Houston's 70% interest in Allen's Creek Reservoir. The Brazos River Authority (BRA) holds the remaining 30% interest in Allen's Creek.
4. CWA's powers allow flexibility to participate in projects in many ways. However, CWA's preferred role is to provide initial capital to finance engineering design and/or construction costs. CWA is able to allow project participants to defer repayment until water is delivered.
5. For the most part, CWA is primarily interested in the design/construction phases of treatment plants (including raw water intake structures, if necessary) and not in the operation of plants, since O&M services may be readily obtained. If necessary, CWA would participate in pipeline projects, but again, that is not CWA's primary interest.

END OF MEMORANDUM



North Fort Bend Water Authority
Potential Source Study
Gulf Coast Water Authority (GCWA)

Meeting Notes

Meeting Date: Friday, November 18, 2005

Meeting Time: 9:00 a.m.

Meeting Location: 3630 Highway 1765, Texas City, Texas

Attendees: Robert Istre, GCWA
Dave Scholler, BGE
Charles Shumate, BGE
Mike Reedy, TCB

The purpose of the meeting was to discuss the potential to obtain surface water from GCWA. Below is a summary of the discussions of the meeting. Please respond in writing to Brown & Gay Engineers, Inc. within 5 days with any comments, revisions or additions to these notes.

1. GCWA has a limited amount of water available and will work with NFBWA to obtain additional water. Existing water rights are all available in/from the Brazos River.
2. GCWA is currently working with several parties on a 20-mgd plant expansion. GCWA is still identifying terms the various parties will agree to. 12-mgd of the expansion is committed and 8-mgd is additional capacity. NFBWA could 'join' this effort.
3. GCWA has other water 'on the books' in Oyster Creek, but that water is unreliable.
4. GCWA operates under a component cost of service system that allocates only those costs directly attributable to each customer as opposed to a system cost. These contract costs have known debt service which decreases over time in contrast to a 'system' cost.
5. The COH Transfer Project that would make Trinity River water available to GCWA customers in the East in order to free-up water in the West for NFBWA use, would require that NFBWA buy-out (make whole) affected customers.
6. GCWA is in negotiations with the Chocolate Bayou Water Company for possible purchase of their water rights. GCWA does not need all the water available from Chocolate Bayou Water Company and is looking for a partner(s) for the purchase of these water rights.
7. The Chocolate Bayou Water Company water rights could be utilized and incorporated into the existing GCWA east canal systems to meet existing and future customers of GCWA in Galveston and other customers in the east. This could potentially "free up" existing Brazos supplies to be used in Fort Bend County.

8. GCWA believes that the reliability of the Chocolate Bayou Water Company water rights is low enough to require several months storage, potentially adding significant cost. It was noted that aquifer storage and recovery (ASR) may be a way to reduce storage costs. The City of Texas City is currently completing design of an ASR well to be located in the vicinity of the Mall of the Mainland.
9. There may be an opportunity related to Chocolate Bayou Water Company rights. The NFBWA will keep GCWA informed as to our progress and GCWA agreed to provide information during the course of our study.

END OF MEMORANDUM

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Meeting Minutes

Subject	Telephone Conversation with Texas Genco
Project reference	Potential Source Water Supply Study
Place	NA
Meeting date	November 29, 2005
Attendees	Jason Fluharty (Texas Genco) Michael Reedy (TCB)
Date prepared	November 29, 2005
Prepared by	Michael Reedy

Distribution	All Attendees
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The purpose of this telephone conversation was to discuss the potential opportunities to obtain surface water supplies from Texas Genco as part of the NFBWA's requirements for groundwater reduction in Fort Bend County. A summary of this meeting is provided below. Please respond in writing to Turner Collie & Braden within 5 days with any comments, revisions, or additions to these notes.

1. Texas Genco has water rights in the Brazos River totaling 40,000 acre-feet for industrial and irrigation use as well as 83,000 acre-feet in contract water from the Brazos River Authority (BRA).
2. Texas Genco currently contracts 24,000 acre-feet to the Richmond Irrigation Company and 4000 acre-feet to Brazos Valley Energy. The contract to Richmond Irrigation Company will expire in 2008 and the contract to Brazos Valley Energy will expire in 2026. Texas Genco is not currently considering the contract of these supplies to any other entity when these contracts expire and will instead hold these rights for Texas Genco use.
3. Texas Genco is currently not considering any additional contract or sale of their water rights and have made the decision not to convert any of their water rights to municipal use.
4. Texas Genco is currently in the process of being acquired by another company and therefore no additional sale of water rights or contracts are being contemplated.
5. The water rights holdings of Texas Genco may, at some point, be available for purchase or contract by the North Fort Bend Water Authority or any other entity depending on the ultimate plans for the W.A. Parish Power Plant in Fort Bend County



North Fort Bend Water Authority
Potential Source Study
TXU Power

Phone Conversation Notes

Meeting Date: Friday, November 4, 2005

Meeting Time: 9:00 a.m.

Meeting Location: (214) 812-4345 Dallas, Texas

Attendees: Paul Zweacker, TXU – Director, Environmental Services
Charles Shumate, BGE

The purpose of the meeting was to discuss the potential of obtaining surface water from TXU's Twin Oak Reservoir. Below is a summary of the discussions of the meeting. Please respond in writing to Brown & Gay Engineers, Inc. within 5 days with any comments, revisions or additions to these notes.

1. TXU's Twin Oak Reservoir was constructed approximately 25 years ago, but the gates were never closed.
2. TXU is planning to construct two coal units that will utilize Twin Oak Reservoir.
3. By itself, water from Twin Oak Reservoir is not sufficient for the two coal units. Therefore, TXU will also utilize Brazos River Authority water from Lake Limestone.
4. TXU may not need all their currently contracted water from Lake Limestone, therefore, the door is open for the NFBWA to purchase water available at Lake Limestone from BRA.

END OF MEMORANDUM



North Fort Bend Water Authority
Potential Source Study
West Harris County Regional Water Authority (WHCRWA)

Meeting Notes

Meeting Date: Wednesday, December 14, 2005

Meeting Time: 11:30 a.m.

Meeting Location: 3100 W. Alabama, Houston, Texas

Attendees: Dan Sallee, WHCRWA President
Wayne Ahrens, WHCRWA Engineer
Dave Scholler, BGE
Charles Shumate, BGE
Mike Reedy, TCB

The purpose of the meeting was to discuss the potential to obtain surface water or otherwise cooperate with WHCRWA. Below is a summary of the discussions of the meeting. Please respond in writing to Brown & Gay Engineers, Inc. within 5 days with any comments, revisions or additions to these notes.

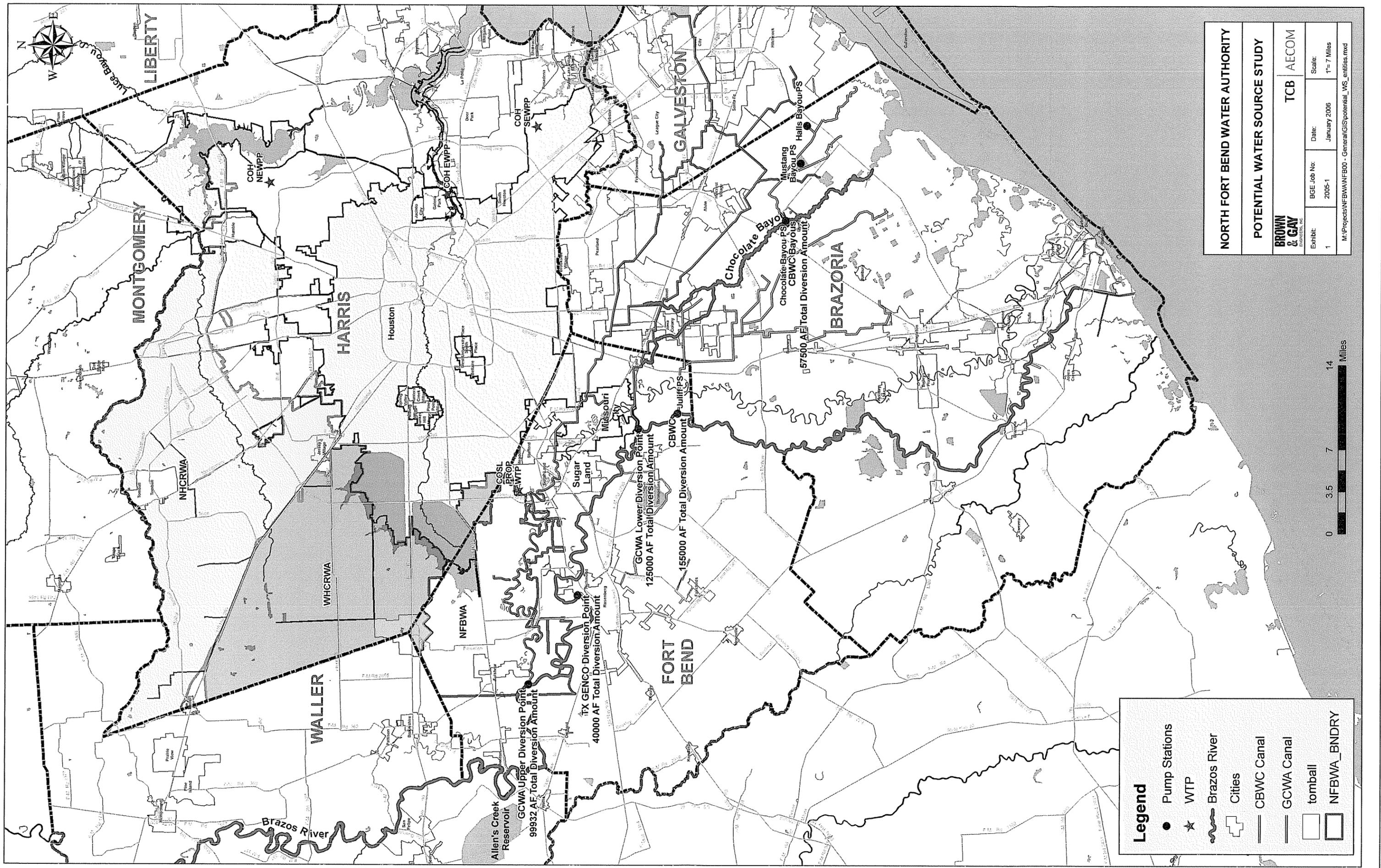
1. The WHCRWA is interested in opportunities that mutually benefit the parties involved.
2. The WHCRWA's contract with the City of Houston for 18.25-mgd is for water from the City's East Water Purification Plant (EWPP). Additional capacity is available at the EWPP that the WHCRWA is considering purchasing.
3. The WHCRWA's existing or currently planned projects meet the surface water requirements of the Harris-Galveston Subsidence District's 2010 conversion date. The WHCRWA's estimated surface water need in 2020 is approximately 50-mgd.
4. The WHCRWA's next conversion date is 2020. The NFBWA conversion dates are in 2013 and 2025. The difference in timing of major projects may make cooperative efforts between the two Authority's more challenging.
5. There is no capacity available at the City's Northeast Water Purification Plant (NEWPP) at this time. Expanding capacity at the NEWPP will require additional raw water improvements (Luce Bayou), increasing the overall cost of water.
6. Precinct 1 of the WHCRWA is isolated from the majority of the WHCRWA, making that area difficult to supply surface water economically. The WHCRWA has discussed purchasing capacity from the City of Houston to serve Precinct 1, but it is unclear whether the City has adequate capacity available in the region to supply that area.
7. The WHCRWA is in the process of finalizing an agreement to purchase approximately 47 miles of pipeline easement. The east end of the easement is equally accessible to the

NFBWA Potential Source Study
Meeting with WHCRWA

December 14, 2005

City's EWPP and NEWPP facilities. The west end of the easement is approximately 5-miles north of the NFBWA's northern boundary.

END OF MEMORANDUM



Legend

- Pump Stations
- ★ WTP
- ~ Brazos River
- ⊕ Cities
- CBWC Canal
- GCWA Canal
- tomball
- NFBWA_BNDRY



NORTH FORT BEND WATER AUTHORITY	
POTENTIAL WATER SOURCE STUDY	
BROWN & GAY <small>ENGINEERS, INC.</small>	TCB AECOM
Exhibit: 1	BGE Job No: 2005-1
Date: January 2006	Scale: 1" = 7 Miles
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APPENDIX E



ALTERNATIVE ANALYSIS

October 2007



ALTERNATIVE ANALYSIS

October 2007

North Fort Bend Water Authority

Alternative Analysis



October 2007

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Section 1

Executive Summary

The North Fort Bend Water Authority (the Authority) consists of a number of water providers within the Fort Bend Subsidence District's (FBSD's) Regulatory Area A. This location within Area A requires that these water providers must limit groundwater pumpage to 70% and 40% of total water demand by the years 2013 and 2025, respectively, as required by the FBSD District Regulatory Plan (DRP). This report represents a response to this requirement by recommending a strategy for converting a portion of the Authority's demand to use surface water in order to reduce groundwater pumpage.

1.1 Development of GIS Database System

Data from existing sources was used to develop a Geographic Information System (GIS) for information relating to the Authority. This information was used for characterizing population and infrastructure within the limits of and surrounding the Authority boundary, as well as for synthesizing new datasets that were customized for use in the alternative analysis.

Available data was obtained from sources that included Fort Bend County Appraisal District (FBCAD), Fort Bend County, FBSD, the Harris-Galveston Area Council (H-GAC), and the U.S. Census Bureau. These datasets were used to develop a working database of districts and regulated wells inside the Authority, locations of water plants and related facilities, and various other datasets critical to the development of the alternative analysis.

1.2 Population and Demand Projection

A study was conducted to estimate the future population within the Authority and the water demand corresponding to this growth. These numbers are a crucial component in determining the future needs for surface water conversion and are a particularly sensitive issue because past population projections have historically underestimated growth within Fort Bend County.

Data from Municipal Information Services (MIS) and the Harris-Galveston Area Council (H-GAC) were selected for the population projection process. Population projections were used to forecast overall population for the Authority through the year 2035 when H-GAC forecasts end. Forecasts were extended beyond this period through the year 2055.

Additionally, these Authority-wide population projections were used as a basis for developing population projections at a level of 1,000 by 1,000 foot grid cells. These overall figures were used to scale up the H-GAC grid cell projections that take into account preferential growth on a spatial basis. These area-distributed demands were then used to

estimate demand within utility boundaries and to determine the extent of development projected for undeveloped areas.

Water demands were determined on a per capita basis through the analysis of utility district records on groundwater pumpage and estimated population as well as a similar analysis at the Authority level. This analysis indicated that use during dry and average years was approximately 210 gallons per capita per day (gpcd) and 170 gpcd, respectively.

1.3 Facilities Planning

1.3.1 Development of Surface Water Supply Strategy

The overall surface water supply strategy was developed in response to the total water demand throughout the planning horizon, the regulations set forth by FBSD, and how demand vary throughout the year due to seasonal use patterns. Two major phases of conversion are planned to meet the growth in surface water demand. The first phase of conversion is planned to meet needs through the year 2024 and the second is planned out to the year 2055. These two phases are based on 30 percent and 60 percent conversion levels, respectively, as required by the FBSD regulations.

Potential sources for surface water were identified that ranged from untreated, raw water from the Brazos River Authority (BRA) that could be treated and distributed by the Authority to treated water from the City of Houston (COH) that could be received from either the COH or the West Harris County Regional Water Authority (WHCRWA) water systems and distributed by the Authority. One site near Richmond/Rosenberg and one site near Fulshear were considered as take points and locations for water treatment plants (WTPs) for water purchased from the BRA. A total of nine potential alternatives were created based on these sources. These alternatives are listed below.

1. Richmond/Rosenberg WTP
2. Fulshear WTP
3. COH Take Point
4. WHCRWA Take Point
5. WHCRWA Take Point (2013 Phase) and Richmond/Rosenberg WTP (2025 Phase)
6. WHCRWA Take Point (2013 Phase) and Fulshear WTP (2025 Phase)
7. COH Take Point (2013 Phase) and Richmond/Rosenberg WTP (2025 Phase)
8. COH Take Point (2013 Phase) and Fulshear WTP (2025 Phase)
9. COH (2013 Phase) and WHCRWA (2025 Phase) Take Points

Alternative 4, the use of water from the WHCRWA system as a sole source of supply, was determined to not be a feasible solution for supply in the near-term due to the timing of the WHCRWA's plans for introducing surface water to the area. All other alternatives were studied in further detail to determine relative costs of implementation.

Plant facilities were phased in 10 mgd increments according to increase in demand over the planning horizon. The first phase was planned to support surface water demand from 2013 through 2024 with an expansion in the year 2020.

Treatment plant facilities for receiving raw water from the Brazos River were planned with a forebay and reverse osmosis (RO) systems for addressing water quality issues in addition to a conventional treatment process. Repumping stations were specified at each of the treated water take point from the COH and the WHCRWA. These facilities would include storage and booster pumps sufficiently sized to provide water at the peak rate to customers within the Authority.

For each alternative, districts that were in close proximity to the source of supply were identified for conversion in the first phase beginning in 2013. Districts were selected until the total water demand for all connected districts, adjusted for peaking effects, was sufficient to meet the 30 percent conversion requirement for the Authority through 2024. Additional district connections were identified beginning in 2025 to meet the 60 percent conversion requirement.

Water system models were developed for evaluating the line sizing requirements for each alternative. Transmission system pipelines were sized to have a maximum head loss of 2 feet per 1,000 feet of pipe and a velocity of 5 feet per second. Pressures within the modeled systems were maintained at a level that would provide a pressure residual of 10 psi at the top of each ground storage tank (GST) served.

1.3.2 Alternative Costs and Economic Analysis

Costs were developed for each component of the studied alternatives to evaluate the overall costs of the different strategies. The cost of water was developed with information from the BRA and the COH. The provided unit costs were applied to the contracted water supplies from each provider to determine the total cost of water for each planning year.

Capital costs were developed for plant facilities based on professional experience, references, information from the Region C and Region H regional water planning processes, vendor quotes, a review of recent bid tabs for existing projects, and other available data. Transmission system costs were developed based on recent bid tab information for various types of construction and consideration was given for special pipe segments that would require more elaborate construction techniques such as borings for the installation of pipes under major roads or among utilities and pipelines.

Operation and maintenance costs for facilities were estimated with consideration for consumables and disposal of waste products. Annual costs for maintaining pipelines and pump station facilities were assumed to be a percentage of the total capital cost.

Long-term costs and revenues were evaluated in order to compare each alternative. This financial analysis included the costs described above as well as costs associated with debt service and other global variables that would affect all of the alternatives in a similar manner.

The resulting analysis demonstrated that Alternative 3, the use of treated COH water to provide for all phases of development, had the lowest total present worth cost of all of the alternatives considered with a total present worth of \$922-million. Alternative 9, with a present worth of \$1,028-million was the second least expensive with a difference of less than 10% between the two options. This alternative, while more expensive than Alternative 3, was selected as the recommended solution because of the advantage of incorporating multiple supply points into the system.

1.3.3 Potential for Over-Conversion

Over-conversion was also considered as a strategy for delaying the need for the second phase of construction associated with the 2025 increase in surface water requirements to 60 percent of the total water demand. It was estimated that changes in operation and/or minor changes to the distribution system could allow the Authority to delay the 2025 conversion phase from one to four years depending upon the strategy selected. Due to the initial positive implications, it is recommended that a more extensive review of over-conversion options be investigated as the Authority moves into design.

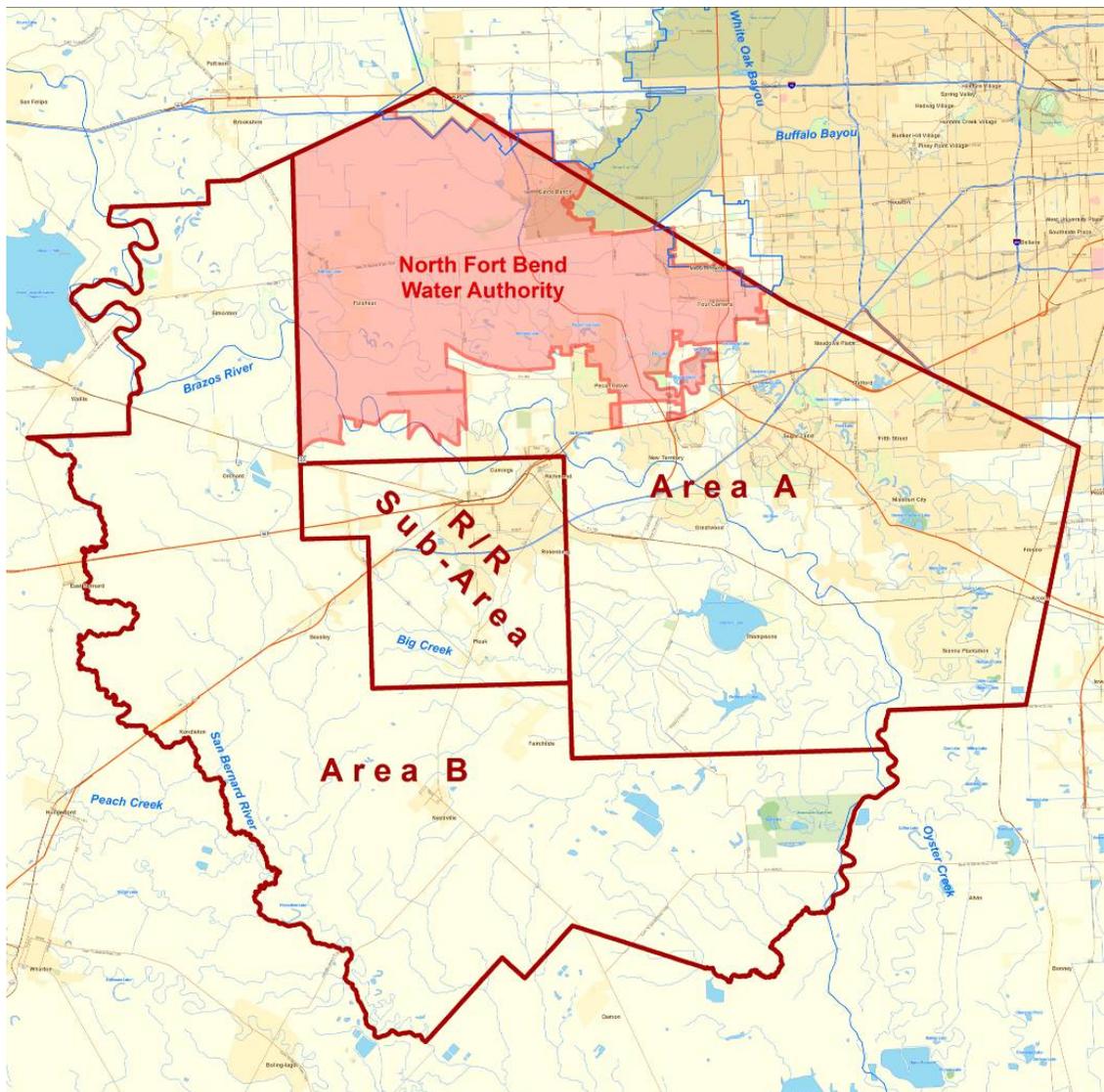
1.4 Summary and Conclusion

Alternative 9 was selected as the preferred surface water conversion strategy although it was not found to be the least expensive option. Alternative 3 was identified as the least costly alternative. However, there is the potential that additional costs associated with Alternative 3 may exist that the COH was not able to identify during the course of this study. Any additional costs would narrow the range of present worth between Alternative 3 and other alternatives. Therefore, it is recommended that the NFBWA ensure a redundant supply of water and avoid potentially hidden costs by proceeding with Alternative 9. The maximum present value surface water cost for Alternative 9 was estimated to reach a maximum rate of \$2.75 per 1,000 gallons.

Section 2 Introduction

The need for the conversion of the Authority to surface water is regulation put in place by the Fort Bend Subsidence District (FBSD). In the 2003 District Regulatory Plan (DRP), the FBSD has divided Fort Bend County into three distinct areas with separate conversion goals and requirements. These areas are shown in *Figure 1*.

Figure 1
FBSD Regulatory Areas



Entities within Regulatory Area A are required to submit a Groundwater Reduction Plan (GRP) beginning in 2008 in anticipation of regulations requiring the reduction of groundwater use starting in 2013. Beginning in 2013, groundwater use will be limited to 70% of the producer's total water demand. This amount will decrease to 40% by 2025. Regulation within the Richmond/Rosenberg Sub-Area will be delayed until 2015 but will follow the same patterns outlined for Area A. There are currently no regulations on groundwater use in Area B except that this water cannot be transferred into Area A. As shown in *Figure 1*, The Authority is contained within Area A, meaning that a water source other than groundwater will be required to meet 30% and 60% of the total water demand beginning in 2013 and 2025, respectively.

Section 3

Development of GIS/Database System

A Geographic Information System (GIS) was developed for the Authority to use for the purposes of data management, data analysis and exhibit production. The strategy for GIS development for the Authority was to utilize existing and available data where possible and to only create additional GIS data for the Authority when necessary. Based on this premise, the largest portion of data now accumulated in the GIS for the Authority originates from other sources. However, there were key pieces of data that did not exist that were created by the project team.

In this section, a general description is provided of the types of data collected from third party sources, followed by a detailed description about the custom data created for the Authority. The third party data is listed in alphabetical order by source.

3.1 Third Party Data

Fort Bend County Appraisal District (FBCAD) – The Engineer purchased a copy of the parcel boundaries and attributes from the Appraisal District. This data was added to the Authority’s GIS for determining land use and ownership.

Fort Bend Subsidence District – The subsidence district provided a file which included information on wells in Fort Bend County. The latitude and longitude coordinates in the file were used to create a GIS dataset that allows the user to illustrate the approximate location of the wells. The files also include owner, permit, and pumpage information.

Fort Bend County – The GIS department of Fort Bend County provided access to an Internet site from which the consultant team was able to download a large number of the County’s GIS data layers. A sample set of the type of data provided includes the location of schools, MUDs, cemeteries, airports, hospitals, landfills, roads, census tract boundaries, and parcel boundaries.

Houston-Galveston Area Council (H-GAC) – H-GAC provided the results of a population projection study recently completed by H-GAC. H-GAC has provided population projection information at a 1,000-foot by 1,000-foot square grid. The grid was provided as a GIS shapefile. Along with the shapefile they provided a table of projected population, jobs and households by grid for each year between 2005 and 2035. Aerial photography flown in 2006 was also obtained from H-GAC.

Texas Natural Resources Information System (TNRIS) – TNRIS maintains a web site that contains a number of county and statewide datasets. Using this link, boundaries were downloaded for legislative districts in the area. This included boundaries for US

Congressional Districts, State House of Representative and House Districts, and State Board of Education Districts.

Texas Water Development Board (TWDB) – TWDB also maintains a web site which includes GIS data. Information downloaded from TWDB includes information on state reservoirs, water conveyance features, and water wells.

Texas Railroad Commission (RRC) – Oil and Gas pipeline information was obtained from the RRC for Fort Bend and Harris County that provides the approximate location and ownership of pipelines.

US Census Bureau – Data was acquired from the Census Bureau that identifies the Census Block, Block Group and Tract boundaries for the 1990 and 2000 Census. In addition, population attribute information was also obtained for the 1990 and 2000 Census.

US Geological Survey (USGS) – A copy of the National Hydrologic Dataset (NHD) for the zones that intersect the Authority's boundary were downloaded from the USGS. The NHD data identifies the locations of water bodies, including streams, bayous, rivers, reservoirs, lakes and ponds. The project team also acquired copies of the 1:24,000 USGS quad maps for the Authority and merged them into a single dataset that could be used to develop a background layer for mapping.

Exxon – Exxon provided a shapefile to the Authority for one of their existing pipeline easements that has recently been purchased by the West Harris County Regional Water Authority (WHCRWA). The portion of the pipeline easement that interests the Authority runs from midway between the COH East Water Purification Plant (EWPP) and the North East Water Purification Plant (NEWPP) to the west side of Houston. This easement may be used to run a pipeline to deliver water to the Authority. The pipeline does not reside within the Authority's boundaries although its placement near the Authority is a relevant part of several of the water supply strategies described in this report.

3.2 Consultant Generated Data

During the course of this study, several required datasets were created specifically for the Authority. These datasets were developed due to a specific need, i.e. boundaries were missing, collected data needed to be stored for future retrieval, or data required for analysis was missing or in the wrong format. During the data gathering phases of this project, MUDs were requested to provide boundary as well as plant information via cadd drawings, metes and bounds descriptions or other information. Existing data was updated as appropriate. Perhaps the most important spatial dataset created was the Authority boundary.

3.3 GIS Data Application

This GIS data was used extensively in our analysis of population and water demand projections which is discussed in further detail in the next section. But it found numerous applications in a broad array of alternative analysis exercises throughout this study.

The location of water plants for each MUD, many found by utilizing aerial photography, was used to generate pipeline routing for water conversion cost estimates in all the alternatives. The topography information was used in the development of the hydraulic models for the pipeline system. Analysis of the aerial photos, the Star Map road data, and the oil and gas pipeline data determined where more expensive pipeline construction methods may be needed to cross existing infrastructure. Those special crossings were included in the cost estimates for the various alternatives.

The parcel information from the FBCAD was used to find potential large areas of land for possible water plants and pump station locations, and the land values were analyzed to estimate land costs.

The parcel information was also reviewed to identify land areas that may not be suitable for future development. The oil and gas pipeline data as well as the road information was used to generate corridors of property that would not be developed. Corridors for future development were also excluded based on road right of ways. Other items identified included high power transmission lines, public parks including the reservoir, cemeteries, schools, and property owned by the Texas Department of Criminal Justice. Areas identified as not developable were used to limit population projections in certain areas.

Of course, all the information was utilized to develop various conceptual working maps, planning tools, and final exhibits for the alternative analysis. This data will continue to be utilized as the Authority moves forward to routing studies, easement acquisition and detailed design.

Section 4

Population and Demand Projections

4.1 Population Projection Methodology

A conservative estimate of future population is essential to ensure that planning efforts adequately anticipate future demand for water. Past forecasts of future population for Fort Bend County have consistently underestimated the population. Therefore, high priority was placed on the effort to identify and evaluate resources available to accurately forecast population in the Authority.

Potential sources of population projections and projection methodologies were investigated to evaluate their advantages, disadvantages and usefulness to the Authority. Sources of population data and / or projections that were identified utilize data from the 2000 Census and include:

- UH Center for Public Policy - UH Houston Economic Multi-Sector (HEMS) Model
- UH Center for Public Policy - Small Area Model-Houston
- Population and Survey Analysis (PSA)
- Municipal Information Services (MIS)
- Houston-Galveston Area Council (H-GAC)
- American METRO/STUDY Corporation
- Texas State Data Center and Texas Water Development Board (TWDB)

The primary considerations with each of these sources of information include:

- Level of detail
- Length of forecast or projection
- Other components

Level of detail refers to whether the data and forecast are for an entire county, incorporated area (towns and cities), groups of census tracts (analysis zones), individual census tracts, or smaller area, for example, a residential subdivision or a cell within a grid of cells.

Length of forecast refers to whether the projection extends to 2025, 2035, 2050, etc.

“Other components” refers to whether the forecast includes subsets of population for example, single-family and multi-family populations, and/or a forecast of employment in addition to population.

After considering the information and forecasts available from the potential sources, Houston-Galveston Area Council (H-GAC) was determined to best meet the Authority's need based on their land use data and computer modeling capabilities to provide the long term population forecast. In addition, Municipal Information Services (MIS) was well-suited to develop an estimate of existing population and short-term forecast of population to 2010 based on their database and knowledge of existing developments and the development process. The MIS forecast was used to adjust the H-GAC forecast so that the two forecasts agree beginning in 2010.

MIS is a recognized collector and distributor of financial and demographic data for special districts in the Houston region and publishes the "Guide to Houston Area Municipal Utility Districts." In its work, MIS utilizes tax role data, current aerial photography, official statements related to sales of bonds, 911 (emergency services) information, and other sources of data. MIS has more than 25 years of experience with clients including forecasting population through the anticipated life of the development to complete build-out.

H-GAC is the cooperative Council of Government for thirteen counties in the region. H-GAC population forecasts are available through 2035 at a 1,000-foot by 1,000-foot grid cell level of detail.

Only in the process of understanding the data and forecasts available could a complete methodology be laid out to project population within the NFBWA. Steps within the methodology include:

1. Estimate population in the Authority from 1990 to present to develop baseline estimates of population growth.
2. Develop high level forecast of Authority-wide population.
3. Develop grid-level forecast of Authority population.

The following sections provide additional information about the steps in the methodology.

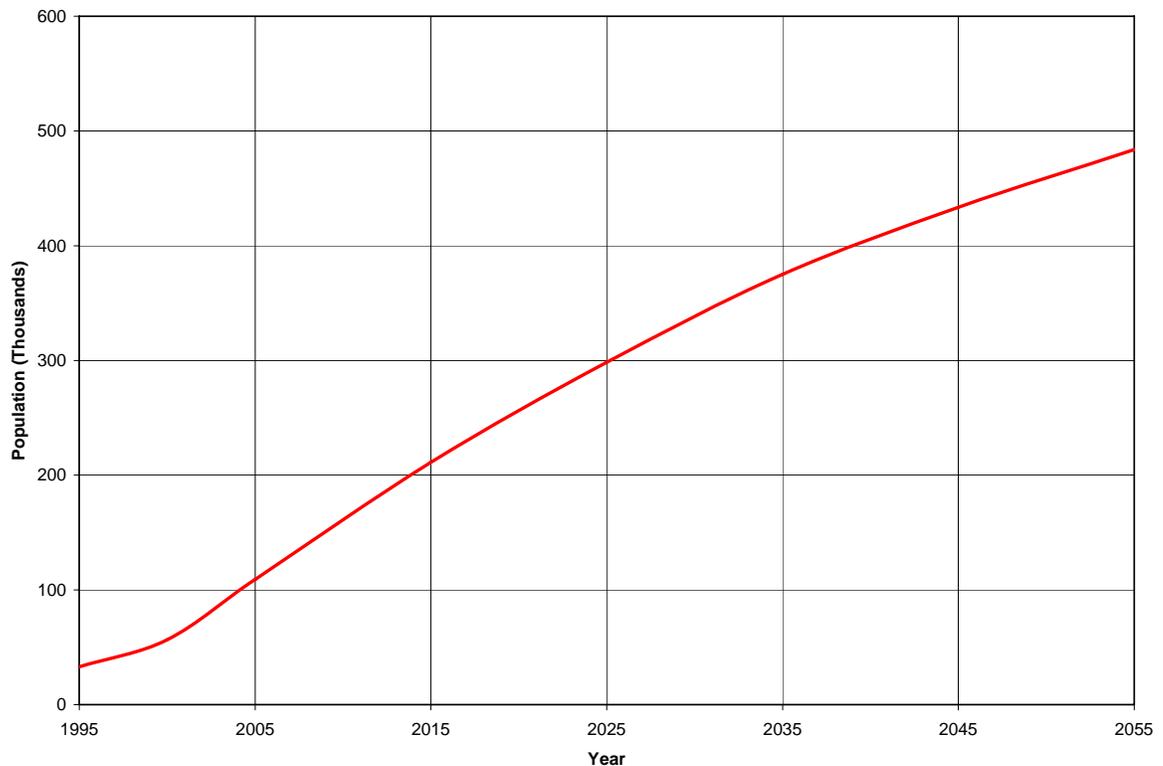
4.1.1 Estimate Population in the Authority from 1990 to Present

New Municipal Utility Districts (MUDs) were identified and current MUD information was obtained to update MIS' MUD database. Data typically consists of counts of lots and housing units and does not address population directly. 2000 Census data was used to determine "Occupancy Rate" and "Population per Occupied Unit" for each of the sixteen census tract entirely or partially within the boundaries of the Authority. Occupancy rates vary from approximately 80% to more than 99%. Population per occupied unit varies between 2.7 and 3.5 people/unit.

The estimated population within the Authority from 1990 to present was calculated based on estimates of single- and multi-family housing units multiplied by corresponding factors for

“Occupancy Rate” and “Population per Occupied Unit.” The population in the Authority is estimated to have been 107,000 in 2005. *Figure 2* shows the rate of growth to be more than 10,000 new residents annually in the Authority.

Figure 2
Population Forecast for the Authority



4.1.2 Develop High Level Forecast of Authority-Wide Population.

Based on MIS years of experience analyzing and developing similar projections, it was determined that MUD information, on-site inspection of current development, and housing market conditions would be used to develop a short-term forecast through 2010 of residential lots and housing units. Based on this information, estimates of population were developed by applying the occupancy rate and persons per occupied unit factors obtained from the 2000 Census. This forecast projects the population to grow from approximately 107,000 in 2005 to 160,000 in 2010.

Being confident that a land-use based model is the preferred method to forecast long-term population, it was necessary to compare H-GAC’s estimated 2010 population to the estimated 2010 population in the Authority of 160,000 people. Based on summing the populations of grid cells within the Authority, H-GAC’s estimate of the Authority’s population in 2010 is approximately 40% less than the estimated population of 160,000. This disparity did not diminish the value of H-GAC’s forecast because a land use model attempts

to accurately represent the relative “attractiveness” of an area with respect to other areas based on factors such as proximity to transportation and likelihood of flooding. Therefore, a method was needed to take advantage of the benefits of H-GAC’s forecast while adjusting the forecast upward to offset the difference in the starting 2010 population.

Of several methods considered, the concept of “capture rate” was chosen because it is consistent with the common idea that some areas develop before other areas because they are more attractive. Therefore, attractive areas capture a greater proportion of the population moving in than do less attractive areas of the County. By comparing the estimated populations within the Authority territory and Fort Bend County since 1990, the Authority’s capture rate (i.e., the population that moves into the Authority territory as a percentage of the population moving into the County) has increased from approximately 18% from 1990 to 1995 to more than 50% from 2000 to 2005. An obvious limitation on the ability of the Authority to continue to capture 50% of the population moving into the County is that the Authority territory fills up. Therefore, the capture rate must decrease as attractive space available to absorb population decreases and decreasing capture rate was the method developed to utilize H-GAC’s forecast.

Beginning in 2010, future population within the Authority was estimated assuming that the Authority’s capture rate decreases to 95% of the capture rate of the previous five-year period. Using this method the projected population within the Authority is approximately 205,000 in 2015, 289,000 in 2025, and 365,000 in 2035 – the end of H-GAC’s forecast.

Adequate water supply planning relies on forecasts of 50 years or more, therefore, the population forecast had to be extended from 2035 to at least 2050 or beyond. It was determined to continue the forecast at 10-year intervals to 2045 and 2055. Analysis of H-GAC’s forecast indicates that the increase in population over five-year periods declines at a predictable rate. Therefore, this predictable trend was used to extend the forecast assuming that the percent increase in population during each five-year period is 88% of the previous five-year period. The projected population within the Authority is approximately 429,000 in 2045 and 481,000 in 2055.

4.1.3 Develop Grid-Level Forecast of Authority Population

The H-GAC grid cell population was used as the basis or starting point to forecast population at the grid level. H-GAC’s population for grid cells within the Authority had already been found to be significantly less than the Authority’s estimate of existing population. However there is value of a land use model in representing the “attractiveness” of an area relative to other areas. The process to adjust H-GAC grid cell population so that the total matches the Authority estimate simply requires multiplying H-GAC’s population for each cell by the ratio of the Authority’s estimate to H-GAC’s total.

The process described above was limited by a “population cap” placing a maximum on the population that could be assigned to a cell based on population density (people per useable

acre). Applying a population cap required a determination of 1) the maximum population density to be allowed and 2) useable area for each cell.

The maximum population density (people per useable acre) was determined by analyzing the densities of built-out developments within the Authority. The criterion used to categorize a development as built-out is that the number of houses be at least 95% of the number of residential lots in the development. Seventeen developments meet this criterion and were found to have an average population density of approximately ten people per useable acre.

The useable area was determined using the Authority's geographic information system (GIS) to analyze land use. Useable area excludes floodways, electric power and petro-chemical transmission corridors, transportation rights-of-way, and school and other governmental entity property (See *Exhibit 2*).

Once the population density factor was determined and the usable area for each cell was obtained using GIS, the adjusted population for each grid cell is the smaller of the population cap or the projected population. If the projected population exceeded the population cap, the population in excess of the cap was added to the adjacent cell to the southwest. This process began at the most northeasterly cell in the Authority and continued until the population remained under the cap. If the southern or southwesterly edge of the Authority was reached and there was still population in excess of the cap, then the excess was added to the next cell at the northeasterly edge of the Authority not already processed. This procedure was repeated for projected populations in 2015, 2025, 2035, 2045, and 2055.

4.2 Development of Per Capita Water Demands

Two approaches were taken to investigate per capita water demand in the Authority. The first approach was at the MUD level and is based on dividing metered groundwater pumpage for the MUD by the MUD's estimated population. To the extent possible, this effort also made use of responses received to the Authority's questionnaire to check population (indirectly based on connection data), pumpage, and interconnects to discover possible import/export of water that otherwise skew the pumpage information. Due to limitations on availability and quality of data, per capita demand based on MUD information was only estimated for 2005. Note that 2005 was a dry year for which pumpage in most MUDs was higher than average.

The results of this effort revealed variations in per capita demand from approximately 100 gallons per capita per day (gpcd) for older development without amenity lakes and significant lawn or esplanade irrigation to approximately 240-gpcd in newer developments with amenity lakes and/or irrigation of large green spaces. The average demand for eighteen MUDs, weighted based on estimated population, was found to be 210-gpcd.

The second approach was at the Authority level and is based on dividing groundwater pumpage reported to the Subsidence District by the estimated population within the Authority. This calculation was made for each year from 1990 to 2005. The first

observation is that data for population and pumpage show similar patterns of increase over this period. The similar patterns confirm the strong, direct relationship between population and water demand. In addition, the largest deviations from the pattern are increased pumpage in the dry years of 1999, 2000, and 2005. Decreased pumpage in wet years does not stand out as clearly, but 1997 and 2004 are notable.

After dividing pumpage by population for each year, a trend of increasing per capita water use is evident. This trend is attributed to the movement toward larger, master-planned communities with amenity lakes and significant irrigation of esplanades and green spaces. Because the upward slope of the trend appears to be skewed by the recent dry years (1999, 2000, 2005), the data were divided into three components for further analysis. Without recent wet or dry years, the four most recent “average years” (1998, 2001, 2002, 2003) have an average of approximately 170-gpcd with only a slight upward trend. Analysis of average years was limited to these four because the recent history is more representative of current conditions in the Authority than are earlier data.

Based on the trend for the average years, lines with the same slope were fit to the wet years and dry years. These lines provide a range of per capita water demand applicable to the Authority depending on rainfall. The average water demand in the Authority is approximately 170-gpcd and the water demand in a dry year is expected to be approximately 210-gpcd.

4.3 Demands for Contract Participants

In addition to the demand summarized in the sections above, water demands were also considered for participants outside of the Authority boundary. Other entities may participate in the Authority’s ultimate Groundwater Reduction Plant (GRP) through contract. These contract participants will pay rates similar to the ones paid by districts within the Authority in exchange for inclusion in the Authority’s GRP. The Authority will then over-convert areas within the Authority boundary to cover the contract participants’ groundwater withdrawals outside the Authority boundary.

Interest was expressed by The George Foundation and Plantation MUD to participate in the Authority’s GRP through contract. The George Foundation owns over 21,000 acres south of the Brazos River and southeast of Richmond making it the most significant contract participant. Forecast demand for the George Ranch property was provided by The George Foundation reflecting a projected development schedule. The George Foundation water demand is listed in *Table 1*.

Table 1
Water Demand for The George Foundation Properties

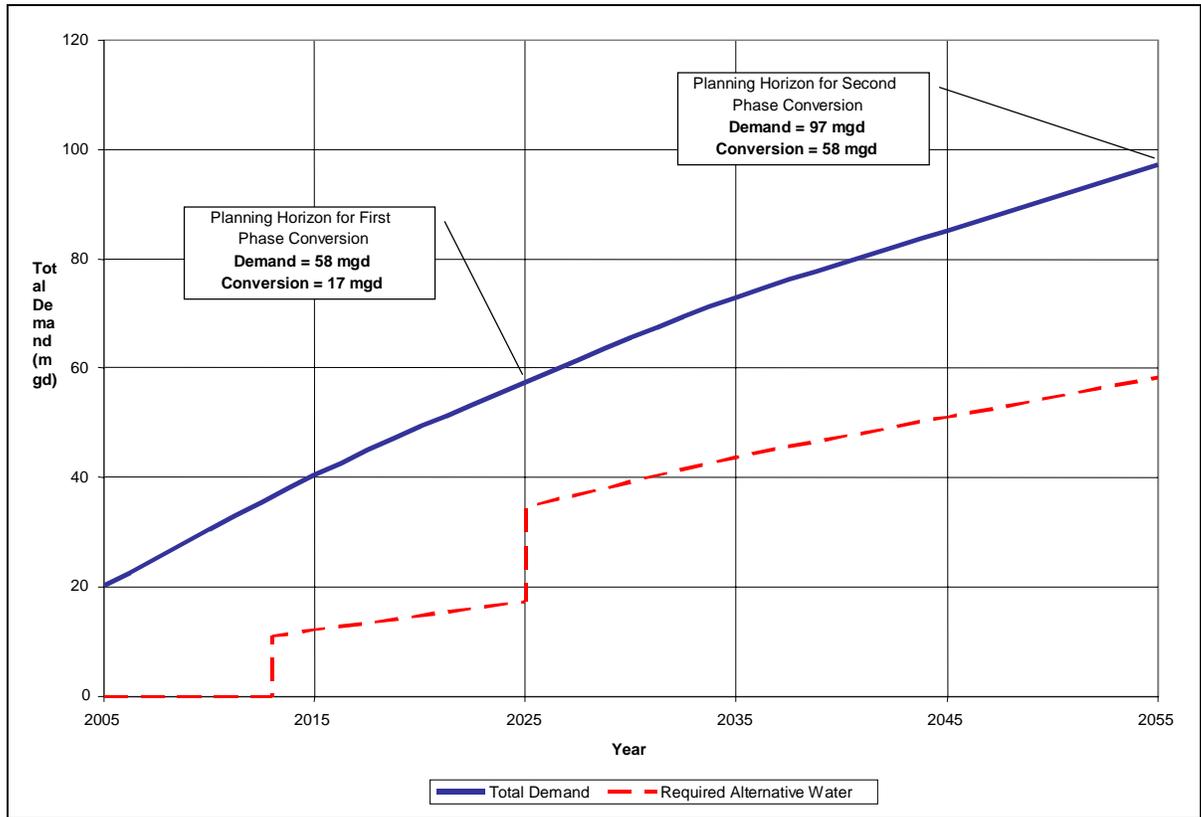
Contract Participant	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
George Ranch ¹	6.00	8.00	14.00	15.00	15.00	15.00

¹ Source: The George Foundation

4.4 Distribution of Water Demands through Planning Horizon

Per capita water demand was developed that allowed the application of these values to the aforementioned population projections to determine total estimated water demand for the Authority. *Figure 3* illustrates the growth of water demand for the Authority through 2055 as well as the required alternative water use based on the conversion requirements of FBSD regulations. FBSD regulations create two distinct planning horizons for surface water conversion in Fort Bend County. The first phase of conversion begins in 2013 and requires regulated groundwater producers to convert at least 30% of their total water demand to an alternative water supply. The second and final phase starts in 2025 and requires conversion of at least 60% of the total water demand to an alternative water supply or supplies. For purposes of this study, the second phase conversion requirement (60%) is continued through the end of the study period in 2055.

Figure 3
Authority Water Demand through Planning Period



Exhibits 3, 4 and 5 illustrate the spatial distribution, by 23-acre grid cell, of estimated water demand in 2005, 2025 and 2055, respectively. The growth in population, and therefore the corresponding increase in water demand, generally increases most significantly in the southwestern portions of the Authority.

The single largest component of demand in the Authority is existing utility districts in the Authority. Forecast water demand was developed for each water district using the population and per capita water demand projections provided in the sections above. The demand estimated and identified spatially by grid cell was associated with the utility districts using GIS. The individual utility district boundaries were overlaid with the grid cell demands for each year. Each grid cell within a district boundary was then associated with that individual utility district. Where grid cells intersected more than one district, the grid cell demand was allocated to each district proportional to the area of the grid cell within that district. *Table 2* provides a summary of projected water demand for each water utility within the Authority from 2013 through 2055.

Table 2
Projected Annual Water Demand by Water District

District	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
Big Oaks MUD	0.49	0.50	0.53	0.56	0.57	0.58
Cinco MUD 1	0.37	0.38	0.38	0.40	0.40	0.40
Cinco MUD 2	0.97	0.97	0.93	0.90	0.95	1.00
Cinco MUD 3	0.33	0.32	0.30	0.38	0.41	0.45
Cinco MUD 5	0.42	0.43	0.41	0.42	0.44	0.45
Cinco MUD 6	0.37	0.38	0.37	0.37	0.42	0.46
Cinco MUD 7	0.69	0.69	0.69	0.68	0.70	0.72
Cinco MUD 8	0.62	0.62	0.60	0.59	0.61	0.63
Cinco MUD 9	0.64	0.64	0.64	0.62	0.63	0.64
Cinco MUD 10	0.68	0.68	0.65	0.67	0.70	0.73
Cinco MUD 12	0.37	0.37	0.34	0.34	0.37	0.40
Cinco MUD 14	0.53	0.59	0.83	1.02	1.03	1.04
Cinco Southwest MUD 1	0.26	0.33	0.62	0.75	0.76	0.76
Cinco Southwest MUD 2	0.31	0.39	0.69	0.98	0.99	1.00
Cinco Southwest MUD 3	0.56	0.70	1.26	1.76	1.78	1.81
Cinco Southwest MUD 4	0.25	0.28	0.48	0.58	0.58	0.59
Cornerstones MUD	0.82	0.82	0.82	0.81	0.83	0.85
Fort Bend County FWSD 2	1.39	1.48	1.73	1.92	1.92	1.93
Fort Bend County MUD 2	0.49	0.49	0.49	0.50	0.50	0.50
Fort Bend County MUD 30	0.87	0.91	1.05	1.19	1.21	1.22
Fort Bend County MUD 34	0.62	0.65	0.77	0.89	0.89	0.89
Fort Bend County MUD 35	0.71	0.85	1.34	1.74	1.76	1.77
Fort Bend County MUD 37	0.47	0.49	0.59	0.71	0.72	0.74
Fort Bend County MUD 41	0.36	0.36	0.37	0.38	0.39	0.41
Fort Bend County MUD 50	0.57	0.69	1.14	1.52	1.53	1.54
Fort Bend County MUD 51	0.15	0.17	0.24	0.29	0.29	0.29
Fort Bend County MUD 52	0.03	0.03	0.04	0.05	0.05	0.05
Fort Bend County MUD 53	0.23	0.25	0.35	0.46	0.47	0.48
Fort Bend County MUD 57	0.54	0.67	1.20	1.68	1.70	1.73
Fort Bend County MUD 58	0.51	0.63	1.09	1.52	1.55	1.57
Fort Bend County MUD 93	0.23	0.29	0.51	0.68	0.68	0.69
Fort Bend County MUD 118	0.45	0.50	0.70	0.89	0.91	0.92
Fort Bend County MUD 119	0.63	0.63	0.63	0.62	0.63	0.64
Fort Bend County MUD 122	0.28	0.32	0.45	0.57	0.58	0.58
Fort Bend County MUD 123	0.42	0.53	0.93	1.30	1.32	1.34
Fort Bend County MUD 124	0.28	0.30	0.35	0.40	0.40	0.40
Fort Bend County MUD 130	0.28	0.34	0.57	0.78	0.79	0.80
Fort Bend County MUD 132	0.53	0.67	1.16	1.58	1.59	1.60
Fort Bend County MUD 133	0.47	0.54	0.76	0.98	0.99	1.00
Fort Bend County MUD 134	1.80	2.19	3.67	4.63	4.65	4.66
Fort Bend County MUD 142	0.43	0.53	0.95	1.36	1.37	1.38

District	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
Fort Bend County MUD 143	0.17	0.22	0.39	0.54	0.55	0.56
Fort Bend County MUD 146	0.59	0.73	1.29	1.81	1.84	1.86
Fort Bend County MUD 151	0.97	1.20	2.04	2.83	2.87	2.91
Fort Bend County MUD 161	0.22	0.26	0.44	0.60	0.61	0.62
Fort Bend County MUD 165	0.31	0.39	0.69	0.97	0.99	1.00
Fort Bend County MUD 169	0.29	0.36	0.65	0.92	0.93	0.94
Fort Bend County MUD 170	0.56	0.70	1.24	1.75	1.77	1.80
Fort Bend County MUD 171	0.40	0.50	0.89	1.25	1.27	1.29
Fort Bend County MUD 172	0.49	0.61	1.09	1.52	1.55	1.57
Fort Bend County MUD 173	0.57	0.71	1.26	1.77	1.79	1.82
Fort Bend County MUD 185	0.29	0.33	0.47	0.55	0.55	0.55
Fulshear	0.27	0.28	0.48	0.67	1.83	3.00
Grand Lakes MUD 1	0.48	0.53	0.66	0.72	0.72	0.72
Grand Lakes MUD 2	0.54	0.59	0.76	0.85	0.85	0.86
Grand Lakes MUD 4	0.88	0.89	0.89	0.95	0.98	1.02
Grand Mission MUD 1	0.27	0.34	0.62	0.84	0.85	0.86
Grand Mission MUD 2	0.45	0.56	1.01	1.42	1.44	1.46
Harris - Fort Bend County MUD 1	0.54	0.58	0.76	0.90	0.92	0.93
Harris - Fort Bend County MUD 5	0.42	0.42	0.39	0.49	0.64	0.80
Kingsbridge MUD	0.92	0.91	0.91	0.96	1.00	1.05
North Mission Glen MUD	0.57	0.57	0.56	0.59	0.59	0.59
Willow Point MUD	0.09	0.11	0.20	0.28	0.29	0.29
Woodcreek Reserve MUD	0.00	0.00	0.00	0.00	0.19	0.39
Total	31.68	35.30	49.25	61.62	64.04	66.45

A large portion of the Fort Bend County water demand, particularly in later years, is associated with regions that are primarily undeveloped and outside the limits of existing utility districts. These portions of the Authority were divided into 14 areas shown in *Exhibit 6*. Demand for these areas was forecast separately and is summarized in *Table 3*.

Table 3
Annual Water Demand Projections for Undeveloped Areas

Undeveloped Area	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
Central Area 1	0.14	0.21	0.29	0.71	2.37	3.59
Central Area 2	0.04	0.14	0.49	0.78	1.71	2.51
Central Area 3	0.02	0.15	0.18	0.32	1.05	1.58
East Area 1	0.17	0.20	0.23	0.30	0.32	0.32
East Area 2	0.12	0.24	0.50	0.58	0.69	1.12
East Area 3	0.08	0.55	1.04	1.27	3.46	4.05
North Area 1	0.13	0.22	0.27	0.32	0.52	0.73

Undeveloped Area	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
Northwest Area 1	0.03	0.15	0.29	0.31	0.42	0.52
Northwest Area 2	0.22	0.37	0.82	1.15	2.14	3.00
South Area 1	0.17	0.17	0.22	0.24	0.91	2.60
Southeast Area 1	1.30	1.82	2.14	2.41	2.87	2.87
Southwest Area 1	0.44	0.85	1.88	2.64	2.91	3.88
West Area 1	0.02	0.08	0.19	0.45	0.51	0.70
West Area 2	0.00	0.01	0.16	0.45	2.04	3.41
Total	2.88	5.16	8.68	11.92	21.91	30.89

Finally, *Table 4* summarizes all of the demand identified above to provide the total water demand for the Authority.

Table 4
Total Water Demand for the Authority

Demand Type	Projected Water Demand (mgd)					
	2013	2015	2025	2035	2045	2055
NFBWA Utility Districts	33.4	35.8	49.3	61.2	64.8	68.1
NFBWA Undeveloped Areas	3.0	5.2	8.7	12.7	23.0	32.8
George Ranch	0.7	0.7	10.7	15.7	15.7	15.7
Total	37.1	41.7	68.7	89.6	103.5	116.6

Section 5

Overall Approach to Conversion

5.1 Surface Water Delivery

Three factors were considered when determining the necessary capacity of the Authority's surface water distribution system. The first and most critical factor was the total water demand throughout the planning period, as this factor directly relates to the amount of conversion required. Secondly, the regulated use of groundwater directly affects the amount of surface water required for delivery to converted areas and these regulated levels are set by FBSD.

However, a third component that is vital to the sizing of the surface water delivery system is the seasonal variation of demand throughout the year. *Figure 4* provides a compilation of groundwater pumpage data on a per connection basis for 15 MUDs in Fort Bend County. *Figure 4* illustrates that during peak day conditions, the overall average day demand could be delivered and used by each district, since all of the peaking needed is produced from groundwater. However, *Figure 4* also illustrates that there are periods of time when the use of the various entities is less than the average day amount. During these times, the amount of surface water delivered and used will be less than average day amounts. As a result, the amount of surface water used by each district will be less than the average day amount as an annual average. The combined result of these two conditions means that a surface water delivery system must be sized to meet the 2025 conversion requirements by either converting more than 60% of the district demand, by increasing the peak delivery rate above average day, or a combination of both.

Figure 4
Groundwater Pumpage Data for Fifteen Fort Bend County Districts

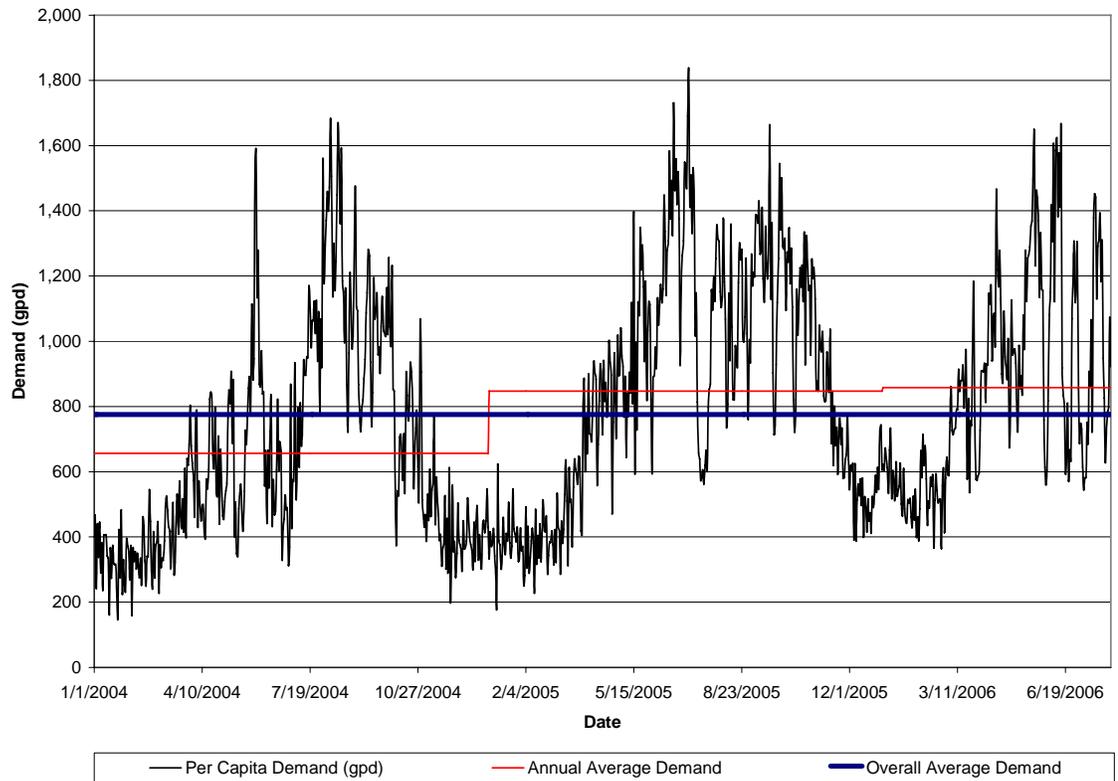
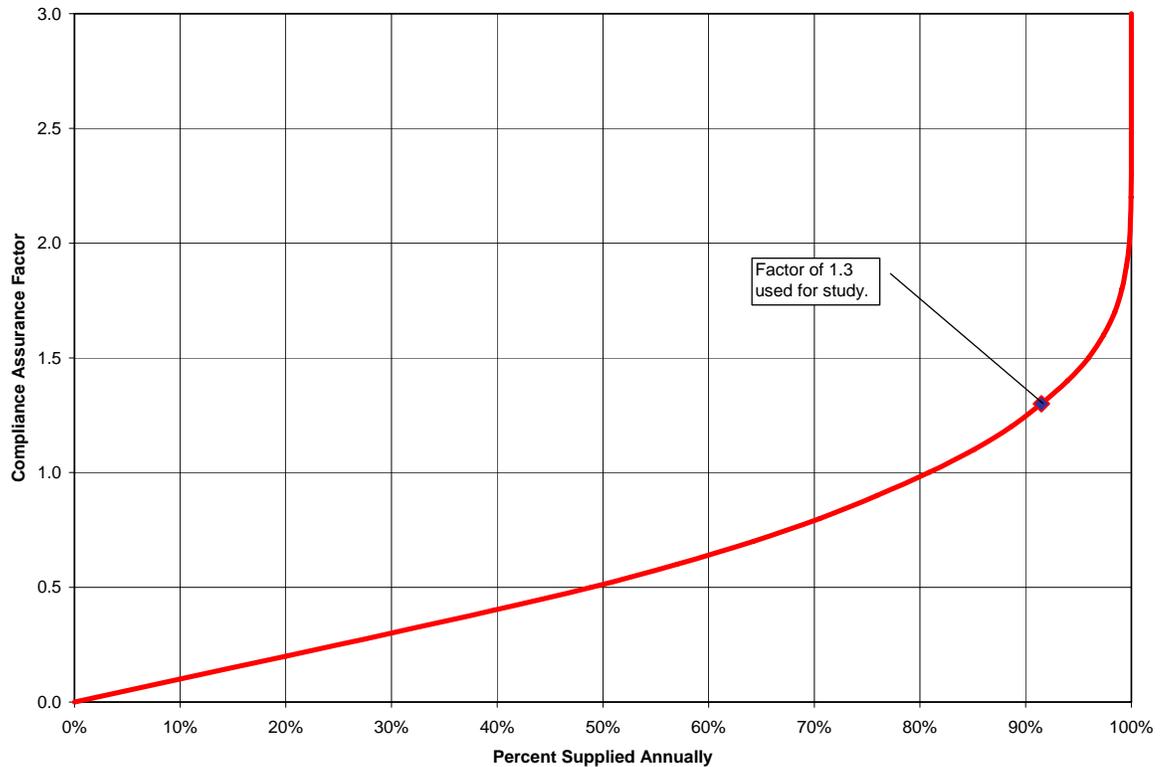


Figure 5 further examines the effect of peaking on the ability to meet seasonal demand. The data for this figure is derived from the information shown above in *Figure 4*. However, *Figure 5* demonstrates how much of a district’s water demand could be met by building a surface water supply system with various compliance assurance factors incorporated. This figure illustrates that supplying water at a rate of average day demand, or a factor of 1.0, would give a district the ability to receive only 80% of their demand from surface water. For instance, if enough districts were converted to represent 30% of the Authority’s average day demand and these districts were served by a surface water delivery system sized for average day demand, only 24% of the Authority’s demand would be met with surface water at the end of the year on average, which would be less than the regulatory requirement of 30% of the total annual demand.

Figure 5
Compliance Assurance Factor Relating to Various Supply Capacities



Consideration was given to this issue and it was recognized that two solutions exist. One solution would be to lay additional lines to convert more districts to compensate for this problem. Alternatively, the pipe system and plant facilities could be oversized to provide for a higher level of peak demand. It was determined to apply a compliance assurance factor of 1.3 to the pipe system, which would mean that the system could supply districts approximately 90% of their total annual water demand with surface water. This determination represents an economical compromise between the need for additional pipelines and the option of over-sizing pipelines. *Table 5* shows the surface water design requirements with this peaking factor included. The term compliance assurance factor is used in this study to define the amount of extra water that must be provided to those entities taking surface water in order to ensure an annual use of 30% or 60% surface water, depending on the year, in the Authority. It is not a peaking factor in the traditional sense of increasing the average day demand to a peak day or peak hour demand. Peak day and peak hour water demand will continue to be addressed through the use of existing wells and storage tanks at each individual MUD.

Table 5
Surface Water Facility Design Requirements

Demand Type	Projected Water Demand (mgd)					
	2013	2024	2025	2035	2045	2055
Total Demand	37.1	65.0	68.7	89.6	103.5	116.6
Required Conversion	11.1	19.5	41.2	53.8	62.1	70.0
Compliance Assurance Factor (30%)	3.3	5.9	12.4	16.1	18.6	21.0
Total Surface Water Demand	14.4	25.4	53.6	69.9	80.7	91.0

5.2 2013 Conversion

The first phase of conversion requires that 30% of the total water demand for the Authority is to be substituted with alternative supplies other than groundwater. It was assumed that facilities constructed during this phase would be sized to accommodate 30% of the year 2025 water demand. In addition, it was also assumed that the districts selected for conversion would receive 90% of their total annual water supply from the Authority, as determined above. For each alternative, districts were added to the conversion strategy until 90% of their total water demand equaled the required conversion rate of 30% of the Authority’s total demand. Consideration was given for the location of water supply points and for minimizing initial pipeline lengths. Priority for conversion was also given to existing water districts. It was assumed that water would be only provided to existing districts for the 2013 Phase Conversion and demand in undeveloped areas were not considered for conversion during this phase. Water was supplied to all known water plants within each MUD or Master MUD. Interconnects between districts were not utilized to deliver water in this plan.

5.3 2025 Conversion

The second phase of conversion is based on future water needs through the year 2055. For purposes of this study, facilities were assumed to be sized to accommodate delivery of 60% of the year 2055 demand throughout the year. Again, it was assumed that the districts that would be connected to the conversion system would receive 90% of their total annual water supply and an adequate number of districts were included in the system until the required overall conversion rate was reached for the Authority as a whole. Similar to the 2013 conversion system, priority for conversion was given to existing districts in the Authority. However, based on the significant increase in required conversion (60%) for the 2025 phase, surface water was supplied to undeveloped areas in order to reach the overall conversion goals for the Authority after all existing districts were converted.

Section 6

Identification of Potential Alternatives

6.1 Potential Water Sources

Several sources of water exist in the vicinity of the Authority. These sources include both raw and treated water supplies located from a number of providers. In all, ten alternative potential water providers were examined and documented in a previous study by the consultant team, *North Fort Bend Water Authority – Potential Water Source Study* (Source Water Study). Since the completion of this study, the Authority has decided to investigate in more detail the acquisition of water from three separate water providers. The first potential provider, the City of Houston (COH), would allow the Authority to acquire treated water directly from the COH water system. The second potential provider, the West Harris County Regional Water Authority (WHCRWA), would allow the Authority to acquire treated water from the COH water system through WHCRWA. The third potential provider, the Brazos River Authority (BRA), could provide raw water capacity from their system of reservoirs throughout the Brazos River basin.

6.1.1 Brazos River Authority

The BRA was identified during the Source Water Study as a potential supplier for the Authority for both near- and long-term water demand. The current permitted and uncontracted supply available from BRA is not sufficient to meet long-term conversion goals at this point. However, the BRA has applied to the Texas Commission on Environmental Quality (TCEQ) for a System Operations Permit which, if granted by the TCEQ, will result in the creation of additional water supply in the Brazos basin. Approval of the BRA System Operations Permit would provide the BRA with adequate water supplies for meeting demand throughout the basin, including those of the Authority. The agreement with the BRA would consist of a contract for raw surface water supplies only.

6.1.2 City of Houston

The COH is the primary regional supplier of raw and treated water in Harris County and is also a major water provider in Fort Bend County. The COH system provides the largest volume of surface water in the region and currently is contracted to provide treated water supplies to the neighboring WHCRWA. The proximity of the Authority to the WHCRWA allows the acquisition of treated water from one of the three COH water purification plants through either the COH or the WHCRWA water systems. In addition, the exclusive use of treated water from the COH would allow for the Authority to provide for projected demand without the need to operate water treatment facilities.

6.2 Description of Alternatives

Nine alternatives were considered for delivering water from the three potential water providers to meet demand within the Authority. These Alternatives are summarized in *Table 6* and described in detail below (See *Exhibits 7 through 14*).

Table 6
Summary of Potential Alternatives

Alternative	Phase	
	2013	2025
1	Richmond/Rosenberg WTP	-
2	Fulshear WTP	-
3	City of Houston Take Point	-
4	WHCRWA Take Point	-
5	Richmond/Rosenberg WTP	WHCRWA Take Point
6	Fulshear WTP	WHCRWA Take Point
7	City of Houston Take Point	Richmond/Rosenberg WTP
8	City of Houston Take Point	Fulshear WTP
9	City of Houston Take Point	WHCRWA Take Point

6.2.1 Raw Water from BRA

Two alternative water treatment plant (WTP) plant sites were identified as potential source points to receive raw water from the Brazos River and treat it for subsequent use in the Authority. The locations for the two water treatment plants were selected near the Richmond/Rosenberg area and the Fulshear area. However, it was assumed that only one of these facilities would be developed in any alternative and no potential alternative would examine the use of more than one WTP. That is, all water treatment capacity the Authority requires would be consolidated to take advantage of any economy of scale possible for a WTP.

6.2.1.1 Richmond/Rosenberg Plant

A WTP location was identified on the north side of the Brazos River (Richmond/Rosenberg Plant) in the approximate area between F.M. 359 and F.M. 723. This gives the plant an favorable location to supply existing demand in the northern and eastern portions of the Authority. The use of this WTP as the sole supply point for the Authority was considered Alternative 1.

6.2.1.2 *Fulshear Plant*

A WTP site generally to the southwest of Fulshear was considered as a western supply point. This plant site offers greater elevation than the Richmond/Rosenberg Plant described above and would reduce the amount of head required to provide water at pressure within the Authority. However, the site is located well to the west of the concentrated demand found in the eastern portions of the Authority during the first phase of conversion. The option to use this as the only supply point for the Authority is described in this report as Alternative 2.

6.2.2 **Treated Water from COH**

6.2.2.1 *WHCRWA Take Point*

Treated water obtained by way of the WHCRWA would be delivered near the northern portion of the Authority. The WHCRWA has acquired an Exxon-Mobil pipeline easement that would be capable of providing right-of-way for the construction of a water transmission line from the vicinity of the COH East Water Purification Plant (EWPP) to an area near the intersection of Peek and Clay Roads north of I-10 (*Exhibit 15*). From here, the water would be conveyed southward to the Authority. Alternative 3 considers the use of this supply point as the sole source of water for the Authority. However, it was recognized that this pipeline would not be in place in time to meet the 2013 demand of the Authority's system. For this reason, Alternative 3 was not considered practical as a single point of supply.

6.2.2.2 *Bellaire-Braes Take Point*

The COH owns and operates a water supply facility near the crossing of Bellaire Boulevard and Brays Bayou. This facility is a major regional pumping station for the COH system and could potentially be sized to provide for the Authority's future demand. Additionally, the D-158 pump station, located just over a mile west of the Bellaire-Braes site, may serve as a delivery point for treated COH water. These sites are located to the east of the Authority and water would be available from these points immediately for the first phase of conversion in 2013. Alternative 4 considers the use of this supply point as the only source point for the Authority, although this facility would require improvements to meet the entirety of the Authority's future demand as the sole point of supply.

6.2.3 **Combinations of Source Points**

Five additional alternatives were considered with two supply points. These alternatives mix raw water supply that would be treated by the Authority and treated COH water or combine COH water from both the COH and WHCRWA supply points. Alternatives 5 and 6 begin conversion with an initial phase of water from the Richmond/Rosenberg or Fulshear WTPs, respectively, and then include treated water from the WHCRWA beginning in 2025. Alternatives 7 and 8 both use water from the COH to meet first phase demand in 2013. These two alternatives assume that treated water from the Brazos River will be used to meet additional demand beginning in 2025. Alternatives 7 and 8 utilize the Richmond/Rosenberg

and Fulshear WTP locations, respectively. Finally, Alternative 9 uses treated water from the COH to meet the first phase conversion demand and adds a WHCRWA take-point beginning in 2025.

In general, alternatives that involve more than one supply point represent a more reliable system, but may result in higher overall costs. A looped system with more than one supply point typically results in better system pressure and flow. In cases where only one supply point is initially feasible, that secondary supply can provide for demand in the interim and also represent reliability as a secondary water supply. In addition, the existing groundwater plant facilities at each individual water district also represent a reliable backup supply of water for short periods when surface water would not be available. This redundancy is inherent to all of the alternatives considered in this study.

Section 7

Phasing and Facilities Planning

7.1 Preliminary Planning for Water Treatment Plant Facilities

Water Treatment Plant facilities were initially phased in 15 mgd increments and then refined to be phased in 10 mgd increments to address the demands shown in *Table 5*. The use of modules allows for ease of expansion, consistency, and efficiency in design. Additional capacity was incorporated so that plant capacities could match the compliance assurance factor of 1.3 determined for the Authority's annual average day demand. Peak day and peak hour water demand will continue to be addressed through the use of existing storage tanks and wells for each individual entity. In all alternatives, the initial phase is sized to accommodate the surface water demand of the system from 2013 through 2024 with a minor expansion in 2020. A second major expansion of infrastructure facilities must be in place by 2025 to meet the 60% surface water requirement. Subsequent expansions are required for all alternatives.

In alternatives with multiple source points, assumptions were made regarding the amount of water that would originate from each source for the sizing of the facilities and the associated cost estimates. For alternatives that initially built a raw water intake structure and accompanying treatment plant, the facilities were sized to deliver all the surface water demand through 2024. By 2025, the second source of supply, which was treated water, was utilized and all additional facility expansions were made to that second supply point in order to minimize costs of raw water intake, storage and treatment. For alternatives that utilized two sources of treated water supply, the flow was more evenly split.

River intake pumping stations were planned at the Richmond/Rosenberg take site and near Fulshear adjacent to the Brazos River. Phasing for the intake structure was assumed to follow the same 10 mgd increment, with two back-up pumps. An additional 15% of intake water was assumed to account for treatment losses. Experience suggests that two backup pumps are prudent given the harsh conditions of river water. Raw water storage was planned at the intake structure site and the water was then to be pumped to the water treatment site via a large diameter pipeline.

Water treatment facilities were envisioned to consist of both a conventional treatment process as well as a membrane treatment system for treating a sidestream of water then blending into a final treated water product. It was further assumed that a forebay would be used to reduce the variability of river water quality and allow for settling of suspended solids. The initial size of this compartmentalized reservoir was recommended as 5 days of raw water storage. That number was revised upward to 7 days of raw water storage for the facility planning in order to be conservative given the number of unknowns. However, this assessment will be subject to further review based on review of additional water quality information. A reverse

osmosis (RO) system was identified as required treatment to reduce total dissolved solids (TDS), turbidity, and cryptosporidium to an acceptable level.

On average, available water quality data indicates that approximately 50% of the WTP's flow will require treatment by RO to reduce TDS and turbidity. However, the daily level of treatment will vary throughout the year and may range as high as the entire plant flow. This variability in water quality was taken into account when planning plant facilities. Losses from the treatment process were estimated to be 12%, with about 10% resulting from membrane processes and approximately 2% resulting from TSS residuals of the conventional treatment process. A conservative estimate of 15% was used for planning purposes. The additional water required to compensate for those losses was addressed in the sizing of the intake structures and raw water storage.

There is a regulatory process currently underway that aims to assign different watersheds a level of cryptosporidium treatment appropriate to their characteristics. Because of this, there may be need for additional treatment in the future and this potential was also incorporated into this analysis by providing for add-on treatment processes.

Preliminary plans for treatment included the requirement for disposal of treatment residuals and membrane concentrate. It was assumed that the sludge produced in the conventional treatment process would be disposed of off-site. Treatment of brine from the RO requires a more complicated process of disposal and various options were evaluated. It was determined that discharging the concentrate to the Brazos River, given that the river is already on the high side of TDS would be difficult and would require significant discussions with TCEQ. The process of disposal through use of evaporation ponds would require excessive amounts of land. Preliminary investigations determined a 10 mgd plant would require 1,000 acres for evaporation. Heat based evaporation methods are very expensive from an energy standpoint. The possibility of using land application of the concentrate is feasible but would require a site that is dedicated to this purpose. The salts would tend to stay at the surface of the soil, slowly building up until plant life was no longer viable. The preferred solution would be the disposal of this byproduct in a sanitary sewer system but that depends on the hydraulic capacity of the system, the dilution capability of the wastewater stream and the distance the waste would need to be pumped. Another option is to locate a user who could create a reliable beneficial use of the concentrate. A significant limitation to this option is finding a user who will be reliable in the long-term and enter into a contractual commitment with the Authority. However, for purposes of this analysis, it was assumed that the only available disposal option would be injection of the waste material into a deep, abandoned oil well. An initial survey indicates the presence of several such capped oil wells and dry holes in the immediate areas of both the Richmond-Rosenberg and Fulshear WTPs. However, further survey will be required to determine the suitability of these wells for deep injection of RO concentrate. This method of disposal will require approval by the TCEQ.

Repumping stations were planned at each of the treated water take points. These facilities would use ground storage to maintain a supply of water that could then be provided to the

Authority under pressure from booster pumps. Ground storage tanks were sized at one half the total firm pumping capacity in 5 mgd units. Standard TCEQ design guidelines for storage are not applicable because surface water is not the sole source of water, each entity has groundwater as an alternative supply of water. Phasing for the pumping facilities was assumed to follow the same 10 mgd increment as used for WTPs with one back-up pump. This study assumed the NFBWA will deliver surface water at a low-pressure connection to the MUD's water storage tank with an air gap and not deliver directly to their distribution system under high-pressure.

7.2 Raw Water Storage Analysis

The Brazos River is subject to a range of flows that vary seasonally and according to specific climatic factors. Stream flow measurements at the river's crossing with US 90A near Richmond demonstrate a variation in flow that averages as much as 14,509 cfs in May and as little as 2,608 cfs in August. Minimum daily flows as low as 35 cfs have been recorded by the USGS at that site. In addition, the wide profile of the river channel is indicative of a channel geometry that would result in low flows and very low stage levels that may be difficult to intercept with a standard pump station positioned on the river bank. Low flows may result in the need for raw water storage if river levels reach a point where flow cannot be adequately captured by an intake structure. For purposes of this study, a river stage height of approximately five feet was used as the limitation for adequate pumping and to estimate raw water storage requirements.

An investigation of flows in the Brazos River was conducted beginning with daily flow data from the USGS gage at Richmond. The period of record for this station spans January 1, 1903 to June 30, 1906 and October 1, 1922 to present. Of particular interest are the low flows experienced in August. This month results in the lowest recorded flows throughout the year. A distribution was created to statistically estimate the number of days when flow is below various river stage levels. It was generally demonstrated that the amount of storage required increases gradually to approximately 500 cfs, at which point the curve climbs sharply indicating a much larger volume of storage required if the threshold flow for uptake were above this point.

Each of the flows corresponds to a stage within the river channel. The data available from USGS had only a limited period of record for stage data. Available hydraulic models for the river are based primarily on high flow events for the purpose of flood planning. In contrast, data was required to determine the lowest flow conditions that would be experienced in the Brazos River. A literature review pointed to some bathymetric survey data that was performed in *Analysis of Instream Flows for the Lower Brazos River – Hydrology, Hydraulics, and Fish Habitat Utilization* produced by the Texas Water Development Board (TWDB). This report examined four cross sections in the portion of the Brazos River near Simonton, which is just upstream of the proposed Fulshear plant site. These cross sections were entered into a steady-state HEC-RAS model. This model was then used to simulate flows at various levels to determine the stage in each of these channel cross sections. The

normal depth within the hydraulic model was set to the average bed slope between the Fulshear and Richmond/Rosenberg plant sites as contained within the Federal Emergency Management Agency (FEMA) *Flood Insurance Study for Fort Bend County, Texas and Incorporated Areas*. It was determined from this analysis that the raw water storage capacity specified as a treatment forebay must be sufficient to provide five days of storage.

This above estimate of required raw water storage is likely a conservative estimate as it does not consider flows in the river resulting from future reservoir storage releases as a result of a water contract with the BRA. Water contracted and obtained from the BRA would be called for from upstream reservoirs and would be delivered in addition to the flows considered in this analysis, further allowing for the water's uptake during low flow conditions. It is important to note that the gage data analyzed reflects the actual conditions of the river as a result of water withdrawals and return flows, and is not necessarily reflective of river conditions that would result if all permitted flows were taken and return flows minimized. It is the position of BRA that approval of their System Operations Permit would improve the reliable supply of water for most of their customers along the river, including potentially NFBWA.

In the final analysis, the water quality conditions of the river indicated a need for raw water storage amounts that would provide improved baseline conditions for the membrane plant processes. For that reason storage of 7 days was used in the cost analysis.

7.3 Sizing of Transmission Pipelines

For each alternative, pipeline alignments were identified that would be capable of providing water to address the 2013 and 2025 conversion requirements. The ultimate water demand through 2055 were used to ensure water line capacity was appropriately sized and would not require paralleling existing pipelines at a later date. This results in some lines with extra capacity which varies over time and is different for each scenario. This extra capacity may be viewed as a factor of safety or a mechanism for achieving early and over conversion for the Authority. Lines were laid out to follow existing roads and drainage corridors, where feasible. In undeveloped areas pipes were laid out following county roads or existing property lines where feasible (*Exhibits 7 through 14*). Loops were also added where feasible to increase reliability in the system.

A compliance assurance factor of 1.3, identified in *Section 6.1*, was used to model the average day system demand for each district. It was assumed that all demand above this level would be met using ground storage tanks and groundwater wells at each district water plant. For each alternative, transmission pipes were conservatively sized such that resulting head losses were no more than 2 ft per 1,000 feet of pipe and velocities in the pipe were not greater than 5 feet per second.

For Alternatives 1 and 2 where only one plant is used to supply water to the converted districts, the pressure coming from the plant was set so that the minimum pressure at the top

of the ground storage tank (GST) at each district water plant was no less than 10 psi after removing losses associated with flow meters and control valves. For Alternatives 5 through 9 which use two water sources to supply water in 2025, the pressure from each source was adjusted to allow approximately half of the required capacity from each source and also providing a minimum pressure at the top of each districts' GST of no less than 10 psi. Elevation data obtained from Fort Bend County LIDAR was used to determine ground elevations for determining the hydraulic grade along the lengths of the system and tank elevations of 25 feet were added at each end point to determine residual pressure at the tops of the tanks. Transmission pipes were first sized for the 2025 system and then the system was scaled back to follow the alignment required for the 2013 phase. Any adjustments to transmission pipe sizes required in the 2013 model were then entered back into the 2025 phase model.

For utility districts, master MUDs, or entities with multiple water plant sites, surface water was supplied to all water plants within the MUD or Master MUD. The assumption was made that individual districts would provide water throughout their service areas utilizing their internal distribution systems. System interconnects were not utilized for water distribution in this planning study but may be utilized in some instances during future study and detailed design. Utilizing existing interconnects during the winter (low demand) months may provide additional conversion area at minimum capital expense.

Section 8 Facility Costs

8.1 Purchased Water Costs

In general, the purchased water costs are estimated based on preliminary discussions with water suppliers. NFBWA has not completed contract negotiations with their potential suppliers so contract terms may change. For the purposes of this study assumptions were made regarding water prices from various suppliers based on the best available information at the time of this study.

8.1.1 Raw Water from BRA

The BRA provided projected pricing for raw water through 2010 on a dollar per acre foot basis. They also provided an estimated pricing cap for their water of 90 to 100 \$/ac-ft and an estimated annual escalation percentage of 5% to 10%. Base costs were escalated approximately 5% annually to 95 \$/ac-ft and then held constant in the financial calculations.

8.1.2 Treated Water from COH through WHCRWA

In a July 6, 2007, letter, the City of Houston confirmed its willingness to provide surface water to the Authority. In addition, the letter confirms that the Authority should purchase surface water through the existing water supply contract between the City and the WHCRWA, as has been discussed by all three parties. In that contract, the Authority's cost for both raw and treated water capacity including transmission line capacity is based on the Authority's pro-rata share of the respective facility(ies) capacity(ies). Those costs as well as a share of the operation and maintenance costs of the COH are paid by the Authority.

The COH was contacted and discussions ensued regarding treated water costs that would potentially be paid by the NFBWA. The cost for raw water capacity is estimated to be \$0.80/1000 gallons of capacity reserved. The cost for treated water (i.e., treatment plant) capacity is estimated to be \$1.50/1000 gallons, and the cost for transmission main capacity is estimated to be approximately \$1.00/1000 gallons.

In addition to these costs, the City and regional water authorities have discussed the timing for development of the Luce Bayou Inter-basin Transfer project. Based on the existing agreement between the City and WHCRWA, the Authority would pay a pro-rata share of the City's debt service (not capital cost) of future raw water projects. Funding of the Luce Bayou project is anticipated in two major phases. The first phase will begin in 2008 and is estimated to require \$36,000,000. The second phase will require an estimated \$214,000,000 in 2015 in order to complete construction and deliver water by 2020. Based on a bond rate of 5% and 30 year life, the Authority's pro-rata share of debt service is estimated to be

\$200,000 annually beginning in 2009 and increase to a total of \$1,365,000 annually beginning in 2016. Debt service may be less or deferred depending on State participation.

The WHCRWA has expressed a commitment to work with the NFBWA and plans to pass through the water purchase price that they pay to the COH with a small administrative markup. That markup has not yet been determined but their verbally expressed intent is to merely cover administrative costs incurred on the Authority's behalf.

8.2 Plant Facility Costs

Plant facility costs include the cost of WTP facilities as well as the cost associated with repumping stations for treated water from the COH. Costs are also included for connection to individual MUDs and potential upgrades to individual MUDs piping to support the surface water delivery. That cost was estimated at \$200,000 per connection. Capital costs for infrastructure and operation and maintenance costs (O&M) were developed from a number of sources including the Region H Regional Water Plan, recent bid tabs, individual product vendors, and professional experience.

8.2.1 Capital Costs

Capital costs for WTP facilities were developed for the entire system from the raw water intake structure to the high pressure pump station through which water would enter the Authority system. Costs for raw water storage were assembled for both the one-time construction of a plant facility and the cost of an initially sized WTP that could be constructed in phases as demand increased over the planning period. Costs were adjusted to present value using the Engineering News Record (ENR) cost index when appropriate. Project costs include standby power costs, land costs, a contingency amount of 20%, and a factor of 15% of the total construction cost of the facilities for engineering, legal and administrative fees.

The costs for a raw water intake pump station were determined from empirical studies of intake structure construction costs as presented in *Pumping Station Design* by Robert Sanks, second edition. Some time was spent evaluating the costs associated with the on-going Coastal Water Authority Expansion of the Trinity River Pump Station, the TWDB Region H and Region C numbers but given the level of unknowns and the limited amount of information, that information was not used.

Raw water storage costs were estimated based on a review of the regional planning data as well as some quantity takeoff calculations. Raw water storage was assumed to take the form of an earthen ring dike of approximately 20 feet in height. The cost of the land is a significant piece of the overall cost.

The costs for the WTP were developed from professional experience with conventional treatment methods augmented with input from vendors of RO treatment equipment. Costs were determined for single phase construction as well as a 20-MGD plant with expansions to

address the different alternatives. It is important to note that costs for expansions are not linear because factors related to membrane sizing and other treatment modularity affects pricing. Costs associated with single phase and multi-phased construction are shown in *Tables 7 and 8*, respectively.

Table 7
Treatment Plant Capital Costs per Gallon of Capacity – Single Phase Construction

	Capacity (mgd)								
	10	20	30	40	50	60	70	80	90
Conventional Treatment	\$3.52	\$2.54	\$2.16	\$1.92	\$1.77	\$1.65	\$1.57	\$1.49	\$1.44
Conventional Treatment + Reverse Osmosis	\$4.53	\$3.47	\$3.06	\$2.79	\$2.63	\$2.49	\$2.40	\$2.31	\$2.24

Table 8
Treatment Plant Capital Costs per Gallon of Capacity - 20 MGD Plant + Phases

		Capacity (mgd)					
		20	30	60	70	80	90
Total Cost for Capacity	Conventional Treatment	\$2.54	\$2.55	\$2.19	\$2.24	\$2.28	\$2.31
	Conventional Treatment + Reverse Osmosis	\$3.47	\$3.51	\$3.11	\$3.18	\$3.22	\$3.26
Incremental Cost	Conventional Treatment	\$2.54	\$2.59	\$1.82	\$2.59	\$2.50	\$2.59
	Conventional Treatment + Reverse Osmosis	\$3.47	\$3.59	\$2.72	\$3.59	\$3.51	\$3.59

Costs for the booster pump stations were assembled from various sources including review of regional planning numbers and WHCRWA bid tabs. Included in the capital costs is a provision for standby power, which may be a second electric power feed or backup generators, estimated at 13.5% of the ultimate construction cost for the facility. Half of the standby power cost was assigned to the initial construction and the rest was spread throughout the expansion phasing. Pressure at the repump stations was assumed to be 85 psi with a pump efficiency of 75% in order to estimate costs.

Costs for ground storage tanks were determined by obtaining vendor quotes and review of recent bid tabs for the WHCRWA. The concrete tanks were assumed to be built in 5 MG units.

The estimated amount of land required was determined from a conceptual layout plan of facilities including buffer areas as well as a review of other planning references. The results of the study are shown in *Table 9* below. Land costs were determined by an aerial photo review of available large parcels of land and then a similar review of property values from information obtained from the Fort Bend or Harris County Appraisal District.

Table 9
Estimated Land Needs and Costs

Alternative	Facility Needs	Acres	Cost M\$
1, 2	Intake and Treatment Plant	200	2.00
4	Pump Station	15	0.15
5, 6, 7, 8	Plant & Pump Station	100	1.00
9	Two Pump Stations	30	0.30

8.2.2 Operation and Maintenance Costs

O&M costs for the WTP facilities were calculated with a primary focus on costs associated with chemicals and consumables, power use, and labor. Power costs were estimated at \$0.12 per kilowatt hour. Sludge disposal costs were included for the conventional portions of the process and a cost was also included to manage waste disposal from the plant's RO stream. As plant size increased the unit cost of treated water was reduced. The costs assume that on average 50% of total demand is treated by the RO system. These costs are itemized on a basis of expense and plant capacity in *Table 10*.

Table 10
Treatment Plan O&M costs in \$M

	Capacity (mgd)								
	10	20	30	40	50	60	70	80	90
Chemicals and Consumables	\$0.78	\$1.57	\$2.35	\$3.14	\$3.92	\$4.70	\$5.49	\$6.27	\$7.06
Power and Labor	\$0.80	\$1.28	\$1.83	\$2.31	\$2.80	\$3.34	\$3.83	\$4.37	\$4.86
RO System	\$1.64	\$3.29	\$4.93	\$6.57	\$8.21	\$9.86	\$11.50	\$13.14	\$14.78
Contingency	\$0.81	\$1.53	\$2.28	\$3.00	\$3.73	\$4.48	\$5.20	\$5.95	\$6.67
Total	\$4.03	\$7.67	\$11.38	\$15.02	\$18.66	\$22.38	\$26.02	\$29.73	\$33.37

Maintenance costs for the intake pump station and the booster pump stations were estimated at 2.5% of the total construction cost, while the raw water reservoir had an assumed annual O&M cost of 1.5% of the total construction cost. Ground storage tank maintenance and pipeline maintenance was assumed to be 1% of the construction cost. These percentages are consistent with the TWDB Regional Planning numbers.

8.3 Transmission System Costs

8.3.1 Capital Costs

Aerial photography was used to determine the level of development along transmission main corridors. Sections of pipe in heavily developed areas were considered to require urban

construction methods and pipelines in minimally developed areas were assumed to use less costly methods. Pipeline costs were determined from a review of recent bid tab information for urban or rural construction. The proper cost was applied to each pipe section recommended in the various alternatives. Easement widths for these pipes varied from 20 feet for pipelines up to 36 inches, 30 feet for pipes up to 72 inches and 40 feet for larger pipelines. An easement cost of \$1 per square foot was used for all pipe segments based on the experience of the WHCRWA. A series of summary tables by alternative of the length of pipe at each diameter required for conversion is in the Appendix.

In addition, a cost of \$200,000 was included to cover costs associated with the connection of the Authority's distribution system to each plant facility requiring connection during each phase. These costs were included to facilitate the connection and meter of each plant to the Authority's surface water supply. This cost was based on the number of plants connected rather than the number of districts served to account for districts with multiple plants or those served by plant facilities in another district. As plants are converted the connection cost was added to the economic analysis in the appropriate year.

8.3.2 Consideration for Special Pipe Segments

An effort was also made to identify special pipe segments that would result in added construction cost. It was assumed that crossings of major state-maintained highway rights-of-way, drainage features, and pipeline easements would require special construction methods such as extensive trenchless construction. Locations where the line layout intersected a road, ditch or pipeline easement were identified using GIS as shown in *Exhibit 13*. Aerial photography was used to estimate the length of the pipe in each easement that would require special construction methods. Once the lengths of the special pipe segments had been estimated for the entire transmission system, the cost was calculated using the average unit cost per linear foot in *Table 11*. The costs in *Table 12* were developed based on a review of recent bid tabs provided by the North Harris County Regional Water Authority and West Harris County Regional Water Authority's for water transmission construction projects involving trenchless construction techniques.

Table 11
Unit Cost Comparison for Special Pipe Segments

Pipe Diameter (in.)	Weighted Average Unit Cost per Linear Foot (\$)
12	237
16	260
20	448
24	449
30	846
36	838
42	997
48	992
54	1,053
60	1,683

8.3.3 Operation and Maintenance Costs

Transmission mains were assumed to require an annual O&M expenditure of 1% of the total construction cost. This is consistent with regional planning figures.

Section 9

Economic Analysis

9.1 Alternative Analysis

A financial spreadsheet was developed to compare alternatives by estimating the costs for each alternative from 2008 through the planning period of 2055. Costs include debt service payments due to capital costs, and annual operations and maintenance costs. Water demand is estimated for each year based on the historic and projected population growth. A factor of 210 gallons per capita per day (gpcd) was used to estimate water demand for Authority cost calculations while a factor of 170 gpcd was used to estimate the Authority's revenue which is a conservative approach to evaluating revenues required to recover projected costs.

Pumpage fees are collected and held in an account that bears 2% interest until such time that the capital is required to fund debt service or operation and maintenance expenses. In general the same fee structure will be utilized for all the parties in the NFBWA Groundwater Reduction Plan (GRP). It was determined that the cost to pump and distribute groundwater is approximately \$0.35 per thousand gallons. Therefore, the pumpage fee on groundwater produced is less than the cost of surface water to offset the operation and maintenance costs of wells. This difference prevents the surface water conversion process from negatively affecting entities that are converted in later phases or never converted.

9.1.1 Global Variables

Variables that are constant across all alternatives are classified as global variables. A table of global inputs was developed to summarize this information which is available in the Appendix. Examples of the types of assumptions made as part of this analysis follow:

- Inflation was set at 3%, while interest earned on funds was set at 2%.
- The bond interest rate was established at 5% for a 25 year bond period.
- Bond preparation and issuance costs were estimated at 2.5%.
- Soft costs including engineering, surveying, geotechnical, construction management, testing and contingencies were set at 35% for facilities and 30% for pipelines.
- Environmental and archeological studies, permitting, and mitigation costs were set at 1% of construction costs.

- Easement costs were assumed to be \$1 per square foot and the easements were acquired 1 year prior to water main construction. Administrative costs associated with the Authority are included in the analysis.
- Bond sales occur as often as every 3 years, if necessary.

9.1.2 Alternative Specific Variables

Alternative specific variables are variables or factors that are unique to an individual alternative or group of alternatives. Such variables include the point of supply of surface water, whether the water is treated or raw, the size and location of transmission lines, the capacity of facilities, and the number of converted entities.

9.2 Results of Analysis

Following the January 31, 2006, deadline for responses regarding participation in the Authority’s GRP, water demand projections were finalized to include Plantation MUD and The George Foundation. A detailed re-evaluation of the infrastructure required to provide surface water was performed.

All costs have been inflated by 3% annually based the historic inflation rate over the last 50 years. For each year, the inflated costs for capital, and operations and maintenance were summed and then discounted to a present worth cost using a current bond return rate of 5%. Those present worth costs for each year to the 2055 planning horizon are summed to calculate a total present worth cost for each alternative. The results of that analysis are presented in *Table 12*, below.

**Table 12
Present Worth of Alternatives**

Alternative		Present Worth (PW)			
		PW with Inflation (\$ millions)			
		Capital	O&M	Total	Rank
4	COH	\$549	\$372	\$922	(1)
9	COH & WHCRWA	\$588	\$440	\$1,028	(2)
7	Richmond Plant & WHCRWA	\$479	\$557	\$1,035	(3)
8	Fulshear Plant & WHCRWA	\$489	\$549	\$1,037	(4)
6	COH & Fulshear Plant	\$534	\$596	\$1,130	(5)
5	COH & Richmond Plant	\$542	\$603	\$1,145	(6)
2	Fulshear Plant	\$483	\$929	\$1,412	(7)
1	Richmond Plant	\$486	\$939	\$1,425	(8)

It is important to note that the two least expensive alternatives (4 & 9) involve obtaining water from the COH for the initial conversion period, 2013. In addition, alternatives that require all the water to be obtained from the Brazos River Authority (BRA) are the most

expensive because of the amount of infrastructure that must be built. In addition, the BRA does not have water available at this time to meet NFBWA's needs. BRA's future water availability is contingent on approval of their Systems Operation Permit by TCEQ. The least expensive alternative, based on the cost data available, is to buy all the Authority's water from the COH, Alternative 4.

For redundancy reasons, it is prudent for the NFBWA to have a second point of supply of water. Also, there is the potential that additional costs associated with Alternative 4 may exist that the COH was not able to identify during the course of this study. Any additional costs would narrow the range of present worth between Alternative 4 and other alternatives. Therefore, it is recommended that the NFBWA ensure a redundant supply of water and avoid potentially hidden costs by proceeding with Alternative 9. Alternative 9, utilizes water available directly from the COH through 2024 and, beginning in 2025, utilizes COH water delivered through the WHCRWA to provide an important second water supply point.

9.3 Preliminary Water Rate Analysis for Recommended Option

The financial spreadsheet developed to compare alternatives was also used to estimate the groundwater pumpage and surface water rates necessary to support the construction, operation and maintenance of the infrastructure proposed in the Authority's plan, see *Appendix A*. As previously stated, a key attribute of the groundwater and surface water revenue streams is the \$0.35 per thousand gallons difference between them based on the cost to pump and distribute groundwater. This difference minimizes any economic advantage or disadvantage to entities that might be associated with use of either source of water.

The estimated rates are developed based on simple accounting in which the cash balance for each year is calculated as the previous years balance (with interest) plus revenue minus costs. A groundwater rate (in multiples of \$0.05) is input and the surface water rate is calculated automatically as the groundwater rate plus \$0.35 per thousand gallons. The groundwater rate is adjusted until the cash balance is positive and is equal to or greater than the previous year's rate. This process is repeated for all years through the 2055 planning horizon. The practice of not setting a rate below the previous year's rate produces a cash balance in some years that could be used to reduce the sale of bonds by funding construction directly. However, in the analysis, available funds are always applied to debt service.

The following table shows the preliminary estimate of future groundwater and surface water rates through 2030. Beginning in about 2030, the rates can begin to decrease so that the cash balance doesn't continue to increase, see *Appendix A*.

Table 13
Estimated Water Rates for Alternative 9

Alternative 9

Revenue, Cash Flow, and Cash Balance									
Year	Sources		Revenue (\$M)			TOTAL ANNUAL REVENUE from Sale of Water	TOTAL ANNUAL COST	Revenue Less Expenses	Cash Balance
	Cost of Surface Water (\$ / 1000)	Cost of Ground Water (\$ / 1000)	Surface Water	Ground Water					
2007		\$0.19		\$1.45	\$1.45	\$1.00	\$0.45	\$0.45	
2008		\$0.30		\$2.47	\$2.47	\$1.00	\$1.47	\$1.92	
2009		\$0.50		\$4.42	\$4.42	\$6.31	(\$1.89)	\$0.08	
2010		\$0.80		\$7.57	\$7.57	\$6.81	\$0.77	\$0.84	
2011		\$1.10		\$11.10	\$11.10	\$6.81	\$4.29	\$5.15	
2012		\$1.30		\$13.92	\$13.92	\$17.68	(\$3.76)	\$1.49	
2013	\$1.95	\$1.60	\$6.63	\$12.69	\$19.32	\$20.74	(\$1.42)	\$0.10	
2014	\$2.15	\$1.80	\$7.71	\$15.06	\$22.76	\$20.85	\$1.92	\$2.02	
2015	\$2.30	\$1.95	\$8.67	\$17.16	\$25.83	\$25.64	\$0.20	\$2.26	
2016	\$2.30	\$1.95	\$9.04	\$17.88	\$26.92	\$26.89	\$0.03	\$2.33	
2017	\$2.30	\$1.95	\$9.40	\$18.60	\$28.00	\$26.98	\$1.02	\$3.40	
2018	\$2.30	\$1.95	\$9.77	\$19.32	\$29.09	\$28.49	\$0.61	\$4.07	
2019	\$2.30	\$1.95	\$10.13	\$20.04	\$30.18	\$28.70	\$1.47	\$5.62	
2020	\$2.30	\$1.95	\$10.50	\$20.77	\$31.26	\$29.24	\$2.02	\$7.76	
2021	\$2.60	\$2.25	\$12.85	\$25.94	\$38.79	\$38.59	\$0.20	\$8.11	
2022	\$2.60	\$2.25	\$13.83	\$27.93	\$41.76	\$38.81	\$2.95	\$11.22	
2023	\$2.60	\$2.25	\$14.81	\$29.91	\$44.72	\$39.68	\$5.05	\$16.49	
2024	\$2.75	\$2.40	\$16.71	\$34.02	\$50.73	\$54.71	(\$3.98)	\$12.85	
2025	\$2.75	\$2.40	\$35.49	\$20.65	\$56.14	\$60.47	(\$4.33)	\$8.77	
2026	\$2.70	\$2.35	\$36.19	\$21.00	\$57.19	\$60.83	(\$3.63)	\$5.31	
2027	\$2.65	\$2.30	\$36.85	\$21.32	\$58.17	\$61.19	(\$3.02)	\$2.40	
2028	\$2.65	\$2.30	\$38.17	\$22.09	\$60.26	\$61.54	(\$1.29)	\$1.16	
2029	\$2.65	\$2.30	\$39.49	\$22.85	\$62.34	\$61.90	\$0.44	\$1.63	
2030	\$2.65	\$2.30	\$40.82	\$23.62	\$64.43	\$63.53	\$0.91	\$2.57	

9.4 Impact of Over-Conversion

Over-conversion involves the acquisition of conversion credits from the FBSD through the conversion of water demand in excess of the required minimum conversion level. In effect, these credits can be used in exchange for surface water conversion at a later time. One gallon of over-conversion credit earned in one year can then be used in lieu of one gallon of surface water conversion in a subsequent year. By acquiring significant over-conversion credits, it may be possible to delay the second phase of conversion in 2025 by some period of time. This analysis examines over-conversion strategies and estimates their impact on the cost of water.

The Alternative 9 system was used as the basis for the over-conversion analysis. Two strategies were considered that require minimal additional infrastructure.

Strategy 1 limits the amount of over-conversion by limiting the number of districts converted in the Alternative 9 plan and limiting the amount of water introduced to the system to the amount contracted from the COH. This strategy uses excess capacity that already exists in the planned system to provide water to districts at a conversion rate greater than 90%. Therefore, the water demand that could be converted in any year is the smaller of 100% of the connected districts demands or the amount of water contracted from the COH. This level of over-conversion will require the least adjustment to capital or operational plans and, therefore, represents a base case that could easily be implemented with no change except the cost of additional pumping.

Strategy 2 considers the addition of more pipelines to serve additional districts. In this strategy, districts were added to the conversion schedule until 90% of all district demands exceeded the 2013 water purchase. It was found that the connection to the Cinco MUD 1 East and West water plants in addition to the districts planned for connection in 2013 would provide more than sufficient capacity to carry out this strategy. This scenario is only limited by the amount of water contracted from the COH. This strategy has a higher capital cost because it requires the installation of nearly 28,000 feet of additional pipelines to connect to the Cinco MUD 1 water plants.

The two over-conversion strategies were evaluated using the same demand projections used throughout this report to determine their impact on delaying the need for converting to 60% surface water in 2025. *Table 13* shows the results of this analysis and indicates the time in years that the year 2025 conversion could be delayed.

Table 13
Impact of Over-Conversion Strategies

Strategy	Description	Years Delayed
1	Currently planned districts	1
2	Connection to Cinco MUD 1 water plants	4

These two strategies take advantage of minor changes that could be incorporated into the Authority’s GRP that may positively impact the conversion schedule. Much of this potential exists because of excess capacity that exists in early phases of construction in anticipation of future demands.

Another factor that may delay the need for conversion is the development schedule for the George Ranch property. If development proceeds at a rate slower than that projected by The George Foundation, the additional capacity planned to meet the needs of this contract participant may instead be used to produce over-conversion credits. The analysis for

Strategies 1 and 2 was repeated assuming that the George Ranch would not develop and the additional capacity would be used, where possible, to meet additional demands within the Authority.

These Strategies were called Strategies 1A and 2A, which correspond to Strategies 1 and 2, respectively. *Table 14* shows the result of this analysis. Based on this analysis, Strategy 2A would be capable of delaying the 2025 conversion beyond 2030. However, the Subsidence District’s current Over-Conversion Credit Policy indicates that “over-conversion credits will not be honored or accepted by the District ... on or after January 1, 2030,” meaning that Strategy 2A is only capable of delaying the second phase of conversion through the year 2030.

Table 14
Impact of Over-Conversion Strategies Without the Development of George Ranch

Strategy	Description	Years Delayed (Complete)
1A	Currently planned districts	2
2A	Connection to Cinco MUD 1 water plants and additional districts	5+

Section 10

Conclusions and Recommendations

This report summarizes the approach to selecting a long-term water supply strategy for the Authority. This process included the development of a GIS database for analysis, the calculation of population and demand projections for the Authority's service area, and the consideration of nine potential alternatives for water supply.

Population projections projected a growth rate that would lead to a total population within the Authority of approximately 481,000 by 2055. This translates to total water demands of approximately 58 and 95 mgd by the years 2025 and 2055, respectively. After taking into account contract participants, the Authority will be required to convert approximately 41 and 66 mgd of average daily demand by the years 2025 and 2055, respectively.

Nine alternatives were analyzed to determine the least costly, suitable solution for surface water supply. Four of these alternatives considered the use of only one supply throughout the planning horizon, while five other strategies planned for an initial source of supply beginning in the year 2013 which was then augmented in the year 2025 with an additional supply point.

The second least costly alternative that was considered, Alternative 9, was recommended for the long-term surface water supply strategy. This alternative uses two source points to receive water from the COH and the WHCRWA beginning in the years 2013 and 2025, respectively. This alternative was selected over the least costly option, Alternative 4, which received water entirely from the COH take-point to the east of the Authority. Alternative 9 was selected as the preferred solution due to the redundancy of the dual supply points inherent in the design as well as unknowns at the time of this study associated with costs of Alternative 4.

The total present value for the selected Alternative 9 was estimated to be \$1,028-million. Annualized, this cost was found to require a present value rate for surface water that reached \$2.75 per 1,000 gallons at approximately the second conversion phase in 2025 but declined in following years.

Over-conversion was considered as a strategy for delaying the need for constructing the second phase of water supply infrastructure. Two strategies were considered for delaying the timing of the second phase of Alternative 9 and two more strategies considered the delay in the second phase of Alternative 9 if the demands of contract customer were not realized as expected. These strategies were shown to delay the 2025 conversion to the year 2026 or as far out as the year 2030 when conversion credits currently expire.

The NFBWA Alternative Analysis Report
has been prepared under the supervision of the following engineers:



David Carver Scholler
10/15/07



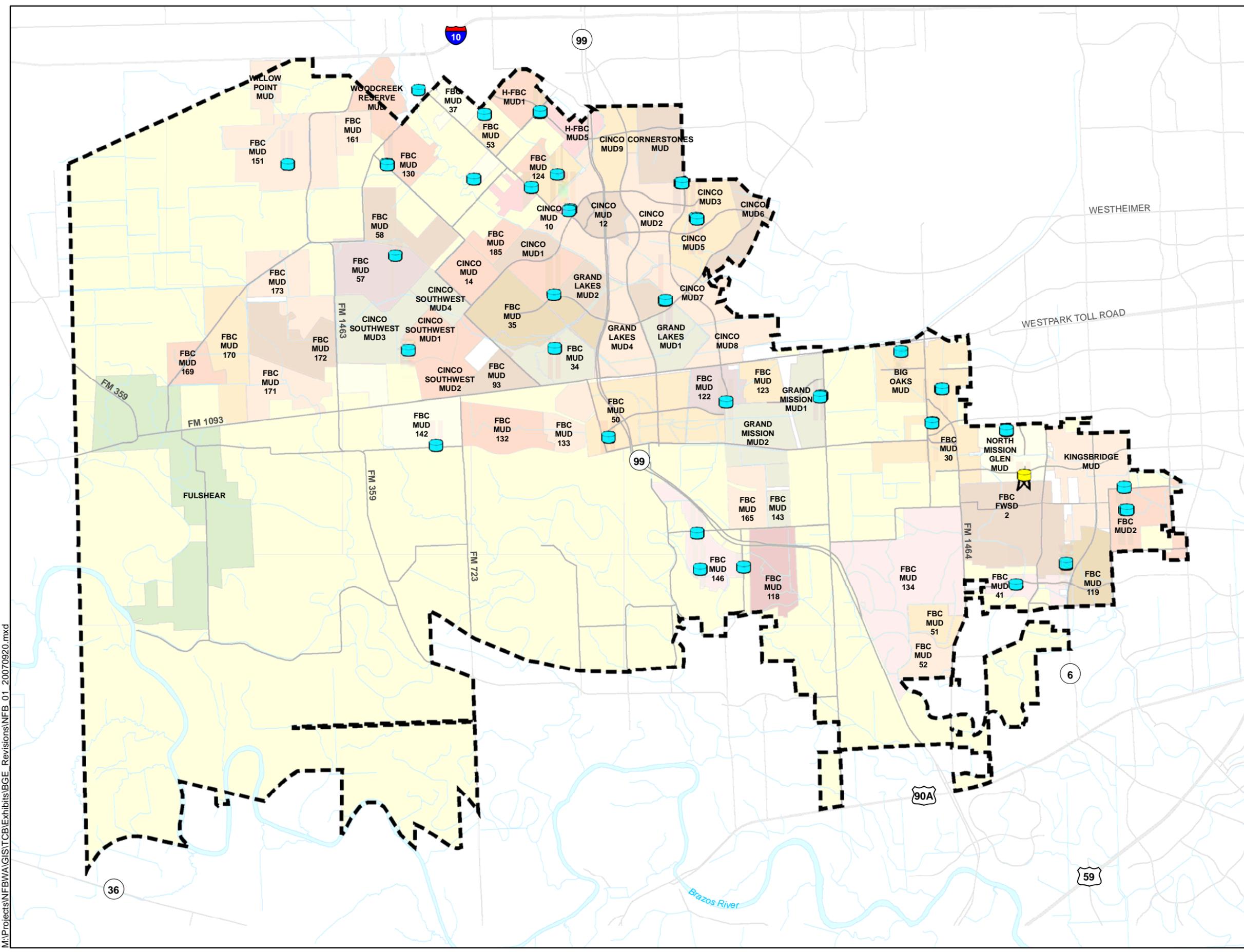
Michael V. Reedy
10/15/07

Alternative 9

Revenue, Cash Flow, and Cash Balance									
Year	Sources		Revenue (\$M)			TOTAL ANNUAL REVENUE from Sale of Water	TOTAL ANNUAL COST	Revenue Less Expenses	Cash Balance
	Cost of Surface Water (\$ / 1000)	Cost of Ground Water (\$ / 1000)	Surface Water	Ground Water					
2007		\$0.19		\$1.45	\$1.45	\$1.00	\$0.45	\$0.45	
2008		\$0.30		\$2.47	\$2.47	\$1.00	\$1.47	\$1.92	
2009		\$0.50		\$4.42	\$4.42	\$6.31	(\$1.89)	\$0.08	
2010		\$0.80		\$7.57	\$7.57	\$6.81	\$0.77	\$0.84	
2011		\$1.10		\$11.10	\$11.10	\$6.81	\$4.29	\$5.15	
2012		\$1.30		\$13.92	\$13.92	\$17.68	(\$3.76)	\$1.49	
2013	\$1.95	\$1.60	\$6.63	\$12.69	\$19.32	\$20.74	(\$1.42)	\$0.10	
2014	\$2.15	\$1.80	\$7.71	\$15.06	\$22.76	\$20.85	\$1.92	\$2.02	
2015	\$2.30	\$1.95	\$8.67	\$17.16	\$25.83	\$25.64	\$0.20	\$2.26	
2016	\$2.30	\$1.95	\$9.04	\$17.88	\$26.82	\$26.89	\$0.03	\$2.33	
2017	\$2.30	\$1.95	\$9.40	\$18.60	\$28.00	\$26.98	\$1.02	\$3.40	
2018	\$2.30	\$1.95	\$9.77	\$19.32	\$29.09	\$28.49	\$0.61	\$4.07	
2019	\$2.30	\$1.95	\$10.13	\$20.04	\$30.18	\$28.70	\$1.47	\$5.62	
2020	\$2.30	\$1.95	\$10.50	\$20.77	\$31.26	\$29.24	\$2.02	\$7.76	
2021	\$2.60	\$2.25	\$12.85	\$25.94	\$38.79	\$38.59	\$0.20	\$8.11	
2022	\$2.60	\$2.25	\$13.83	\$27.93	\$41.76	\$38.81	\$2.95	\$11.22	
2023	\$2.60	\$2.25	\$14.81	\$29.91	\$44.72	\$39.68	\$5.05	\$16.49	
2024	\$2.75	\$2.40	\$16.71	\$34.02	\$50.73	\$54.71	(\$3.98)	\$12.85	
2025	\$2.75	\$2.40	\$35.45	\$28.65	\$56.14	\$60.43	(\$4.33)	\$8.77	
2026	\$2.70	\$2.35	\$36.19	\$21.00	\$57.19	\$60.83	(\$3.63)	\$5.31	
2027	\$2.65	\$2.30	\$36.85	\$21.32	\$58.17	\$61.19	(\$3.02)	\$2.40	
2028	\$2.65	\$2.30	\$37.17	\$22.09	\$60.26	\$61.54	(\$1.29)	\$1.16	
2029	\$2.65	\$2.30	\$38.49	\$22.85	\$62.34	\$61.90	\$0.44	\$1.63	
2030	\$2.65	\$2.30	\$40.82	\$23.62	\$64.43	\$62.53	\$0.91	\$2.57	
2031	\$2.60	\$2.25	\$46.77	\$23.52	\$64.30	\$63.73	\$0.57	\$3.19	
2032	\$2.55	\$2.20	\$40.71	\$23.41	\$64.12	\$63.93	\$0.19	\$3.44	
2033	\$2.50	\$2.15	\$40.61	\$23.28	\$63.89	\$65.74	(\$1.85)	\$1.67	
2034	\$2.45	\$2.10	\$40.48	\$23.13	\$63.62	\$60.95	\$2.66	\$4.36	
2035	\$2.35	\$2.00	\$39.49	\$22.44	\$61.89	\$61.15	\$0.74	\$5.19	
2036	\$2.25	\$1.90	\$38.29	\$21.56	\$59.85	\$62.53	(\$2.68)	\$2.61	
2037	\$2.10	\$1.75	\$36.19	\$20.11	\$56.29	\$51.81	\$4.48	\$7.15	
2038	\$1.95	\$1.60	\$34.02	\$18.61	\$52.63	\$52.09	\$0.54	\$7.83	
2039	\$1.80	\$1.45	\$31.79	\$17.07	\$48.87	\$54.63	(\$5.77)	\$2.22	
2040	\$1.80	\$1.45	\$31.78	\$17.28	\$49.46	\$50.55	(\$1.09)	\$1.17	
2041	\$1.80	\$1.45	\$32.56	\$17.49	\$50.05	\$50.70	(\$0.65)	\$0.55	
2042	\$1.80	\$1.45	\$32.95	\$17.70	\$50.64	\$50.85	(\$0.21)	\$0.35	
2043	\$1.80	\$1.45	\$33.34	\$17.90	\$51.24	\$49.73	\$1.51	\$1.87	
2044	\$1.80	\$1.45	\$33.72	\$18.11	\$51.83	\$49.88	\$1.95	\$3.86	
2045	\$1.65	\$1.30	\$31.26	\$16.42	\$47.69	\$51.19	(\$3.50)	\$0.44	
2046	\$1.55	\$1.20	\$29.66	\$15.31	\$44.97	\$41.01	\$3.96	\$4.40	
2047	\$1.45	\$1.10	\$28.02	\$14.17	\$42.19	\$41.15	\$1.04	\$5.53	
2048	\$1.30	\$0.95	\$25.37	\$12.36	\$37.72	\$42.69	(\$4.97)	\$0.68	
2049	\$1.15	\$0.80	\$22.66	\$10.51	\$33.16	\$28.80	\$4.37	\$5.06	
2050	\$1.00	\$0.65	\$19.89	\$8.62	\$28.51	\$28.93	(\$0.42)	\$4.73	
2051	\$1.00	\$0.65	\$20.08	\$8.70	\$28.78	\$29.40	(\$0.63)	\$4.20	
2052	\$1.00	\$0.65	\$20.27	\$8.78	\$29.05	\$29.54	(\$0.49)	\$3.80	
2053	\$1.00	\$0.65	\$20.45	\$8.86	\$29.32	\$29.67	(\$0.35)	\$3.52	
2054	\$1.00	\$0.65	\$20.64	\$8.95	\$29.59	\$29.82	(\$0.23)	\$3.35	
2055	\$1.00	\$0.65	\$20.83	\$9.03	\$29.86	\$28.69	\$1.17	\$4.59	

Exhibit 1

NFBWA Territory, Utility Districts, and Municipalities



Legend

- Water Plants
 - Elevated Storage Tank
 - Ground Storage Tank
- City of Fulshear
- Undeveloped Area
- NFBWA

DISCLAIMER

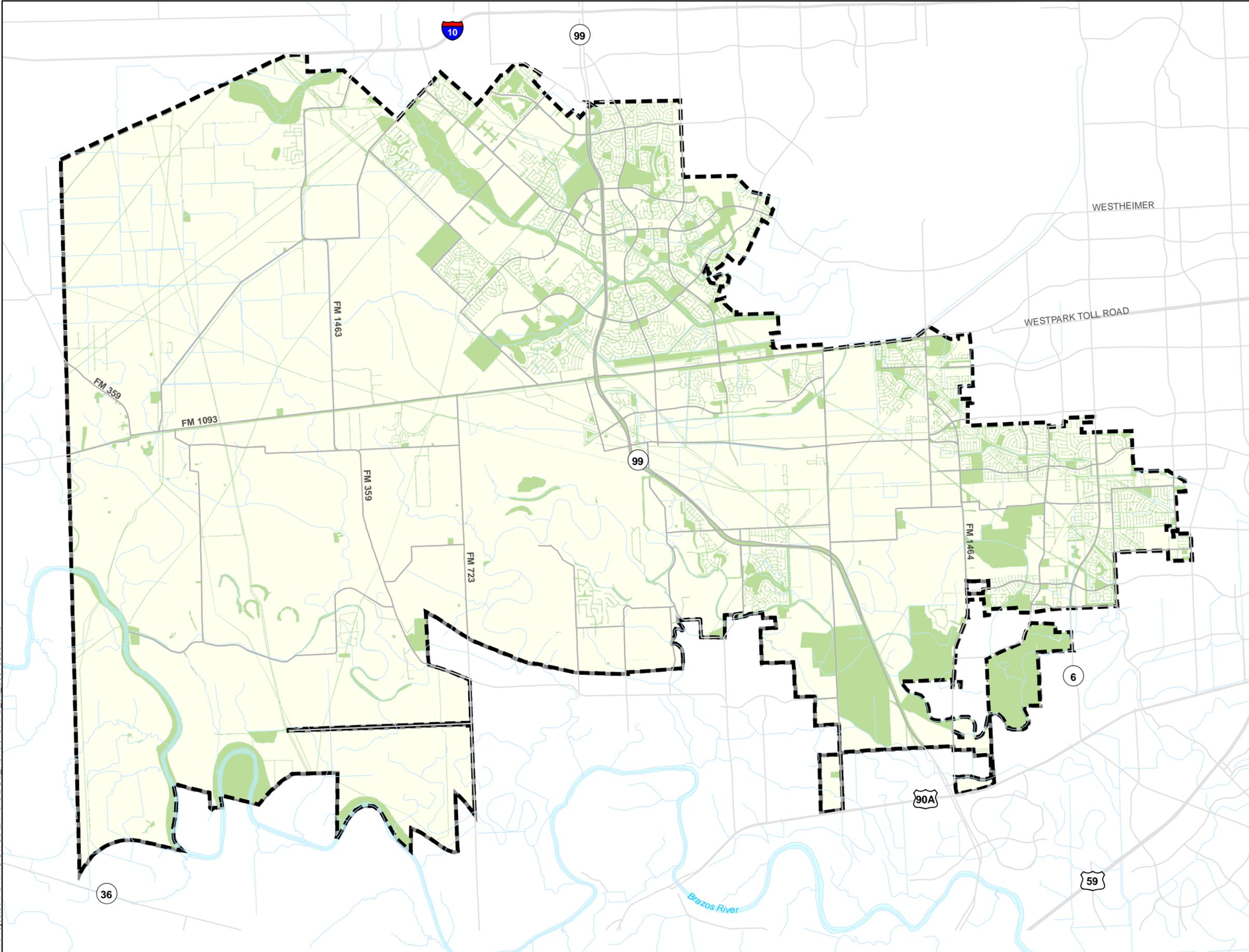
Information regarding utility districts may be incomplete. For illustration purposes only.



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Exhibit 2

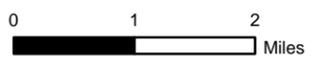
Areas Unusable for Residential Development



Legend

- Unusable Area
- NFBWA

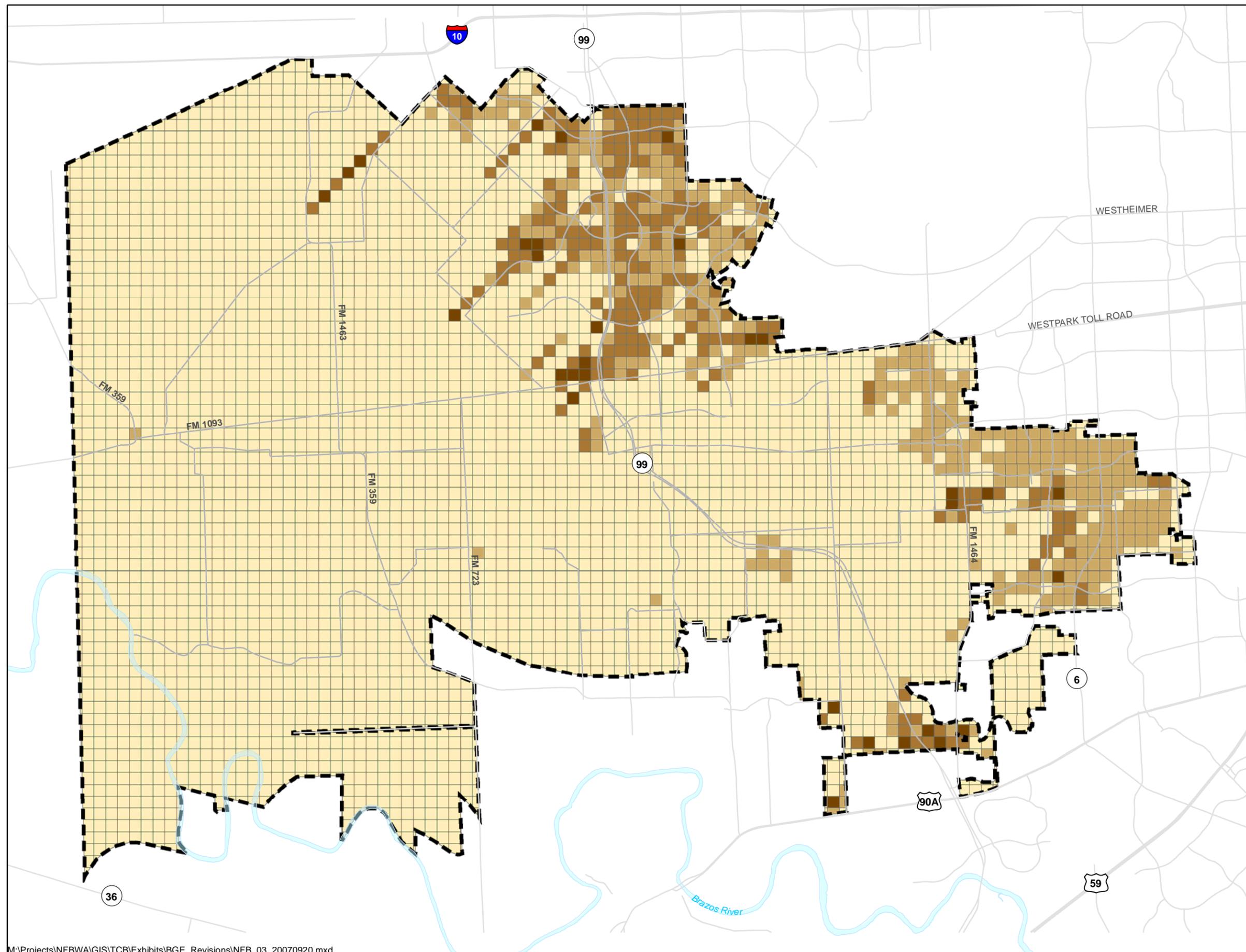
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Exhibit 3

Water Demand by Grid Cell for 2005



Legend

2005 Water Demand
Gallons per Day

- 0 - 15,000
- 15,001 - 30,000
- 30,001 - 45,000
- 45,001 - 60,000

NFBWA

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For illustration purposes only.

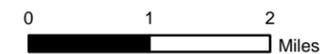
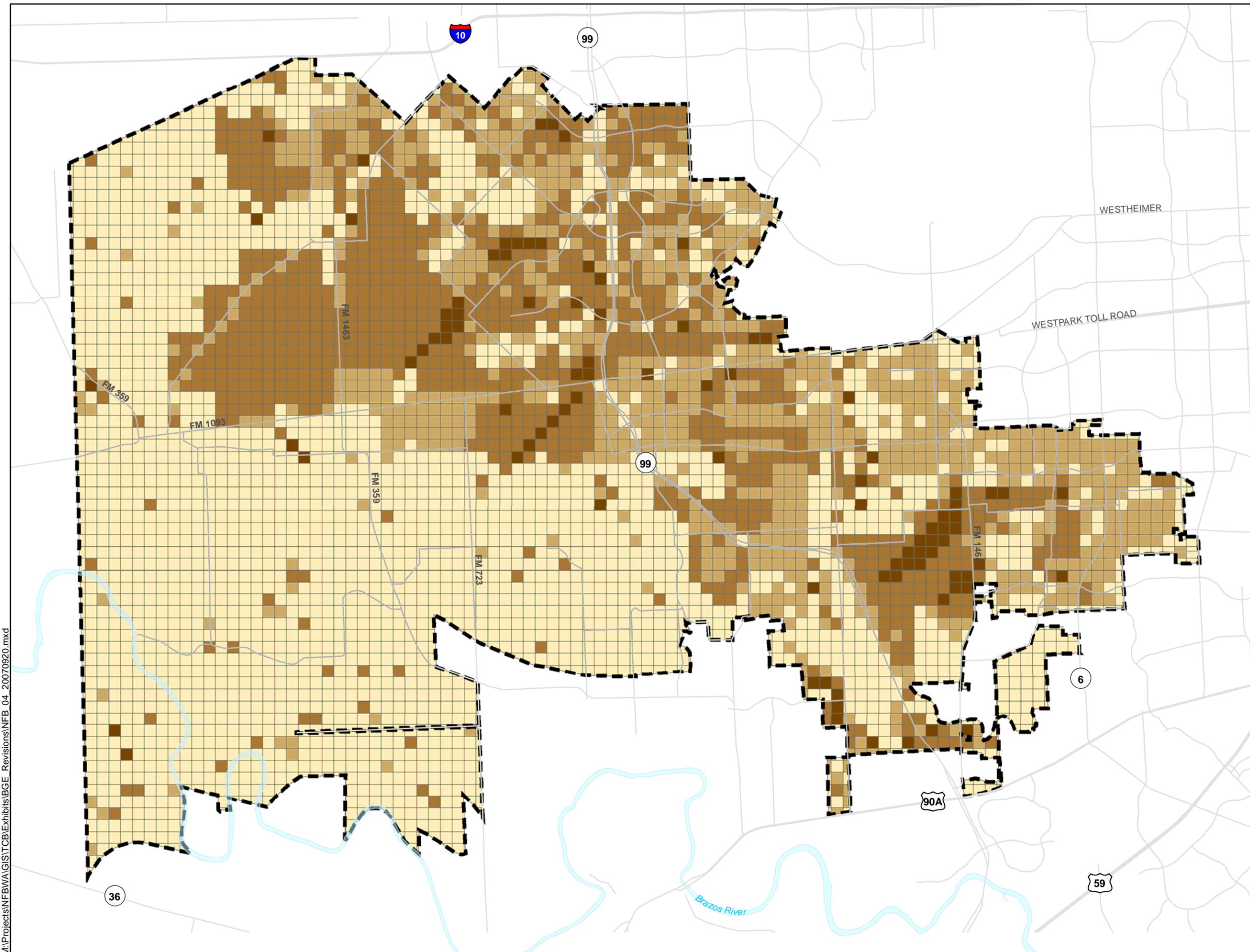


Exhibit 4

Water Demand by Grid Cell for 2025



Legend

2025 Water Demand

- 0 - 15,000
- 15,001 - 30,000
- 30,001 - 45,000
- 45,001 - 60,000

NFBWA

DISCLAIMER

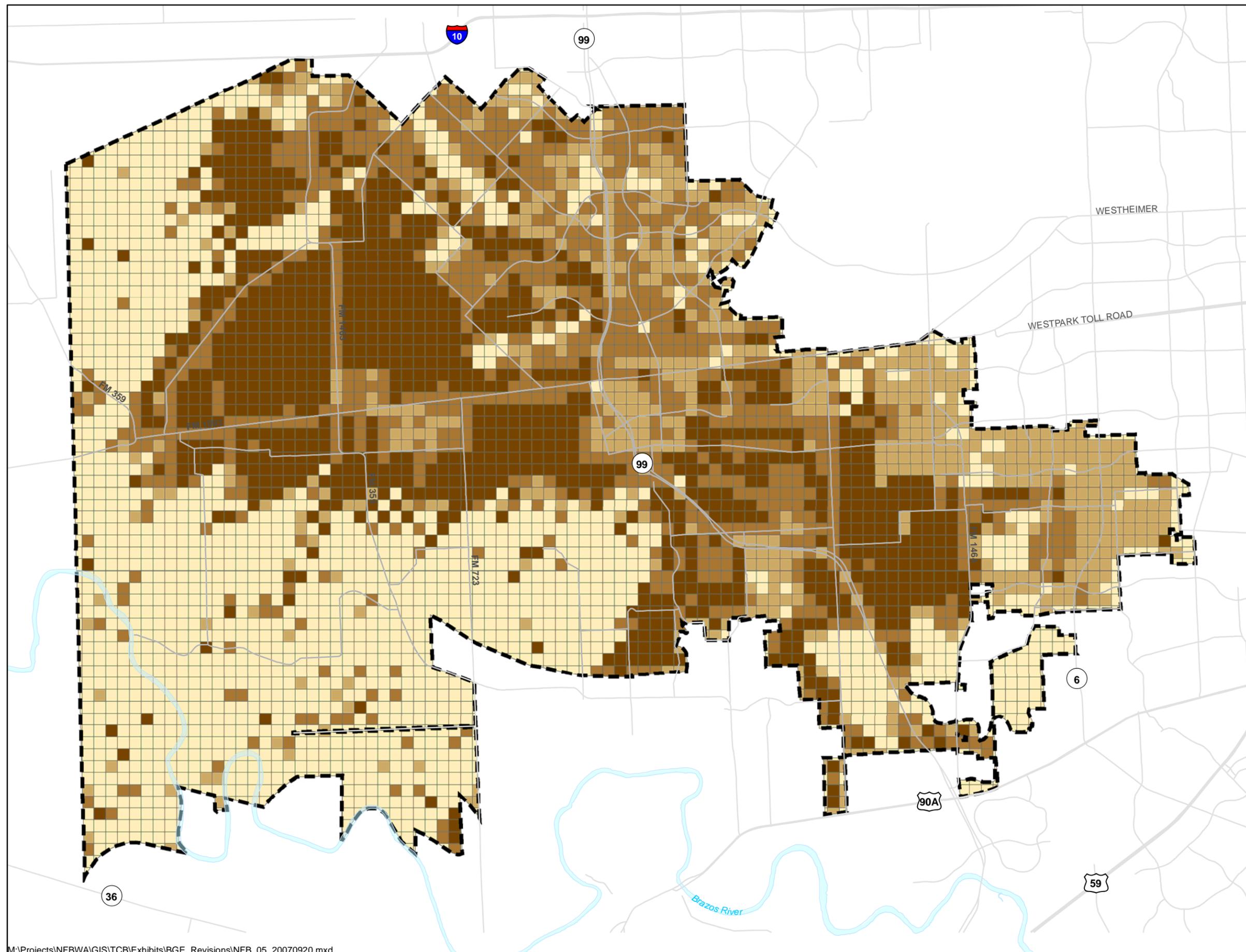
For illustration purposes only.



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Exhibit 5

Water Demand by Grid Cell for 2055



Legend

2055 Water Demand

- 0 - 15,000
- 15,001 - 30,000
- 30,001 - 45,000
- 45,001 - 60,000

NFBWA

DISCLAIMER
For illustration purposes only.



Exhibit 6

Undeveloped Areas Not Within Existing MUDs

Legend

Undeveloped Areas

- C1 - Central 1
- C2 - Central 2
- C3 - Central 3
- E1 - East 1
- E2 - East 2
- E3 - East 3
- N1 - North 1
- NW1 - Northwest 1
- NW2 - Northwest 2
- S1 - South 1
- SE1 - Southeast 1
- SW1 - Southwest 1
- W1 - West 1
- W2 - West 2

NFBWA

DISCLAIMER

Information regarding utility districts may be incomplete. For illustration purposes only.



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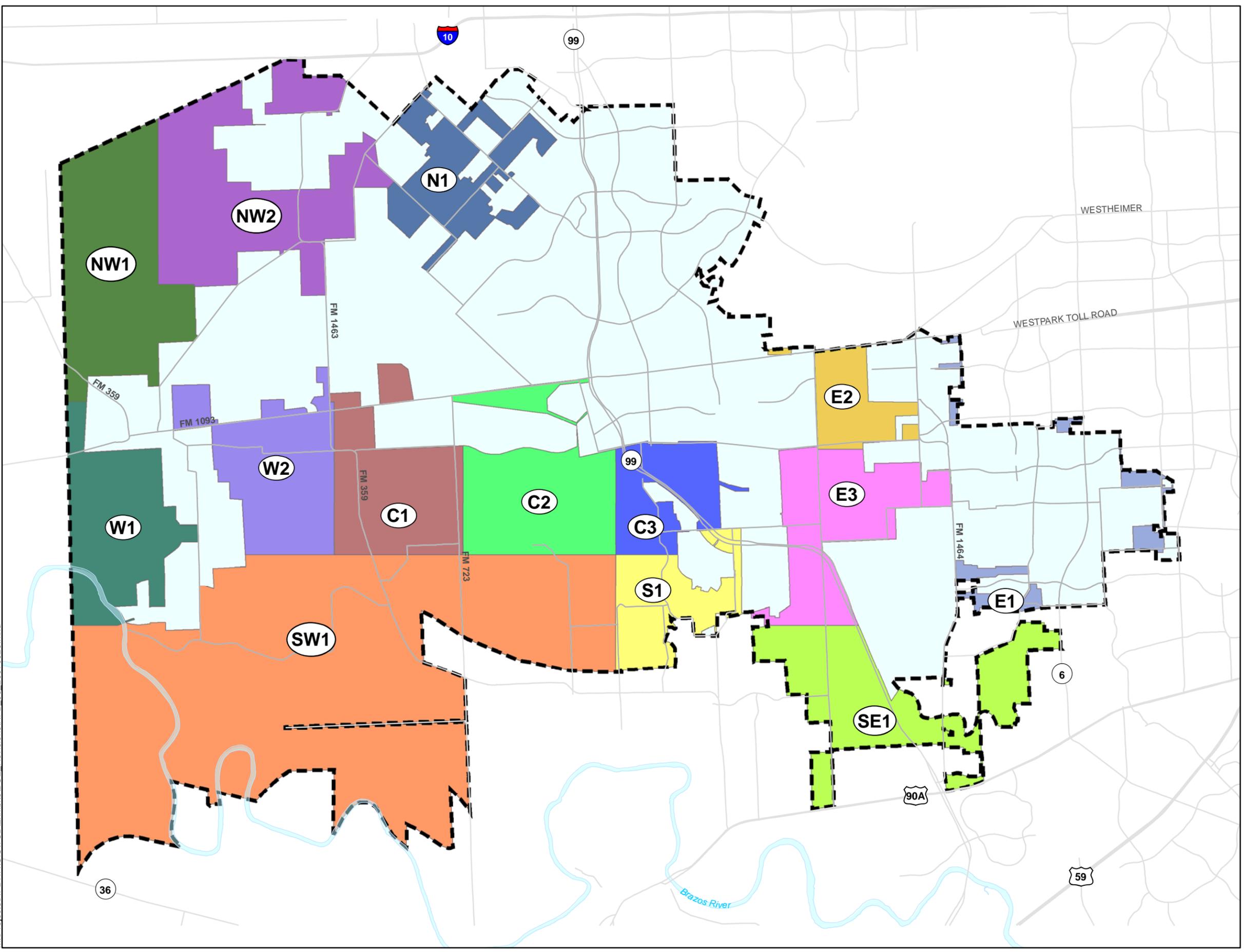
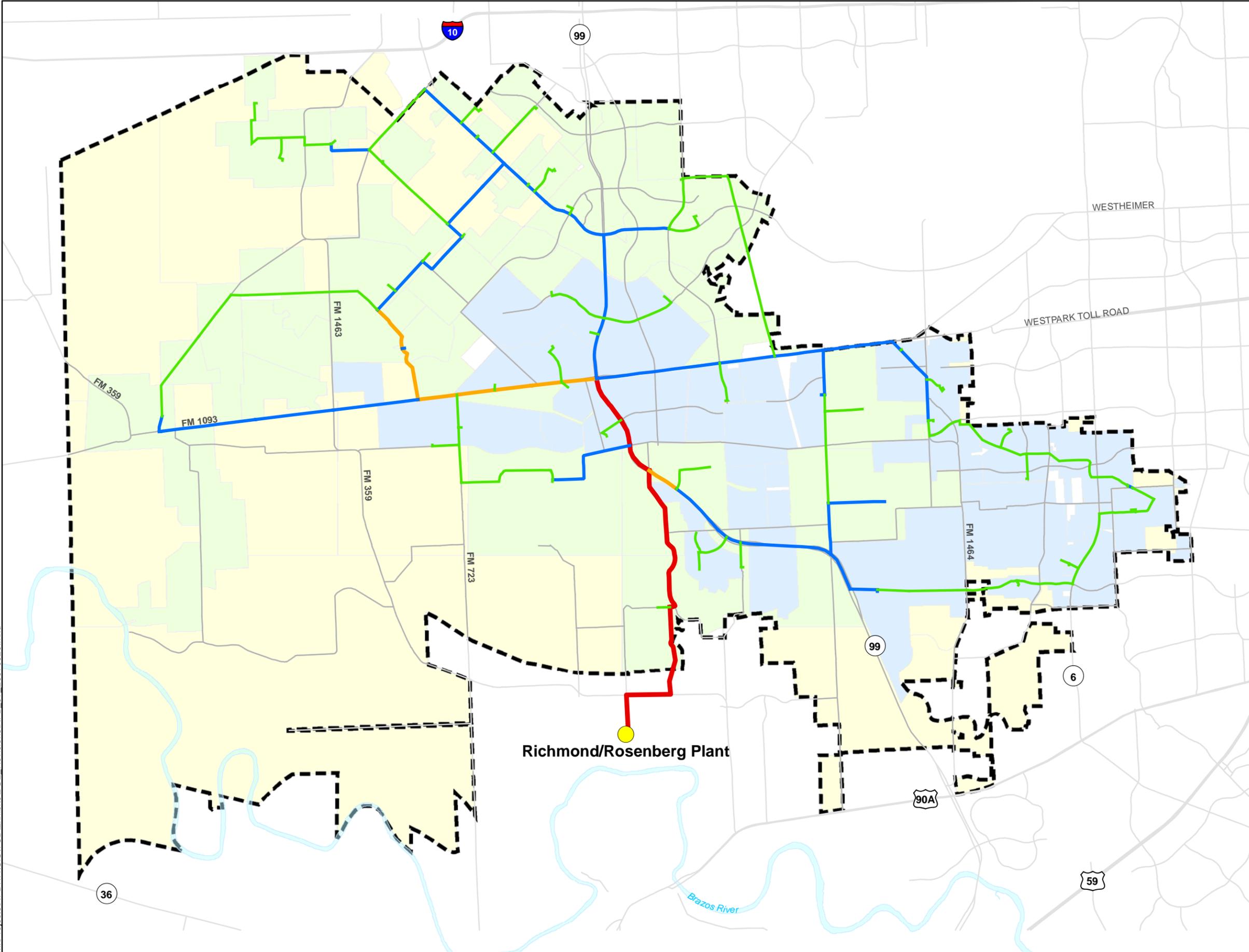


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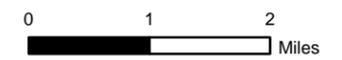
Alternative 1 Richmond/ Rosenberg Treatment Plant



Legend

- Richmond/Rosenberg Plant
- Pipeline
- Diameter in Inches
 - <= 20
 - 24 - 36
 - 42 - 54
 - >= 60
- Conversion Phase
 - 2013 Conversion
 - 2025 Conversion
 - No Conversion
- NFBWA

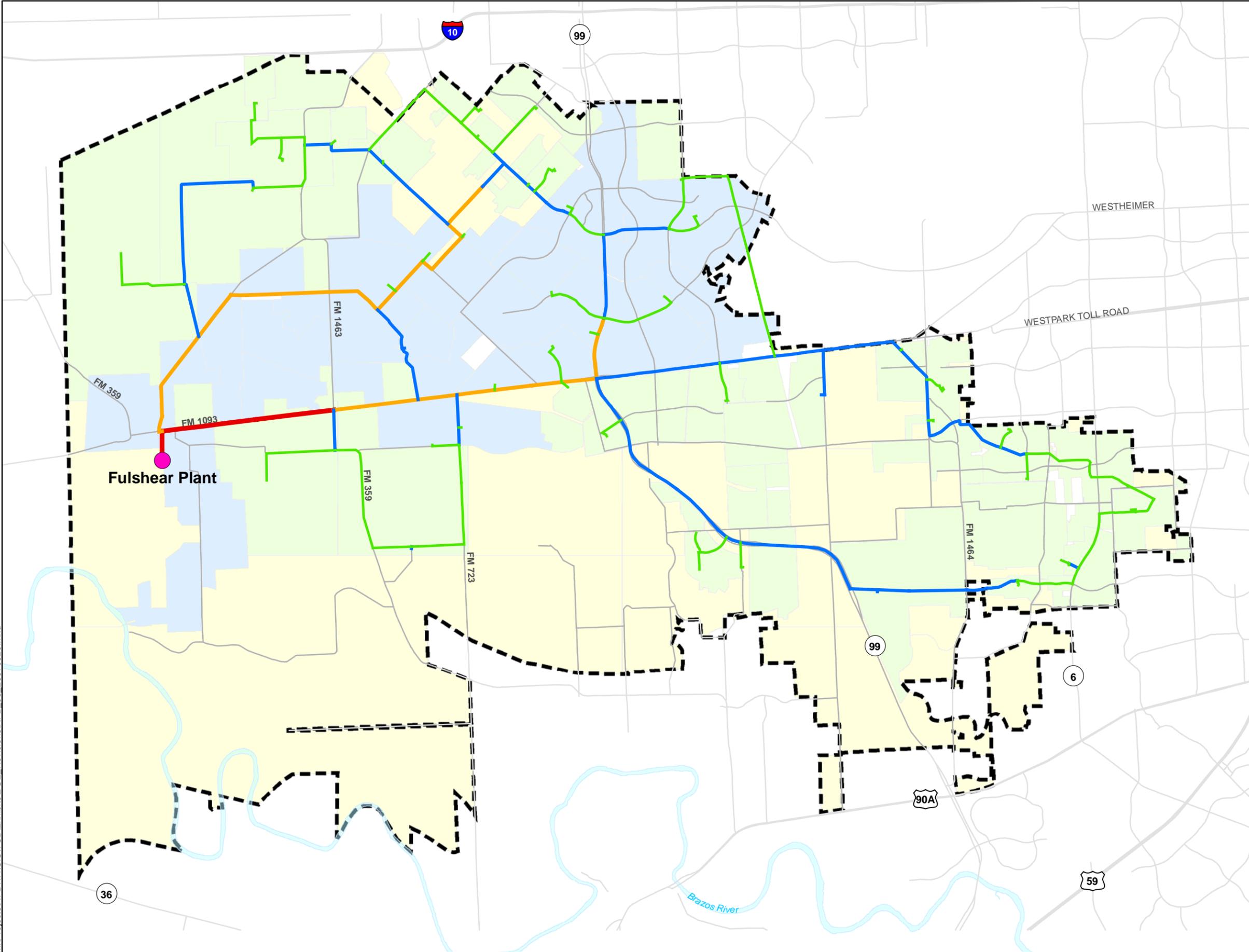
DISCLAIMER
Information regarding utility districts may be incomplete. For illustration purposes only.



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Exhibit 8

Alternative 2 Fulshear Treatment Plant



Legend

- Fulshear Plant
- Pipeline
- Diameter in Inches
 - ≤ 20
 - 24 - 36
 - 42 - 54
 - ≥ 60
- Conversion Phase
 - 2013 Conversion
 - 2025 Conversion
 - No Conversion
- NFBWA

DISCLAIMER

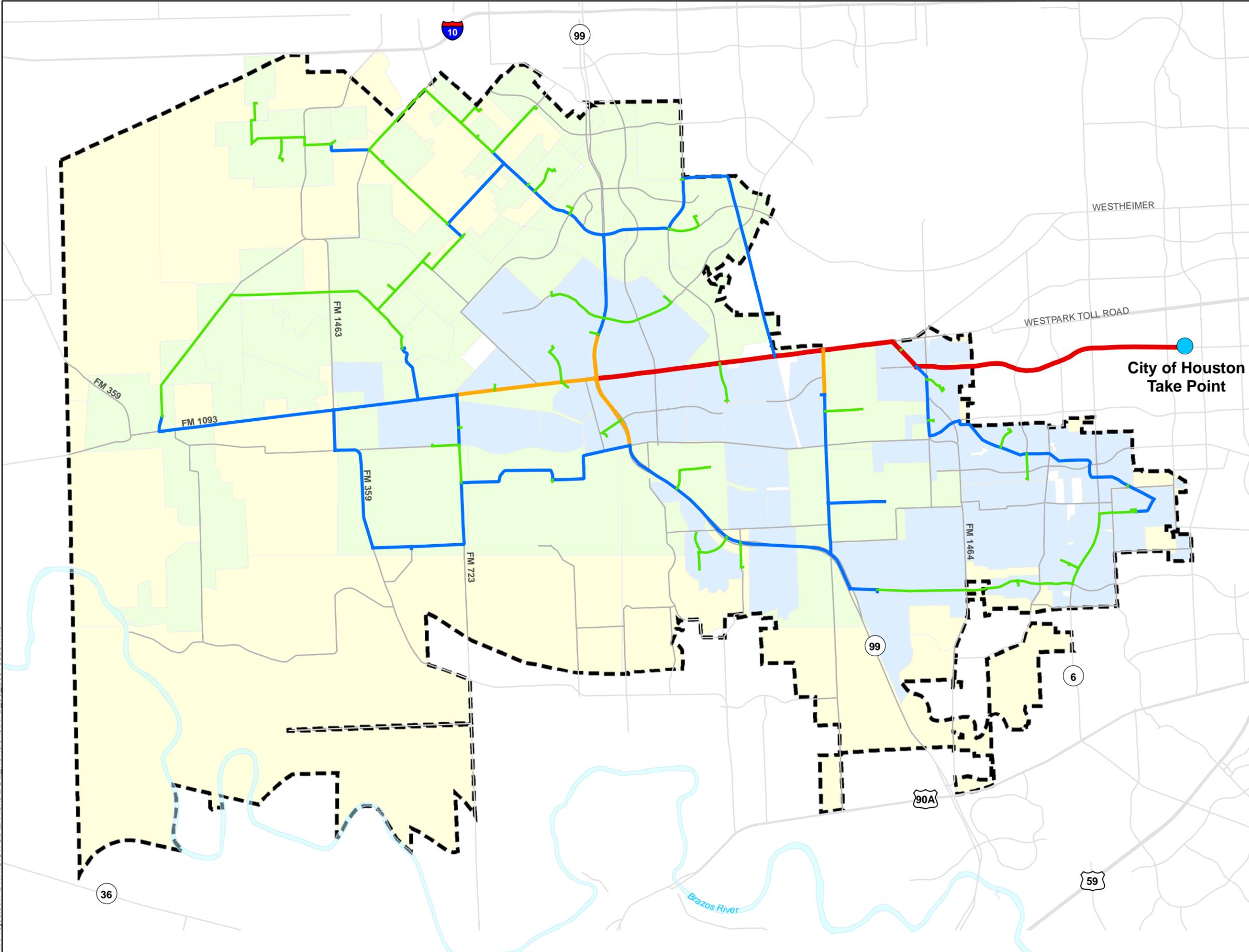
Information regarding utility districts may be incomplete. For illustration purposes only.



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Exhibit 9

Alternative 4 City of Houston Take Point

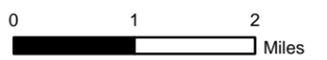


Legend

- City of Houston Take Point
- Pipeline Diameter in Inches
 - <= 20
 - 24 - 36
 - 42 - 54
 - >= 60
- Conversion Phase
 - 2013 Conversion
 - 2025 Conversion
 - No Conversion
- NFBWA

DISCLAIMER

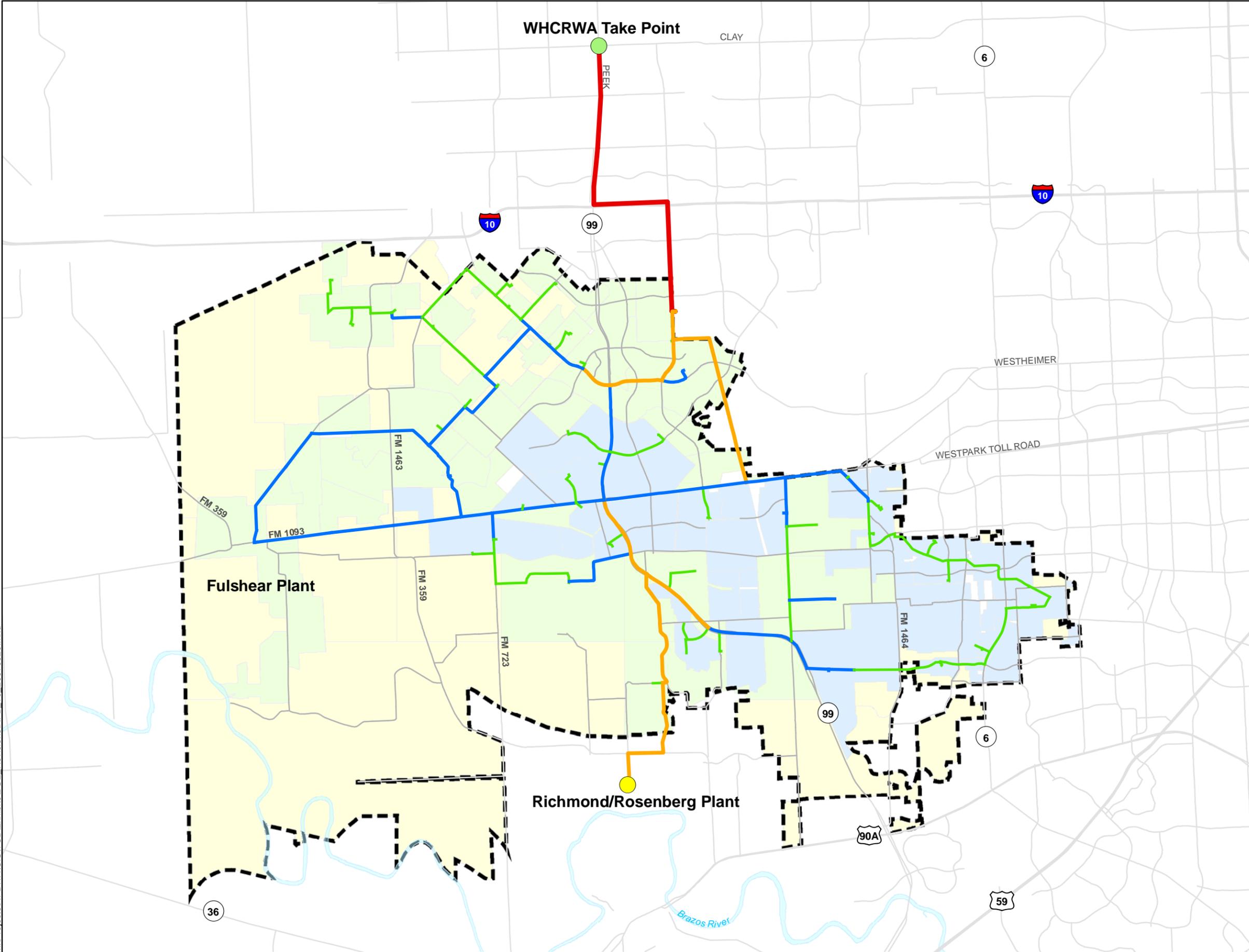
Information regarding utility districts may be incomplete. For illustration purposes only.



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Exhibit 10

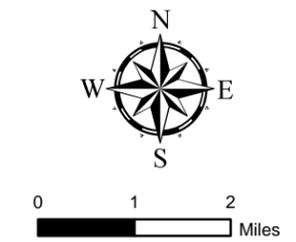
Alternative 5 WHCROWA Take Point and Richmond/ Rosenberg Treatment Plant



Legend

- WHCROWA Take Point (Green circle)
- Richmond/Rosenberg Plant (Yellow circle)
- Pipeline Diameter in Inches
 - <= 20 (Green line)
 - 24 - 36 (Blue line)
 - 42 - 54 (Orange line)
 - >= 60 (Red line)
- Alternative 1 Conversion Phase
 - 2013 Conversion (Light blue shading)
 - 2025 Conversion (Light green shading)
 - No Conversion (Light yellow shading)
- NFBWA (Dashed black line)

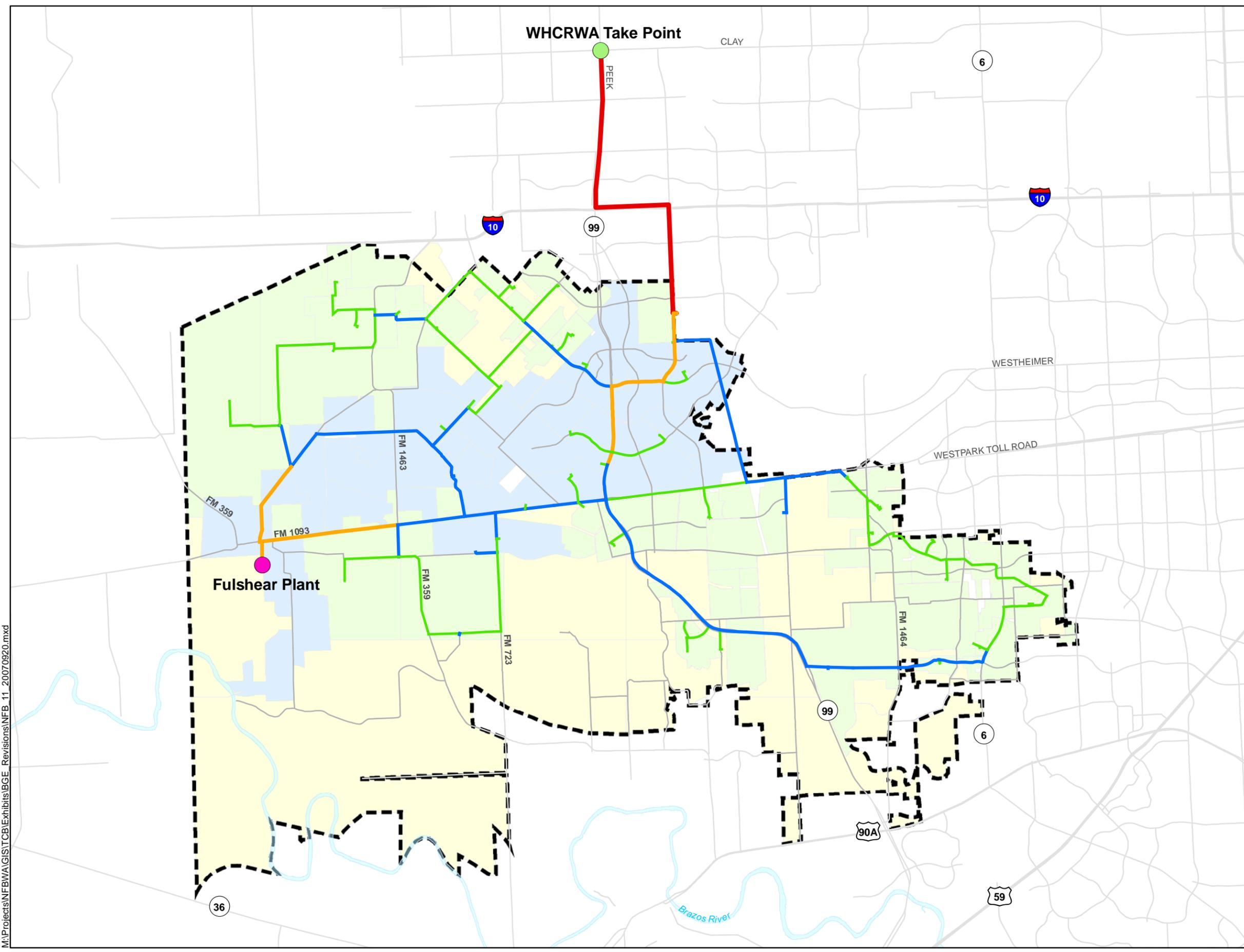
DISCLAIMER
Information regarding utility districts may be incomplete. For illustration purposes only.



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Exhibit 11

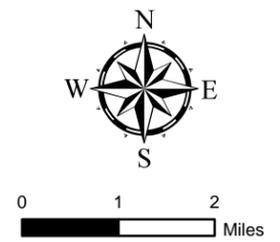
Alternative 6 WHCRA Take Point and Fulshear Treatment Plant



Legend

- WHCRA Take Point (Green circle)
- Fulshear Plant (Pink circle)
- Pipeline Diameter in Inches
 - <= 20 (Green line)
 - 24 - 36 (Blue line)
 - 42 - 54 (Orange line)
 - >= 60 (Red line)
- Conversion Phase
 - 2013 Conversion (Light blue shading)
 - 2025 Conversion (Light green shading)
 - No Conversion (Light yellow shading)
- NFBWA (Dashed black line)

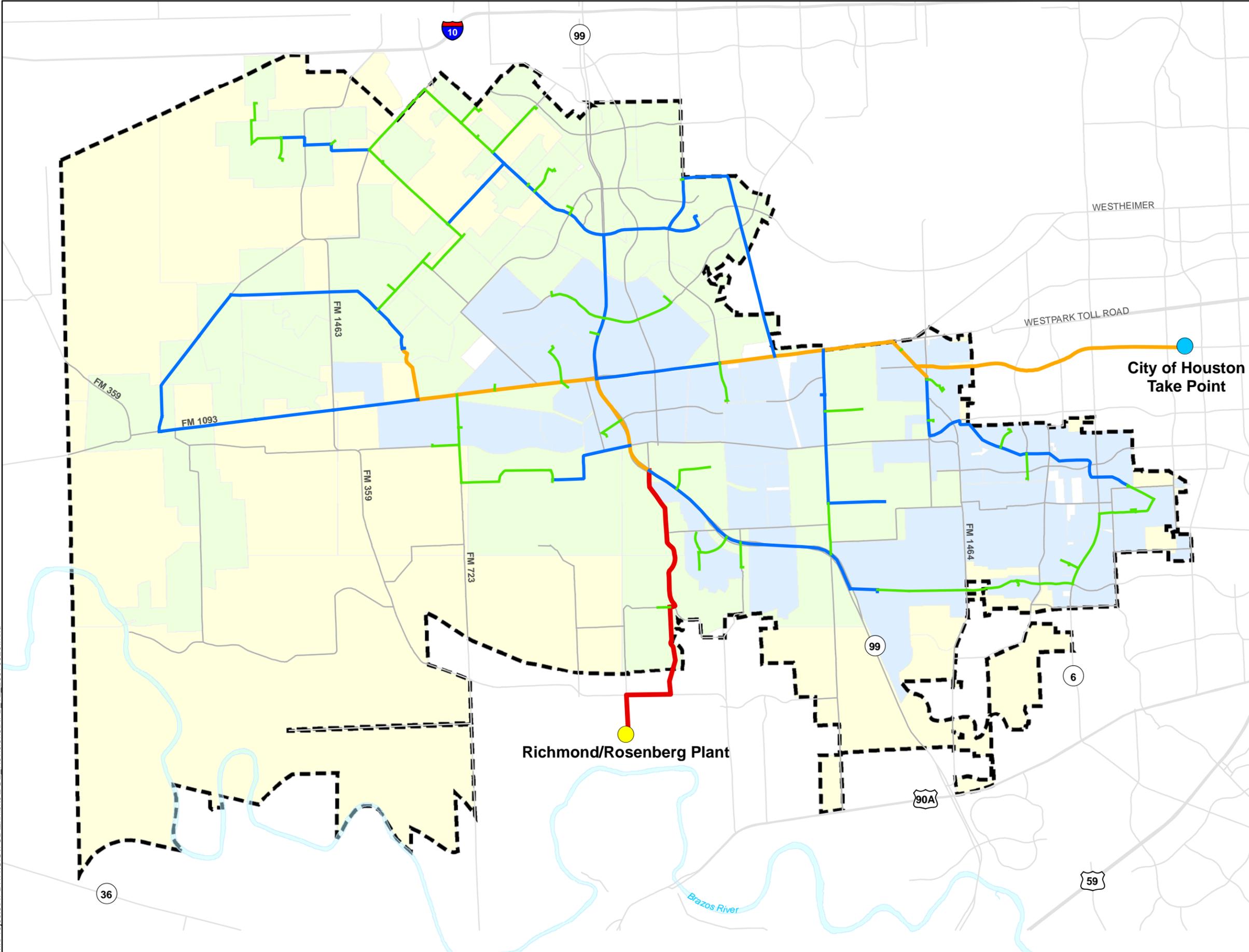
DISCLAIMER
Information regarding utility districts may be incomplete. For illustration purposes only.



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Exhibit 12

Alternative 7 City of Houston Take Point and Richmond/ Rosenberg Treatment Plant



Legend

- Richmond/Rosenberg Plant
- City of Houston Take Point
- Pipeline
- Diameter in Inches
- <= 20
- 24 - 36
- 42 - 54
- >= 60
- Conversion Phase
- 2013 Conversion
- 2025 Conversion
- No Conversion
- NFBWA

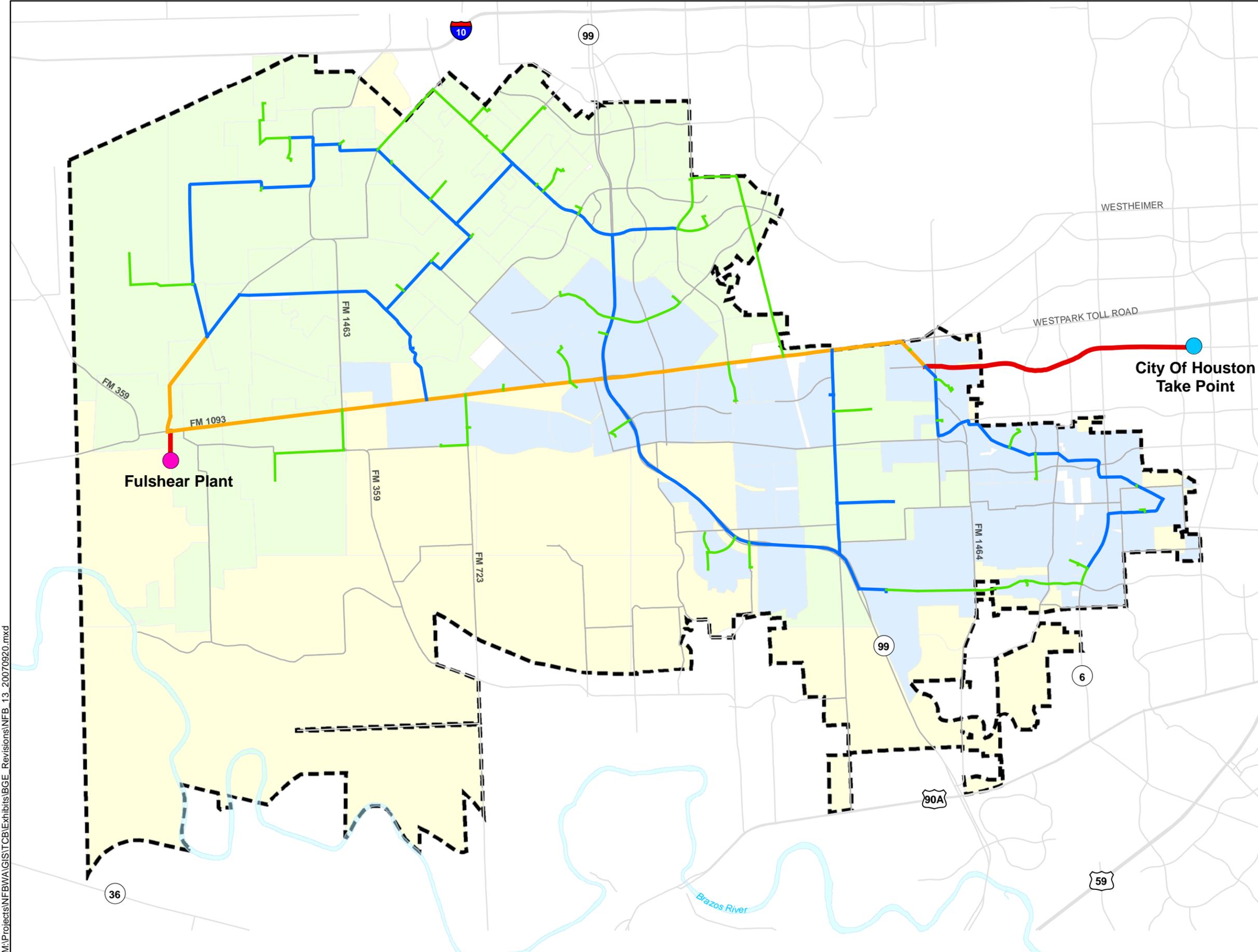
DISCLAIMER
Information regarding utility districts may be incomplete. For illustration purposes only.



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Exhibit 13

Alternative 8 City of Houston Take Point and Fulshear Treatment Plant



Legend

- City of Houston Take Point (Blue circle)
- Fulshear Plant (Pink circle)
- Pipeline Diameter in Inches
 - <= 20 (Green line)
 - 24 - 36 (Blue line)
 - 42 - 54 (Orange line)
 - >= 60 (Red line)
- Conversion Phase
 - 2013 Conversion (Light blue shading)
 - 2025 Conversion (Light green shading)
 - No Conversion (Light yellow shading)
- NFBWA (Dashed black line)

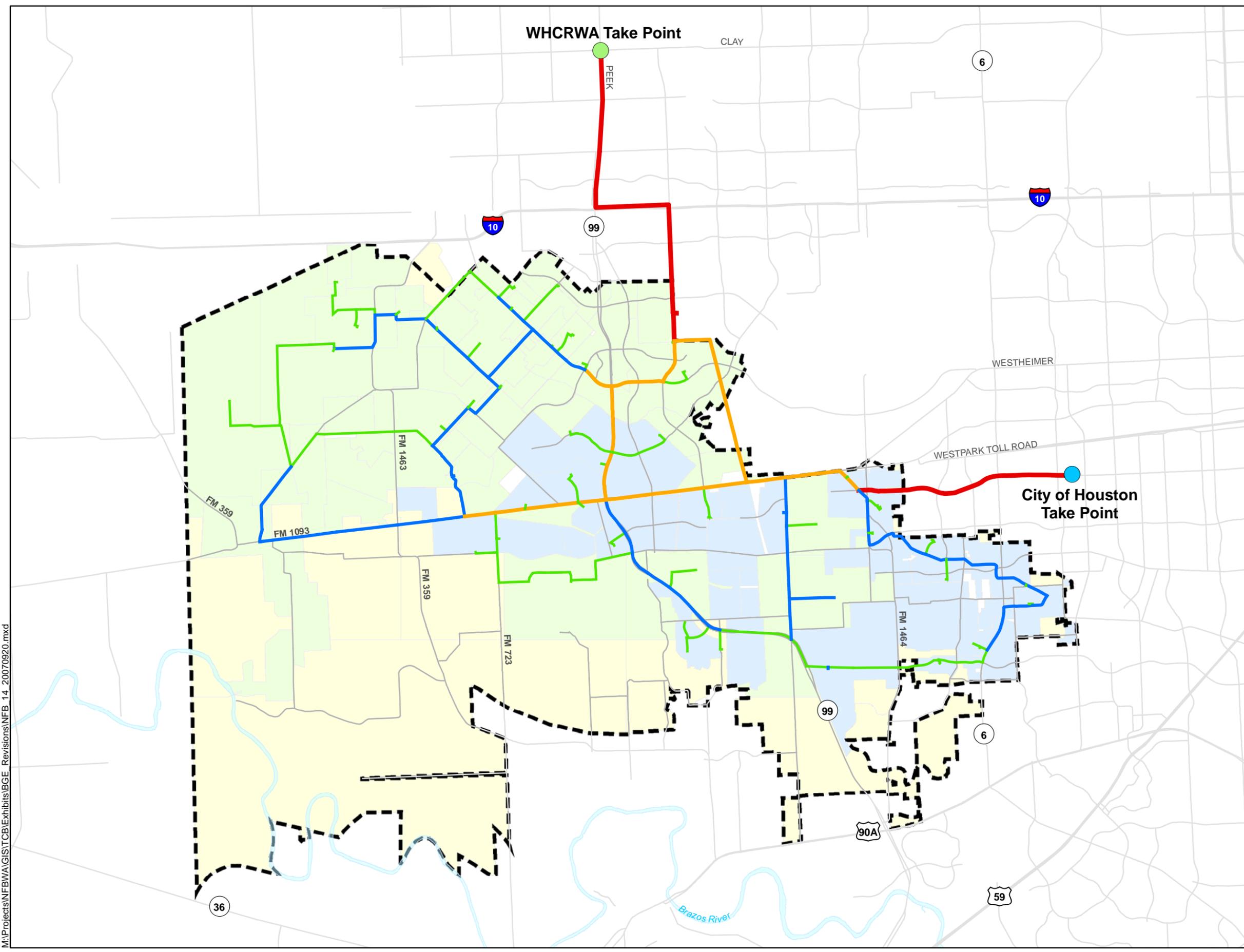
DISCLAIMER
Information regarding utility districts may be incomplete.
For illustration purposes only.



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Exhibit 14

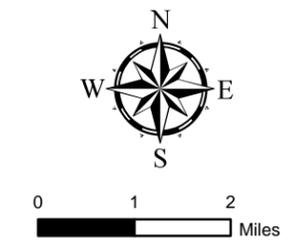
Alternative 9 City of Houston and WHCRWA Take Points



Legend

- City of Houston Take Point (Blue circle)
- WHCRWA Take Point (Green circle)
- Pipeline Diameter in Inches
 - <= 20 (Green line)
 - 24 - 36 (Blue line)
 - 42 - 54 (Orange line)
 - >= 60 (Red line)
- Conversion Phase
 - 2013 Conversion (Light Blue shading)
 - 2025 Conversion (Light Green shading)
 - No Conversion (Light Yellow shading)
- NFBWA (Dashed black line)

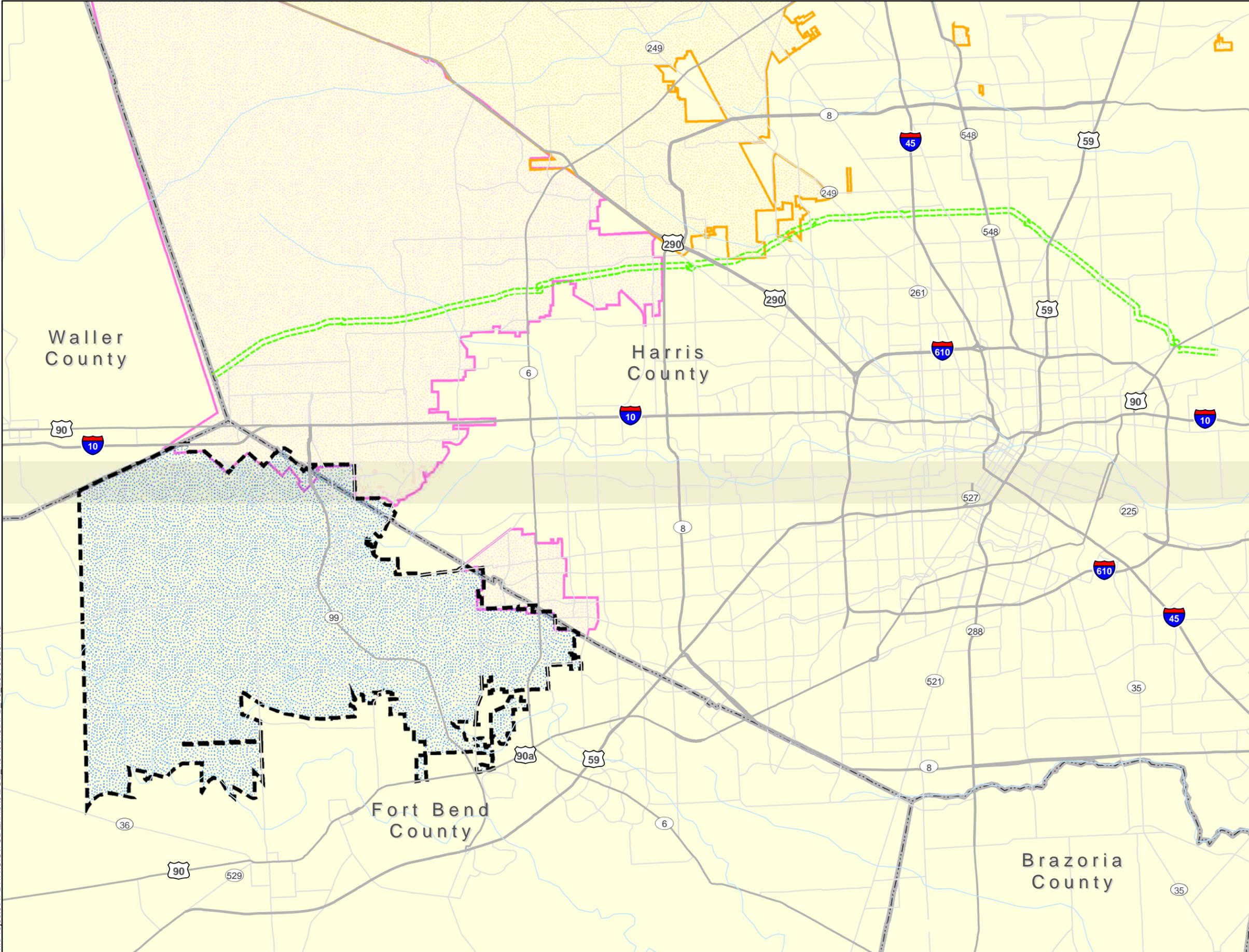
DISCLAIMER
Information regarding utility districts may be incomplete.
For illustration purposes only.



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Exhibit 15

WHCRWA Pipeline Corridor

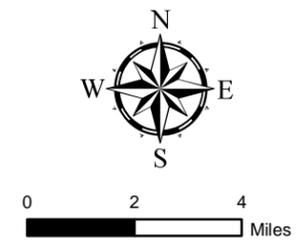


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Legend

- WHCRWA Easement Segment
- NFBWA
- NHCRA
- WHCRWA
- WHCRWA

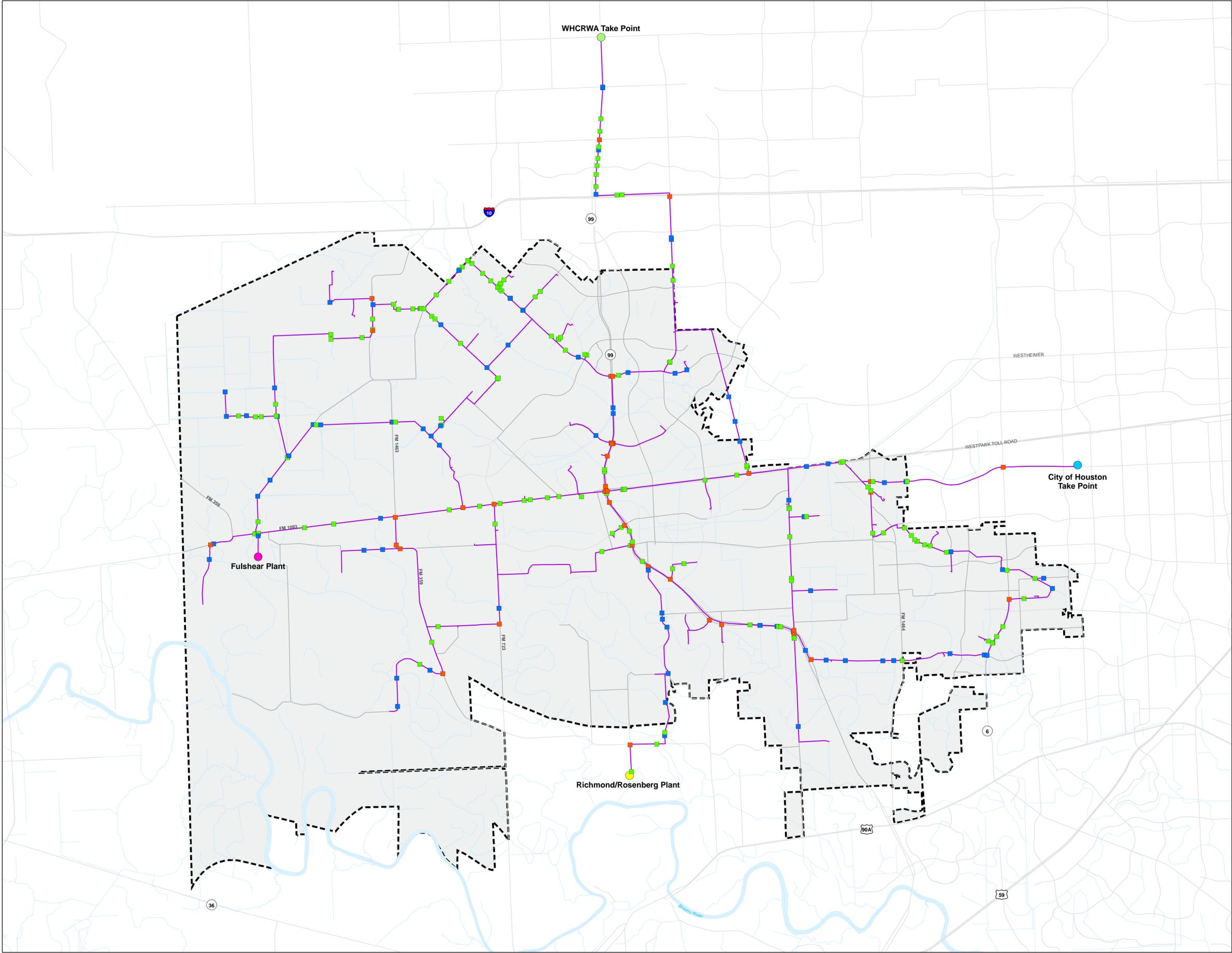
DISCLAIMER
For illustration purposes only.



Logos for the North Fort Bend Water Authority, Brown & Gay Engineers, Inc., TCB, and AECOM.

Exhibit 16

Pipe Segments Identified as Special Crossings



Legend

Special Crossings

- Channel
- Pipeline
- TxDOT Roadway

Supply Points

- City of Houston Take Point
- Fulshear Plant
- Richmond/Rosenberg Plant
- WHCRWA Take Point

Pipe Corridor

- NFBWA

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For illustration purposes only.



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APPENDIX F

NORTH FORT BEND WATER AUTHORITY

June 26, 2007

The Honorable Bill White
City of Houston
PO Box 1562
Houston, TX 77251

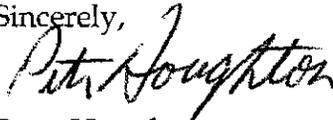
Re: North Fort Bend Water Authority ("Authority")

Dear Mayor White:

Representatives of the Authority have had informal discussions with representatives of the City of Houston (the "City") regarding entering into a potential water supply contract to address surface water needs and facilitate compliance with Fort Bend Subsidence District groundwater conversion requirements for the area within the Authority's boundaries.

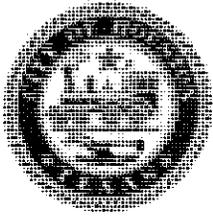
By this letter, the Authority's Board of Directors formally requests to contract with the City for surface water upon terms that are substantially similar to the water supply contracts the City has entered into with the North Harris County Regional Water Authority and the West Harris County Regional Water Authority. Please do not hesitate to call the Authority's attorney, Joe B. Allen, at (713) 860-6402 if you have any questions. Thank you for your attention to this matter.

Sincerely,



Peter Houghton
President, Board of Directors

c: Mr. Michael S. Marcotte, P.E., DEE
Mr. Jeff Taylor, P.E.
Mr. Andrew F. Icken
Ms. Susan Bandy
Mr. Jun Chang, P.E.
Mr. David C. Scholler, P.E.
Mr. Joe B. Allen



CITY OF HOUSTON
Department of Public Works and Engineering

Bill White

Mayor

Michael S. Marcotte, P.E., DEE
Director
P.O. Box 1562
Houston, Texas 77251-1562

T. 713 837-0037
F. 713 837-0040
www.houstontx.gov

July 6, 2007

Mr. Peter Houghton
President, Board of Directors
North Fort Bend Water Authority
c/o Allen Boone Humphries Robinson LLP
3200 Southwest Freeway, Phoenix Tower Suite 2600
Houston, Texas 77027

Re: North Fort Bend Water Authority ("Authority")

Dear Mr. Houghton:

This is in response to your letter to Mayor White dated June 26, 2007 requesting a water supply contract for surface water purchase from the City of Houston. The City of Houston is willing to provide water to the North Fort Bend Authority (NFBWA) that will ensure compliance with the Fort Bend Subsidence District's groundwater conversion requirements.

For simplicity and expediency, we suggest that, as discussed informally, the NFBWA purchase the required surface water through the existing Water Supply Contract between the City of Houston and West Harris County Water Regional Authority ("the WHCRWA Contract"). If this is agreeable to NFBWA, a request by WHCRWA for sale of water outside boundaries must be made in accordance with Article VIII, Section 8.10 of the WHCRWA Contract and the purchase of surface water by NFBWA through WHCRWA Contract needs to be approved by the City.

We look forward to working with you and the WHCRWA on this matter. Please contact Jun Chang of my staff at (713)837-0433 if you have any questions.

Sincerely,

Michael S. Marcotte, P.E., DEE

MSM:AFI:jc

c: Mayor Bill White
Andrew F. Icken
Jeff Taylor
Susan Bandy
Jun Chang
Dave Schoeller
Joe B. Allen

Council Members: Toni Lawrence Jarvis Johnson Anne Clutterbuck Ada Edwards Addie Wiseman M.J. Khan, P.E. Pam Holm Adrian Garcia Carol Alvarado
Peter Brown Sue Lovell Ronald C. Green Michael Berry Melissa Noriega Controller: Annise D. Parker,

**JOINT FACILITIES AGREEMENT BETWEEN THE WEST HARRIS COUNTY
REGIONAL WATER AUTHORITY AND THE NORTH FORT BEND WATER
AUTHORITY**

THIS WATER SUPPLY AGREEMENT (“Agreement”) is made by and between the **WEST HARRIS COUNTY REGIONAL WATER AUTHORITY** (the “West Authority”), a Texas conservation and reclamation district created pursuant to House Bill 1842 of the 77th Legislature, as amended, and Article XVI, Section 59, of the Texas Constitution, and the **NORTH FORT BEND WATER AUTHORITY** (the “Fort Bend Authority”), a Texas conservation and reclamation district organized and operated under the provisions of Senate Bill 1798 of the 79th Legislature, Regular Session (2005), as amended, and the Texas Water Code, as amended. (The West Authority and the Fort Bend Authority are individually referred to herein as a “Party” and collectively referred to herein as the “Parties.” The West Authority and the Fort Bend Authority also are individually referred to herein as an “Authority” and collectively referred to herein as the “Authorities.”)

WITNESSETH:

Recitals

WHEREAS, Houston and the West Authority entered into a Water Supply Contract effective as of April 8, 2003 (the “Contract”); and

WHEREAS, the Fort Bend Authority desires to purchase Water from the City of Houston, Texas (“Houston”) in order to satisfy Fort Bend Subsidence District regulations; and

WHEREAS, Houston and the Fort Bend Authority have entered or will enter into Water Supply Contract (the “Fort Bend Authority Contract”) to allow the Fort Bend Authority to purchase Water from Houston pursuant to the terms of the Contract (all references hereafter in this Agreement to the Contract shall mean the Contract and the Fort Bend Authority Contract); and

WHEREAS, the West Authority and the Fort Bend Authority expect that substantially all Water received by both Authorities from Houston will be through jointly owned transmission lines, pump stations, and related distribution facilities, whether now existing or constructed in the future; and

WHEREAS, the West Authority and the Fort Bend Authority desire to set forth the terms and conditions upon which the West Authority and the Fort Bend Authority will jointly receive Water from Houston; and

WHEREAS, the West Authority and the Fort Bend Authority desire to agree upon certain terms and conditions upon which they will design, construct, operate, and maintain any joint use water supply, water treatment, and water distribution facilities and all related appurtenances that the West Authority and the North Fort Bend Authority determine are necessary for delivery of Water from Houston to customers within the boundaries of the Authorities; and

WHEREAS, the Parties have heretofore determined and hereby declare and represent that they are authorized to enter into this Agreement; that the terms, conditions and provisions of this Agreement are mutually agreeable, fair and advantageous, and that they desire to enter into this Agreement for the purposes set forth herein and to provide specific terms and conditions upon which such improvements will be financed, designed, constructed, owned, operated and maintained;

NOW, THEREFORE, for and in consideration of the premises and the mutual covenants and agreements herein contained, the West Authority and the Fort Bend Authority do agree as follows:

Article I
Approval and Incorporation of Recitals

Section 1.01 Recitals. The recitals set forth above are declared true and correct and are hereby incorporated as part of this Agreement.

Article II
Definitions

Section 2.01. Definitions.

Capitalized terms used in this Agreement shall have the same meanings given to such terms in the Contract.

“Joint Use Facilities” shall mean any and all water supply, water treatment, and water distribution facilities and all related appurtenances that the West Authority and the North Fort Bend Authority determine to jointly design, construct, and operate to enable them to receive Water from Houston for delivery to customers of the Authorities.

“Pro-Rata Share of Capacity” shall mean the percentage derived by comparing the amount of capacity that an Authority has reserved in any facility to the total amount of capacity in such facility.

Article III
Water Supply From Houston

Section 3.01. Provision of Water From Houston. Houston has agreed or will agree by the First Amendment to provide Water to the North Fort Bend Authority pursuant to the terms and conditions of the Contract. The West Authority and the Fort Bend Authority agree to receive Water from Houston under the terms and conditions of the Contract, subject to any terms and conditions provided herein.

Section 3.02 No Right to Capacity. The Parties agree and acknowledge that neither Authority shall be entitled to use any of the other Authority's Water Demand Allocation under the Contract unless agreed to in writing by the Authorities.

Section 3.03. Reservations. Pursuant to the terms of the Contract, either Authority may submit Reservation(s) to Houston for the amount(s) of Water needed by such Authority.

a. Notice of Intention of Reservation. At least ninety (90) days prior to submitting a Reservation to the City under the Contract, an Authority shall notify the other Authority of its intent to make such reservation so that the other authority has the right to review and comment on such Reservation and determine if it would like to submit Reservation or participate in a Joint Use Facility.

c. No right to prevent Reservation. Neither Authority shall prohibit or prevent the other Authority from making a Reservation; provided, however, the Authorities agree and acknowledge that it is in the best interest of the Authorities to coordinate their Reservations and to share the cost of Joint Use Facilities where possible.

d. Capital Payments Attributable to Reservation. If Houston grants a Reservation made by an Authority under the Contract, each Authority shall make any payment of capital costs attributable to said Reservation directly to Houston to the extent and in the manner provided by for in the Contract.

e. O&M Charges. Each Authority shall be responsible for O&M charges due under the terms of the Contract for Water it receives from the Houston. Recognizing that, in the future, Water will be received from Houston at multiple Points of Delivery and in various amounts to each Authority, the Parties agree and acknowledge that the Party that owns and operates the applicable Joint Use Facility (an "Operating Authority") will be responsible for making payments to Houston for all O&M charges due under the terms of the Contract for all Water received from Houston at such Joint Use Facility. To ensure that the amount of Water received by each Authority can be determined, the Authorities shall install water meters at locations mutually agreed

upon by the engineer for the West Authority and the engineer for the Fort Bend Authority. The Operating Authority will provide the non-Operating Authority with all information from its meters so that the Operating Authority can properly determine the allocation of Water used by each Authority on a monthly basis. Upon determining the allocation of Water used by each Authority, the Operating Authority will invoice the non-Operating Authority for its share of O&M charges in a reasonable manner mutually agreed upon by the parties. The Non-Operating Authority shall pay the Operating Authority for its share of O&M charges within thirty (30) days of receipt of an invoice from the Operating Authority. If the Non-Operating Authority fails to timely pay amounts due to the Operating Authority for its share of O&M charges, the delinquent amounts will bear interest at the rate applicable under Chapter 2251, Texas Government Code. Upon receipt from the non-Operating Authority of any O&M charges due under the Contract, the Operating Authority shall promptly pay to Houston any O&M charges due under the Contract attributable to the non-Operating Authority's water usage.

The Operating Authority shall not charge any fees or mark-ups to non-Operating Authority for billing and processing any payments due under this Agreement or the Contract, nor for any water received by the non-Operating Authority, except for such actual and reasonable fees, charges, fines, penalties, administrative costs, or other costs incurred by the Operating Authority as a result of its responsibility to administer the O&M charges due under the Contract on behalf of the non-Operating Authority or because the non-Operating Authority fails to carry out timely any of its obligations under the Contract or this Agreement. If the Operating Authority incurs such actual fees, charges, fines, penalties, administrative or other costs, the Operating Authority shall provide the non-Operating Authority with appropriate documentation of such items at such time as it bills those items to the non-Operating Authority.

Article IV **Joint Use Facilities**

Section 4.01. Additional Agreement. In the event that the West Authority and the Fort Bend Authority agree to jointly finance and construct any Joint Use Facilities, the Parties agree to negotiate, in good faith, a separate written agreement or an amendment to this Agreement to address terms and conditions for the design, construction, operation and maintenance of any such Joint Use Facilities (an "Additional Agreement").

Section 4.02. Agreed Upon Facilities and Terms. The Authorities agree and acknowledge that they intend to jointly finance and construct the following two Joint Use Facilities to receive and distribute Water received under the Contract from Houston: (i) a pump station and a portion of the transmission system related to Houston's Bellaire-Braes Pump Station (the "Bellaire-Braes Facility") and (ii) a pump

station and a portion of the transmission system that utilizes or incorporates the Katy Products Pipeline right of way acquired by the West Authority from Exxon-Mobil Corporation (the "Exxon Facility"). The Authorities agree that the Fort Bend Authority will be responsible for designing, constructing, owning, and operating the Bellaire-Braes Facility and the West Authority will be responsible for designing, constructing, owning, and operating the Exxon Facility. To the extent that any Joint Use Facility utilizes or incorporates the Katy Products Pipeline right of way acquired by the West Authority from Exxon-Mobil Corporation, the historic cost acquiring such right of way (including all reasonable engineering and legal fees, administrative costs, and other reasonable costs and cost of funds) shall be included in determining the cost of the Joint Use Facility to be shared among the Authorities.

Section 4.03 Terms of Additional Agreements. Except to the extent already provided for in Section 4.02 above, the Parties further agree and acknowledge that any Additional Agreement for the design, construction, operation and maintenance of any Joint Use Facility shall:

- a. Specify each Authority's ultimate reserved capacity in the Joint Use Facility.
- b. Provide that the design and construction phase engineering costs, permitting costs, realty interest costs, and construction costs attributable to any Joint Use Facility constructed by the Authorities shall be shared by the Authorities based on their Pro-Rata Share of Capacity reserved by each Authority in the Joint Use Facility.
- c. Provide the method, manner, and timing of all payments due by the Authorities for the design, permitting, right-of-way acquisition and construction of the Joint Use Facility.
- d. Designate which Authority will enter into the necessary contracts for the design and construction of the Joint Use Facility.
- e. Designate which Authority's engineer is responsible for overseeing the design, permitting, right-of-way acquisition, and construction of the Joint Use Facility.
- f. Specify any alignment, right-of-way, design, construction, financial, timing, or other criteria necessary or related to the construction of the Joint Use Facility.
- g. Provide that each Authority shall have the right to review and approve the plans and specifications for any Joint Use Facilities.
- h. Require the responsible Authority to provide monthly reports regarding the construction of the Joint Use Facility, to grant the non-responsible Authority access

to the construction sites at all reasonable times and, upon request, to provide the non-responsible Authority with copies of all plans, modifications, contracts and change orders, if any, related to the construction of the Joint Use Facility.

i. Provide that the non-responsible Authority shall have the right to inspect and approve the Joint Facility prior to final acceptance of the Joint Facility by the responsible Authority.

j. Provide the manner, terms and conditions that all books, test data, charges, and other records relating to the rendering of and billing for the costs of designing and constructing the Joint Use Facility shall be preserved by the responsible Authority.

k. Provide which Authority shall hold legal title to the Joint Use Facility, subject to the other Authority's undivided equitable interest in, and the use and benefit of capacity in, the Joint Use Facility.

l. Provide the manner in which purchase and reallocation of capacity in the Joint Use Facility may be accomplished.

m. Provide which authority shall be responsible for the maintenance and operation of the Joint Use Facility.

n. Provide that all operating and maintenance expenses for the Joint Use Facility shall be shared by the Authorities based on their Pro-Rata Share of Capacity reserved by each Authority in the Joint Use Facility.

o. Provide the manner, terms, and conditions in which all operating and maintenance expenses will be budgeted and paid for.

p. Provide the manner, terms and conditions that all books, test data, charges, and other records relating to the rendering of and billing for the costs of operating and maintaining the Joint Use Facility shall be preserved by the responsible Authority.

q. Provide that the Authorities shall install water meters at locations mutually agreed upon by the engineer for West Authority and the engineer for the Fort Bend Authority in order to determine the amount of Water received by each Authority from Houston.

Article V
Water Supply Reductions

5.01 From City of Houston. If Houston is unable to deliver Water to the Authorities at a Joint Use Facility in the capacities that have been reserved for the West Authority and the Fort Bend Authority in such Joint Use Facility, the reduction in Water received by the Authorities at any Joint Use Facility shall be shared by the Authorities in proportion to each Authority's Pro Rata Share of capacity in such Joint Use Facility. For example, if each Authority owns 10MGD of the capacity in a facility (for a total of 20MGD) and Houston reduces the amount of Water it can deliver to the Authorities at such facility to only 15 MGD, then each Authority will be entitled to 7.5 MGD of Water from such facility. This provision shall not apply to water obtained via any non-Joint Use Facilities (e.g., Water delivered by Houston to the West Authority at its Jersey Village Pump Station).

Section 5.02 Due to Joint Use Facility Malfunction or Failure. If there is a reduction in Water delivered by the Authorities at any Joint Use Facility because of a failure or malfunction of the Joint Use Facility, such reduction shall be shared by the Authorities in proportion to each Authority's Pro Rata Share of capacity in such Joint Use Facility. For example, if each Authority owns 10MGD of the capacity in a facility (for a total of 20MGD) and the Joint Use Facility only produces 15 MGD because of failure or malfunction, then each Authority will be entitled to 7.5 MGD of Water from such facility.

Article VI **General Provisions**

Section 6.01 General Cooperation. The Authorities will hold periodic meetings to discuss potential Reservations, potential Joint Use Facilities, the status of ongoing projects, construction and operational issues, general policies and procedures and any other matters that the Authorities deem necessary to ensure that each is informed of the other's activities and to achieve efficiency and cooperation in the administration of this Agreement.

Section 6.02 No Liability for General Obligations. Nothing in this Agreement shall have the effect of causing either Authority to assume, guarantee, or become in any way liable upon any bond, warrant, indebtedness, or other obligation of the other Authority or to undertake any obligation of the other Authority to its inhabitants.

Section 6.03 Payment for Expenses of Agreement. Fort Bend Authority will pay all actual and reasonable engineering and legal fees incurred by the West Authority related to the negotiation and preparation of this Agreement and the First Amendment within 45 days from receipt of an invoice from the West Authority.

Section 6.04 Force Majeure. If any Party is rendered unable, wholly or in part, by force majeure to carry out any of its obligations under this Agreement, other than the payment of money, then the obligations of such Party, to the extent affected by such

force majeure and to the extent that due diligence is being used to resume performance at the earliest practicable time, shall be suspended during the continuance of any inability so caused to the extent provided but for no longer period. Such cause, as far as possible, shall be remedied with reasonable diligence. The term "force majeure", as used herein, shall include, but not be limited to acts of God, strikes, lockouts, or other industrial disturbances, acts of the public enemy, orders of any kind of the Government of the United States or any agency, department or branch thereof, or the State of Texas or any agency, department, branch or political subdivision thereof, or any civil or military authority, insurrections, riots, epidemics, landslides, lightning, earthquakes, fires, hurricanes, storms, floods, washouts, droughts, arrests, restraints of government and people, which are not within the control of the Party claiming such inability, and which such Party could not have avoided by the exercise of due diligence and care.

Section 6.05 Assignability. This Agreement shall not be assignable, in whole or in part, without first obtaining the written consent of all other Parties, which consent shall not be unreasonably withheld.

Section 6.06 Successors and Assigns. This Agreement shall apply to all permitted successors and assigns of the Parties.

Section 6.07 Regulatory Agencies. This Agreement shall be subject to all present and future valid laws, orders, rules and regulations of the United States of America, the State of Texas, and of any regulatory body having jurisdiction.

Section 6.08 No Additional Waiver Implied. The failure of any Party hereto to insist, in any one or more instances, upon performance of any of the terms, covenants or conditions of this Agreement, shall not be construed as a waiver or relinquishment of the future performance of any such term, covenant, or condition by any other Party hereto, but the obligation of such other Party with respect to such future performance shall continue in full force and effect.

Section 6.09 Modification. Except as otherwise provided in this Agreement, this Agreement shall be subject to change or modification only with the written mutual consent of all Parties hereto.

Section 6.10 Parties in Interest. This Agreement shall be for the sole and exclusive benefit of the Parties and their permitted successors and assigns and shall not be construed to confer any rights upon any third party.

Section 6.11 Severability. The provisions of this Agreement are severable, and if any provision or part of this Agreement or the application thereof to any person or circumstance shall ever be held by any court of competent jurisdiction to be invalid or unconstitutional for any reason, the remainder of this Agreement and the application of

such provision or part of this Agreement to other persons or circumstances shall not be affected thereby.

Section 6.12 Merger. This Agreement embodies the entire understanding among the Parties with respect to the terms and conditions upon which they will design, construct, operate, and maintain any joint use water supply, water treatment, and water distribution facilities and all related appurtenances that the Parties determine are necessary for delivery of Water from Houston to customers within the boundaries of the Authorities, and there are no prior effective representations, warranties or agreements between or among the Parties with respect to the terms and conditions upon which the Parties will design, construct, operate, and maintain any joint use water supply, water treatment, and water distribution facilities and all related appurtenances that the Parties determine are necessary for delivery of Water from Houston to customers within the boundaries of the Authorities. This Agreement shall supercede and replace all previous agreements pertaining to the design, construction, operation, and maintenance of any joint use water supply, water treatment, and water distribution facilities and all related appurtenances that the Parties determine are necessary for delivery of Water from Houston to customers within the boundaries of the Authorities between or among the Parties.

Section 6.13 Construction of Agreement. This Agreement shall not be construed in favor of or against any Party on the basis that the Party did or did not author this Agreement.

Section 6.14 Consultation. The Parties each hereby acknowledge, represent and warrant to each other: (i) each has had the opportunity to consult with legal counsel of their own choice and has been afforded an opportunity to review and negotiate this Agreement with assistance of their legal counsel, (ii) each has reviewed this Agreement, and fully understands the effects hereof and all terms and provisions contained herein, and (iii) each has executed this Agreement of its own free will and volition.

Section 6.15 Approval or Consent. Whenever this Agreement requires or permits approval or consent to be hereafter given by any Party, the Parties agree that such approval or consent shall not be unreasonably withheld.

Section 6.16 Applicable Law. This Agreement shall be governed and construed in accordance with the laws of the State of Texas and venue shall be in Fort Bend County, Texas.

Section 6.17 Counterparts. This Agreement may be executed and delivered in any number of counterparts, each of which when so executed and delivered shall be deemed to be an original and all of which counterparts taken together shall constitute

one instrument and agreement. A copy of an executed counterpart delivered by telecopy or PDF shall bind the Party executing that counterpart.

Section 6.18 Notices. Notices required or permitted to be given by any Party to the other hereunder, including bills, shall be deemed to have been received by the Party or entity to whom they are sent, within five (5) days after their deposit in the United States Mail, properly stamped and addressed. The Parties shall have the right from time to time to change their respective address and each shall have the right to specify as its address any other address by at least fifteen (15) days written notice to all other Parties. Notices shall be in writing and shall be mailed to the Parties at the following address:

If to West Authority, to:

West Harris County Regional Water Authority
c/o Allen Boone Humphries Robinson LLP
3200 Southwest Freeway, Suite 2600
Houston, Texas 77027

If to Fort Bend Authority, to:

North Fort Bend Water Authority
c/o Allen Boone Humphries Robinson LLP
3200 Southwest Freeway, Suite 2600
Houston, Texas 77027

Section 6.19 Default. In the event of default by any Party, any Party may employ attorneys to pursue its legal rights; and the prevailing Party shall be entitled to payment by the other Party(ies) of all reasonable attorneys' fees incurred.

Section 6.20: Term. This Agreement shall commence on the date first written above and shall remain in effect for 60 years thereafter, unless terminated earlier pursuant to the provisions hereof or pursuant to the mutual written consent of the Authorities.

Section 5.20: Joint Legal Representation. The West Authority and the Fort Bend Authority requested that Allen Boone Humphries Robinson LLP ("ABHR") represent them in connection with the preparation and review of this Agreement and the First Amendment. ABHR has discussed with the Authorities the advantages and disadvantages of the parties engaging independent counsel to represent them in connection with the preparation and review of this Agreement and the First Amendment because of the potential conflict of interest in ABHR's representation of the Authorities in this matter. With a full understanding of their option to retain

independent counsel or ABHR to represent them in the preparation and review of this Agreement and the First Amendment, and the advantages and disadvantages of either choice, the West Authority and the Fort Bend Authority requested that ABHR represent both parties in the preparation and review of this Agreement and the First Amendment.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the parties hereto have executed this Contract in multiple copies, each of which shall be deemed to be an original, effective on the date of countersignature indicated below.

**WEST HARRIS COUNTY
REGIONAL WATER AUTHORITY**

By: _____
President, Board of Directors

ATTEST

By: _____
Secretary, Board of Directors

**NORTH FORT BEND
WATER AUTHORITY**

By: _____
President, Board of Directors

ATTEST

By: _____
Secretary, Board of Directors

**WATER SUPPLY CONTRACT BETWEEN
THE CITY OF HOUSTON, TEXAS AND
NORTH FORT BEND WATER AUTHORITY**

THIS WATER SUPPLY CONTRACT ("Fort Bend Authority Contract") is made by and between the **CITY OF HOUSTON, TEXAS** ("Houston") and the **NORTH FORT BEND WATER AUTHORITY** (the "Fort Bend Authority").

WITNESSETH:

Recitals

Houston is a municipal corporation and home-rule city, principally located in Harris County, Texas. Houston owns raw water rights and a water treatment and distribution system, and desires to sell water to the Fort Bend Authority.

The Fort Bend Authority is a Texas conservation and reclamation district organized and operating under the provisions of Senate Bill 1798, Seventy Ninth Legislature, Regular Session (2005) (the "Act"), as amended, and the Texas Water Code, as amended. The Fort Bend Authority desires to purchase Water from Houston in order to satisfy Fort Bend Subsidence District regulations.

Houston and the Fort Bend Authority seek to enter into this Fort Bend Authority Contract to allow Houston to provide Water to the Fort Bend Authority on the same terms and conditions as it provides Water to the West Authority under the Contract.

Houston is authorized to enter into this Fort Bend Authority Contract pursuant to its Home Rule Charter, Section 402.021 of the Texas Local Government Code, as amended, and any other available law, as amended.

The Fort Bend Authority is authorized to enter into this Fort Bend Authority Contract pursuant to the provisions of the Act, as amended, and the Texas Water Code, as amended.

NOW, THEREFORE, for and in consideration of the premises and the mutual covenants and agreements herein contained, Houston and Fort Bend Authority do mutually agree as follows:

ARTICLE I

Definitions

Unless the context requires otherwise, the following terms as used in this Contract shall have meanings as follows:

“Advisory Committee” is defined in Section 8.17.

“Annual Audit” is defined in Section 4.06.

“Annual Interest Payment” is defined in Section 3.03.

“Annual New Untreated Water Facilities Payment” is defined in Section 3.02(c).

“Annual O&M Budget” is defined in Section 4.03.

“Annual Outstanding Debt Service” means the amount of debt service (principal and interest) actually owed by Houston during a Houston fiscal year on any and all bonds, notes, or other obligations for construction and acquisition of New Untreated Water Facilities.

“Authority” shall mean the North Fort Bend Water Authority.

“Authority System” shall mean all facilities owned and operated by the Authority to enable the Authority to receive Water from the Houston System, including without limitation, transmission lines, inter-connection lines, storage facilities, booster pumps, meter vaults, casings, air gap or other backflow prevention controls, valves and flow control devices.

“Commencement of Delivery of Water” shall mean commencement of delivery of Water for consumption and shall not mean delivery of Water for line testing or flushing purposes.

“Existing Untreated Water Facilities” means those facilities listed in Exhibit “A.”

“GRP” is defined in Section 8.18.

“Houston System” shall mean all of Houston's Water production, treatment and distribution facilities, including all treatment plants, mains, distribution lines, booster pumps, storage tanks and meter facilities.

“Initial Untreated Water Facilities Demand Allocation” is defined in Section 3.02(a).

“Interest Rate” means the 20 City Municipal Bond Index on the first day of the Houston fiscal year during which the Contract is executed, which the parties hereby agree equals 5.10%.

“Major Rehabilitations” are major capital projects required to maintain and operate the Plant Facilities and Transmission Facilities at their current capacity or as required by applicable regulatory requirements and estimated to cost in excess of \$500,000.

“MGD” shall mean million of gallons per day of Water.

“New Untreated Water Facilities” means any untreated surface water canals, reservoirs, lakes, untreated surface water rights, or other major untreated surface water facilities not listed in Exhibit “A” that are hereafter constructed or acquired by Houston pursuant to Section 3.02(c).

“O&M Expenses” are defined in Section 4.02.

“O&M Reserve” is 25% of the then-current Annual O&M Budget.

“Outstanding Debt” means the amount of principal owed by Houston on any and all bonds, notes, or other obligations for construction and acquisition of Existing Untreated Water Facilities.

“Payment for Existing Untreated Water Facilities” is defined in Sections 3.02 (a), (b), and (c), as applicable.

“Payment for Untreated Water Facilities Costs Avoided” is defined in Section 3.02(c).

“Plant Facilities” means those facilities listed in Exhibit “B” and any additional water treatment facilities agreed to in writing by the Utility Official and the Authority.

“Point(s) of Delivery” shall mean the output flanges of the tap(s) on Houston's System that will serve the Authority under the provisions of this Contract, as more particularly identified and described on Exhibit “C” attached hereto and incorporated herein for all purposes. “Point(s) of Measurement” shall mean the location of the meter(s) at which the Authority's consumption of Water is measured, as more particularly described on Exhibit “C” attached hereto and incorporated herein for all purposes. All Point(s) of Measurement shall be at the Point(s) of Delivery, unless mutually agreed to in writing by the Utility Official and the Authority.

“Reservation” means a written request from the Authority, at the Authority’s option, that is approved in writing by the Utility Official, seeking the Utility Official’s approval to increase the Authority’s then-current Untreated Water Facilities Demand Allocation and/or its Treated Water Facilities Demand Allocation.

“Ten Year Period” is defined in Section 3.02(c).

“Transmission Facilities” shall mean: (i) those transmission lines and facilities described and shown on Exhibit “D” and (ii) any additional transmission lines and facilities agreed to in writing by the Utility Official and the Authority..

“Treated Water Facilities” is defined in Section 3.03.

“Treated Water Facilities Capital Contribution” is defined in Section 3.03.

“Treated Water Facilities Capital Costs” means the actual costs incurred by Houston to construct or acquire the Treated Water Facilities, including engineering, testing services, construction, construction management, right-of-way, legal and auditing expenses, expenses

related to contractor claims, and cost for services of employees of Houston for construction of the Treated Water Facilities.

“Treated Water Facilities Demand Allocation” is defined in Section 3.03.

“Untreated Water Facilities” means the Existing Untreated Water Facilities plus any New Untreated Water Facilities.

“Untreated Water Facilities Demand Allocation” is defined in Section 3.02.

“Utility Official” shall mean the Utility Official of the Department of Public Works and Engineering of Houston, or any other person who may hereafter exercise the functions of said Utility Official.

“Water” shall mean potable treated surface water from the Houston System serving its own inhabitants.

“Water Demand Allocation” shall mean the maximum amount of Water the Authority is entitled to take pursuant to the terms of this Contract and pursuant to the Authority’s then-current Treated Water Facilities Demand Allocation.

ARTICLE II

Construction of Facilities

Section 2.01 Construction by Houston.

Houston shall be responsible for the design, construction, ownership, maintenance and operation of the Untreated Water Facilities and the Treated Water Facilities, which facilities are upstream from the Point(s) of Delivery.

Section 2.02 Construction by the Authority of Certain Facilities.

The Authority shall be responsible for the design, construction, ownership, maintenance and operation of all facilities located downstream of the Point(s) of Delivery necessary to enable it to receive Water at the Point(s) of Delivery. The Authority shall obtain the Utility Official's approval of all plans and specifications of the Authority facilities in the Authority System, which approval shall not be unreasonably delayed or withheld.

Section 2.03 Time of Completion.

If not already constructed, Houston agrees to proceed with due diligence to construct the facilities described in this Article in order to provide the quantities of Water to the Authority required by this Contract.

Section 2.04 Point(s) of Delivery.

The Point(s) of Delivery for Water sold under this Contract shall be located at the physical point(s) of connection between the Houston System and the Authority System shown on

Exhibit "C." Additional Point(s) of Delivery and Point(s) of Measurement may be added from time to time, by mutual agreement of the Authority and the Utility Official.

ARTICLE III

Sale and Delivery of Water

Section 3.01 Delivery of Water.

Subject to the terms and conditions of this Contract, beginning January 1, 2009, and continuing thereafter, Houston shall deliver and make available to the Authority at the Point(s) of Delivery the amount of Water that equals the Water Demand Allocation. If for any reason the Authority takes more Water than its Water Demand Allocation during any given day, the Authority shall pay Houston for operation and maintenance charges associated with such excess Water pursuant to Article IV of this Contract but will not be deemed to have increased its Untreated Water Facilities Demand Allocation or Treated Water Facilities Demand Allocation.

The Authority may, but is not obligated to, purchase Water from Houston in order to satisfy the Authority's year 2020 and year 2030 FBSD conversion requirements. Currently, the Authority's total Water need is projected to be 19.5 MGD for the year 2013, 27 MGD for the year 2020 and 75 MGD for the year 2040. In the event the Authority purchases more than 19.5 MGD from Houston by increasing its Water Demand Allocation by Reservation, the cost sharing formulas and methods of calculating payments by the Authority to Houston that are provided in this Article III shall apply.

The Utility Official shall send the Authority written approval of any Authority Reservation request within ninety (90) days of receipt of same if Houston at the time of the Reservation request has sufficient capacity to serve the increase requested by the Authority. If Houston does not at that time have sufficient capacity to serve the increase requested by the Authority, the Utility Official shall send a written rejection of such Reservation request to the Authority within ninety (90) days of receipt of same, which rejection shall also advise the Authority of what new facilities are necessary to serve the requested Reservation. Unless the Utility Official agrees to a lesser period, the Authority shall provide a Reservation request at least five (5) years prior to the date the Authority requires the increase of its then-current Untreated Water Facilities Demand Allocation and/or its Treated Water Facilities Demand Allocation. The Utility Official shall provide the Authority with a copy of any Reservation request submitted by the North Harris County Regional Water Authority or the West Harris County Regional Water Authority within twenty (20) days of the Utility Official's receipt of same.

Section 3.02 Untreated Water Capital Costs.

Untreated Water Facilities Demand Allocation shall mean 19.5 MGD; provided, however, that in the event the Authority increases its Untreated Water Facilities Demand Allocation pursuant to the terms of this Contract, then Untreated Water Facilities Demand Allocation shall mean such total increased amount.

Section 3.02(a) Initial Untreated Water Facilities Demand Allocation.

On no more than three (3) occasions prior to the year 2010, the Authority may, at its option, purchase any portion(s) of its 19.5 MGD Untreated Water Facilities Demand Allocation (the "Initial Untreated Water Facilities Demand Allocation") by payment to Houston of the Payment for Existing Untreated Water Facilities pursuant to this Section 3.02(a). The Authority shall be obligated to purchase all of its Initial Untreated Water Facilities Demand Allocation no later than December 31, 20092012, by payment to Houston of the Payment for Existing Untreated Water Facilities pursuant to this Section 3.02(a). The Payment for Existing Untreated Water Facilities under this Section 3.02(a) shall be calculated as follows:

Payment for Existing Untreated Water Facilities = (A/B)C

Where: "A" is the portion (in MGD) of the Initial Untreated Water Facilities Demand Allocation to be purchased.

"B" is the total amount of untreated surface water (in MGD) sold to Houston's water customers during Houston's fiscal year ending June 30, 2001, including such untreated surface water received at Houston's water treatment plants as well as the billable quantity (including any take-or-pay amounts) taken by Houston's untreated surface water customers, but excluding untreated surface water loss by evaporation or leakage.

"C" is the Outstanding Debt as shown on Exhibit "E", items 1-8 inclusive, for all Existing Untreated Water Facilities (such facilities being shown on Exhibit "A").

Within sixty (60) days after the Commencement of Delivery of Water, Houston shall calculate, according to the above formula, the Payment for Existing Untreated Water Facilities for the first portion of the Initial Untreated Water Facilities Demand Allocation to be purchased and send written notice to the Authority showing the amount of such payment and the calculation therefor. (In such calculation, Houston shall only include actual Outstanding Debt incurred by Houston as of the date of such notice, and no estimated Outstanding Debt shall be included.) The Authority shall make such Payment for Existing Untreated Water Facilities to Houston for

the first portion of the Initial Untreated Water Facilities Demand Allocation no later than sixty (60) days after the date the Authority receives such notice from Houston.

For each portion of the Initial Untreated Water Facilities Demand Allocation that the Authority purchases after the first portion, the Authority shall pay Houston the Payment for Existing Untreated Water Facilities no later than sixty (60) days after the Authority has sent written notice to Houston that it intends to purchase an additional portion of the Initial Untreated Water Facilities Demand Allocation. Effective immediately upon the Authority's payment for each portion of the Initial Untreated Water Facilities Demand Allocation subsequent to the first portion, the Authority shall be entitled to take such additional Water.

In the event the Authority, as indicated by a written notice from the Authority to Houston, seeks to pay Houston the Payment for Existing Untreated Water Facilities over a maximum period of fifteen (15) years (with interest) in lieu of a lump sum payment, the Authority and the Utility Official shall in good faith negotiate a separate written agreement providing for such payment terms. If the Authority and the Utility Official are unable to enter into a separate written agreement upon terms mutually agreeable to both parties, then the Authority shall be required to pay the Payment for Existing Untreated Water Facilities to Houston as a lump sum payment.

In the event Houston constructs or acquires New Untreated Water Facilities for any reason, the Authority shall, in addition to the Payment for Existing Untreated Water Facilities paid under this Section 3.02(a), owe Houston the Annual New Untreated Water Facilities Payment, as provided in Section 3.02(c)(2).

Exhibit "E" hereto includes: (i) the first portion of the Initial Untreated Water Facilities Demand Allocation to be purchased by the Authority, (ii) the Outstanding Debt; and (iii) the total amount (in MGD) of factor "B" for the calculation of the Payment for Existing Untreated Water Facilities under this Section 3.02(a).

Section 3.02(b) Reservation Not Requiring Construction of New Untreated Water Facilities.

In the event the Authority submits a Reservation request on or after January 1, 2010, to the Utility Official for an increase in its Untreated Water Facilities Demand Allocation and Houston then has capacity available in the Existing Untreated Water Facilities to serve such increase, the Utility Official shall, within ninety (90) days of the Authority's request for the Reservation, send written approval of such Reservation request to the Authority. For the

approved Reservation, the Authority shall owe Houston a Payment for Existing Untreated Water Facilities under this Section 3.02(b), calculated as follows:

Payment for Existing Untreated Water Facilities = (A/B)C

Where: “A” is the amount (in MGD) of the increase of the Authority’s Untreated Water Facilities Demand Allocation pursuant to a Reservation under this Section 3.02(b).

“B” is the total amount of untreated surface water (in MGD) sold to Houston’s water customers during Houston’s fiscal year that precedes the fiscal year during which the Authority’s Reservation request is approved in writing by the Utility Official, including such untreated surface water received at Houston’s water treatment plants as well as billable quantity (including any take-or-pay amounts) taken by Houston’s untreated surface water customers, but excluding untreated surface water loss by evaporation or leakage.

“C” is the Outstanding Debt for all Existing Untreated Water Facilities (such facilities being shown on Exhibit “A”) as of the first day of Houston’s fiscal year in which the Authority’s Reservation request is approved in writing by the Utility Official.

If the Authority submits a Reservation request to the Utility Official prior to January 1, 2010, and Houston then has capacity available in the Existing Untreated Water Facilities to serve such increase, then, for purposes of calculating the Payment for Existing Untreated Water Facilities under this Section 3.02(b) for such Reservation only, factors “B” and “C” of Section 3.02(a) shall be used instead of factors “B” and “C” of this Section 3.02(b).

The Authority shall pay Houston the Payment for Existing Untreated Water Facilities under this Section 3.02(b) no later than sixty (60) days after the Authority sends written notice to Houston that the Authority requires Water from its Reservation made pursuant to this Section 3.02(b). The Authority shall send notice to Houston that the Authority requires Water from its Reservation no later than five (5) years after the date of the Utility Official’s written approval of the Reservation.

In the event the Authority, as indicated by a written notice from the Authority to Houston, seeks to pay Houston the Payment for Existing Untreated Water Facilities over a maximum period of fifteen (15) years (with interest) in lieu of a lump sum payment, the Authority and the Utility Official shall in good faith negotiate a separate written agreement providing for such payment terms. If the Authority and the Utility Official are unable to enter into a separate written agreement upon terms mutually agreeable to both parties, then the

Authority shall be required to pay the Payment for Existing Untreated Water Facilities to Houston as a lump sum payment.

In the event Houston constructs or acquires New Untreated Water Facilities for any reason, the Authority shall, in addition to the Payment for Existing Untreated Water Facilities, if any, paid under this Section 3.02(b), owe Houston the Annual New Untreated Water Facilities Payment, as provided in Section 3.02(c)(2).

Section 3.02(c) New Untreated Water Facilities.

In the event the Authority sends a Reservation request to the Utility Official for an increase in its Untreated Water Facilities Demand Allocation and Houston does not then have capacity available in the Existing Untreated Water Facilities to serve such increase, the Utility Official shall send a written rejection of such Reservation request to the Authority within ninety (90) days of the Utility Official's receipt of such Reservation request, which rejection shall also advise the Authority of what New Untreated Water Facilities are necessary to serve the requested Reservation. If the Authority thereafter seeks to increase its Untreated Water Facilities Demand Allocation, it shall send written notice to the Utility Official of the Authority's need for New Untreated Water Facilities and the amount (in MGD) of its requested Reservation. After receipt of such Authority notice, Houston shall promptly construct or acquire New Untreated Water Facilities and the Authority shall owe Houston the Payment for Existing Untreated Water Facilities plus the Annual New Untreated Water Facilities Payment under this Section 3.02(c). Upon completion of the New Untreated Water Facilities necessary to serve the Authority's requested Reservation, the Authority's Reservation request shall be deemed approved by the Utility Official.

In the event Houston constructs or acquires New Untreated Water Facilities for any reason but the Authority does not desire capacity in the New Untreated Water Facilities and accordingly does not make a Reservation request under this Section 3.02(c), the Authority shall owe Houston the Annual New Untreated Water Facilities Payment under Section 3.02(c)(2) (based on the Authority's then-current Untreated Water Facilities Demand Allocation), but the Authority shall not owe Houston the Payment for Existing Untreated Water Facilities under Section 3.02(c)(1).

The Payment for Existing Untreated Water Facilities, if due under this Section 3.02(c), and the Annual New Untreated Water Facilities Payment under this Section 3.02(c) shall be calculated based on the formula:

$$(A/B)C + (D/E)F$$

and shall be calculated as follows:

(1) Payment for Existing Untreated Water Facilities = $(A/B)C$

Where: "A" is the amount (in MGD) of the increase of the Authority's Untreated Water Facilities Demand Allocation pursuant to a Reservation under this Section 3.02(c).

"B" is the total amount of untreated surface water (in MGD) sold to Houston's water customers during Houston's fiscal year that precedes the fiscal year during which the Utility Official's written statement regarding lack of available capacity is issued, including such untreated surface water received at Houston's water treatment plants as well as billable quantity (including any take-or-pay amounts) taken by Houston's untreated surface water customers, but excluding untreated surface water loss by evaporation or leakage.

"C" is the Outstanding Debt for all Existing Untreated Water Facilities (such facilities being shown on Exhibit "A") as of the first day of Houston's fiscal year in which the Utility Official's written statement regarding lack of available capacity is issued.

(2) Annual New Untreated Water Facilities Payment = $(D/E)F$

Where: "D" is the then-current Untreated Water Facilities Demand Allocation, plus the amount, if any, (in MGD) that the Authority seeks to increase its Untreated Water Facilities Demand Allocation upon completion of the New Untreated Water Facilities, as identified in the applicable Authority Reservation request, if any, pursuant to this Section 3.02(c).

"E" is the total amount of untreated surface water (in MGD) sold to Houston's water customers during the Houston fiscal year that precedes the date Houston calculates the Annual New Untreated Water Facilities Payment, including such untreated surface water received at Houston's water treatment plants as well as the billable quantity (including any take-or-pay amounts) taken by Houston's untreated surface water customers, but excluding untreated surface water loss by evaporation or leakage.

"F" is the Annual Outstanding Debt Service for all New Untreated Water Facilities as of the first day of the Houston fiscal year in which Houston calculates the Annual New Untreated Water Facilities Payment.

The Authority shall pay Houston the Payment for Existing Untreated Water Facilities, if due under this Section 3.02(c), no later than sixty (60) days after the Authority receives written certification from the Utility Official that construction of the New Untreated Water Facilities necessary to serve the Authority's requested Reservation is complete.

In the event the Authority, as indicated by a written notice from the Authority to Houston, seeks to pay Houston the Payment for Existing Untreated Water Facilities over a maximum period of fifteen (15) years (with interest) in lieu of a lump sum payment, the Authority and the Utility Official shall in good faith negotiate a separate written agreement providing for such payment terms. If the Authority and the Utility Official are unable to enter into a separate written agreement upon terms mutually agreeable to both parties, then the Authority shall be required to pay the Payment for Existing Untreated Water Facilities to Houston as a lump sum payment.

Within ninety (90) days after Houston's first issuance of bonds, notes, or other obligations to finance any New Untreated Water Facilities pursuant to this Section 3.02(c), Houston shall calculate the Annual New Untreated Water Facilities Payment according to the formula above and send written notice to the Authority of Houston's calculation and the amount of the payment due from the Authority for the fiscal year in which Houston issues such bonds, notes or other obligations. For each Houston fiscal year thereafter, Houston shall calculate the Annual New Untreated Water Facilities Payment according to the above formula and send written notice to the Authority of Houston's calculation and the amount of the payment due from the Authority within ninety (90) days of the last day of the previous Houston fiscal year. Each year, the Authority shall pay Houston the Annual Untreated Water Facilities Payment within sixty (60) days of its receipt of such notice from Houston. The Authority shall owe Houston the Annual Untreated Water Facilities Payment each year during the life of the Houston bonds, notes or other obligations used to finance the New Untreated Water Facilities or until this Contract is no longer in effect, whichever occurs first. To assist the Authority in its financial planning, Houston shall, prior to the last day of each Houston fiscal year, send a written statement to the Authority of Houston's reasonable estimate of the Annual Outstanding Debt Service for the following three (3) Houston fiscal years.

Houston shall maintain each Annual New Untreated Water Facilities Payment in an interest-bearing account, which interest shall be credited to the account of the Authority.

Houston shall use the Annual New Untreated Water Facilities Payments, and interest accrued thereon, only for the purpose of paying Annual Outstanding Debt Service. Within one hundred eighty (180) days of the last day of each Houston fiscal year, Houston shall prepare an accounting of the Annual Outstanding Debt Service actually paid by Houston on the New Untreated Water Facilities during such fiscal year. Houston shall engage an independent certified public accounting firm to audit such accounting. Houston and the Authority agree to “true-up” the Annual New Untreated Water Facilities Payment made by the Authority such that if the Authority has underpaid, taking into account interest accrued, it will pay Houston such shortfall within sixty (60) days of receiving the final audit, and Houston agrees to refund to the Authority any overpayment, taking into account interest accrued, within sixty (60) days of Houston receiving the final audit if the Authority overpaid.

In the event Houston intends to construct or acquire New Untreated Water Facilities for any reason, Houston shall send written notice to the Authority of such intent at least one hundred eighty (180) days before Houston’s first issuance of bonds, notes or other obligations to finance such New Untreated Water Facilities. If the Authority desires to increase its Untreated Water Facilities Demand Allocation, it shall submit a Reservation request pursuant to this Section 3.02(c) within ninety (90) days after receipt of such notice of intent from Houston.

If the Authority’s Untreated Water Facilities Demand Allocation is increased pursuant to a Reservation under this Section 3.02(c), then the payment for all subsequent Reservations of the Untreated Water Facilities Demand Allocation (regardless of whether or not they require construction of New Untreated Water Facilities) shall be calculated and made pursuant to the hereinbefore formulas of this Section 3.02(c) and not Sections 3.02(a) or (b). If within ten (10) years after Houston’s first issuance of bonds, notes, or other obligations to finance New Untreated Water Facilities pursuant to this Section 3.02(c) (the “Ten Year Period”), the Authority submits a Reservation request that does not require the construction of New Untreated Water Facilities, the Authority shall pay Houston the “Payment for Untreated Water Facilities Costs Avoided.” The Payment for Untreated Water Facilities Costs Avoided shall equal the total dollar amount, without interest or penalty, of the Payment for Existing Untreated Water Facilities and the total accrued Annual New Untreated Water Facilities Payments which would have been paid by the Authority, according to the hereinbefore formulas of this Section 3.02(c), had the Authority made a Reservation request for such increase prior to Houston’s first issuance of

bonds, notes, or other obligations to finance the New Untreated Water Facilities. The Payment for Untreated Water Facilities Costs Avoided shall be made to Houston within one hundred twenty (120) days of the Authority's receipt of the Utility Official's approval of such later Reservation request. The Authority shall not owe Houston the Payment for Untreated Water Facilities Costs Avoided if: (i) the Authority submits a Reservation request within the Ten Year Period that requires the construction of New Untreated Water Facilities; or (ii) the Authority submits a Reservation request, regardless of whether or not it requires construction of New Untreated Water Facilities, after the Ten Year Period.

Section 3.03 Treated Water Capital Costs.

Treated Water Facilities Demand Allocation shall mean 19.5 MGD; provided, however, that in the event the Authority increases its Treated Water Facilities Demand Allocation pursuant to the terms of this Contract, then Treated Water Facilities Demand Allocation shall mean such total increased amount.

Except as provided elsewhere in this Section 3.03, the Authority shall pay Houston its pro-rata Treated Water Facilities Capital Contribution for the Plant Facilities and the Transmission Facilities (collectively, the "Treated Water Facilities") as follows: (i) for those Treated Water Facilities shown on Exhibits "B" and "D", ~~upon the later of (A) ninety (90) one hundred eighty (180) days after the effective date of this Contract or (B) the date that the Authority's GRP is certified by the FBSD, but in no event later than July 1, 2008;~~ (ii) for Treated Water Facilities constructed prior to the date of the Utility Official's written consent of any Reservation request from the Authority, no later than sixty (60) days after the Authority receives the Utility Official's written consent for the Authority to increase its Treated Water Facilities Demand Allocation; and (iii) for Treated Water Facilities not constructed prior to the date of the Utility Official's written consent of any Reservation request from the Authority, sixty (60) days after receipt of the Utility Official's reasonable estimate of the Treated Water Facilities Capital Contribution.

The cost for any Reservation of Treated Water Facilities Demand Allocation shall be in accordance with the formulas set forth in this Section 3.03. Upon request from the Authority, Houston shall promptly provide the Authority with Houston's cost calculation, in accordance with the cost formulas in this Section 3.03, for any Reservation of the Treated Water Facilities Demand Allocation, that at that time may be under consideration by the Authority. Any Authority written request for such a Reservation shall include Houston's cost calculation. The

Utility Official shall either approve or reject, in writing, the Authority's Reservation request within ninety (90) days after receipt of such request. If the Utility Official fails to approve such request within such ninety (90)-day period, the Reservation request shall be deemed rejected. A Reservation for Treated Water Facilities not constructed prior to the date of the Reservation request must be approved by the Board of Directors for the Authority before Houston will commence design and construction of the designated Treated Water Facilities.

(1) For Treated Water Facilities that are in service before the effective date of the Contract (which includes all Treated Water Facilities shown on Exhibits "B" and "D") or for Treated Water Facilities that are in service before the date of any Reservation request, the Authority's pro-rata Treated Water Facilities Capital Contribution is based on the formula:

$$\text{Treated Water Facilities Capital Contribution} = (A - B) \times (C/D)$$

(2) For Treated Water Facilities that are not in service before the effective date of any Reservation request, the Authority's pro-rata Capital Contribution is based on the formula:

$$\text{Treated Water Facilities Capital Contribution} = A \times (C/D)$$

Where: "A" is the Treated Water Facilities Capital Costs of the Treated Water Facilities.

"B" is the amount of depreciation calculated by applying the 50-year straight line depreciation method for the period of time running between the in-service date of the facilities and the effective date of the Contract, or for any Reservation made by the Authority, the date of such Reservation request (i.e. 2% of Treated Water Facilities Capital Costs per year).

"C" is the Treated Water Facilities Demand Allocation in MGD to be purchased.

"D" is the capacity in MGD of the particular facility. The capacity for transmission lines shall be calculated at a flow rate of 5 feet per second.

The Authority may defer payment of the Treated Water Facilities Capital Contribution for the 19.5 MGD Treated Water Facilities Demand Allocation for the period of time running from the date payment is due pursuant to this Section 3.03 to the date payment is made, but no

later than commencement of the delivery of Water, by annually paying Houston an annual interest payment (“Annual Interest Payment”). The Annual Interest Payment shall be calculated by multiplying the Treated Water Facilities Capital Contribution times the Interest Rate. If the Authority does not pay Houston the Treated Water Facilities Capital Contribution on the date payment is due pursuant to this Section 3.03, then the Authority shall pay Houston the Annual Interest Payment on such date and, thereafter, on the anniversary date of such payment until the Authority has paid Houston the Treated Water Facilities Capital Contribution. Because the Annual Interest Payment constitutes the payment of annual interest in advance, in the event the Authority pays Houston the Treated Water Facilities Capital Contribution prior to the anniversary date of any Annual Interest Payment made by the Authority, Houston shall, within sixty (60) days of its receipt of the Treated Water Facilities Capital Contribution, refund to the Authority, with interest at the Interest Rate, the pro-rated portion of such Annual Interest Payment based on the amount of days remaining in such annual period. Houston shall not be required to deliver Water to the Authority until the Authority has paid Houston its Treated Water Facilities Capital Contribution for the Treated Water Facilities Demand Allocation of 19.5 MGD, plus any interest costs due from the Authority to Houston pursuant to this paragraph.

In the event there is no final design and construction for the Treated Water Facilities on the date that any Reservation request is submitted by the Authority to the Utility Official, the pro-rata Treated Water Facilities Capital Contribution shall be paid in two (2) increments:

(i) For the pro-rata Treated Water Facilities Capital Contribution for design engineering services, including surveys, soils boring and testing, as well as design services, the Utility Official must provide the Authority a reasonable estimate of the pro-rata Treated Water Facilities Capital Contribution for such services based on Houston’s contract with the design engineer. The Authority shall deposit with Houston the amount of the Utility Official’s reasonable estimate within sixty (60) days of its receipt of such estimate.

(ii) For the pro-rata Treated Water Facilities Capital Contribution for the cost of construction of the Treated Water Facilities, the Utility Official must provide the Authority a reasonable estimate of the pro-rata Treated Water Facilities Capital Contribution for the construction based on the lowest responsible bid received plus estimated costs for construction management, engineering, testing services and a 15% contingency. The Authority shall deposit

with Houston the amount of the Utility Official's reasonable estimate within sixty (60) days of its receipt of such estimate.

All Authority pro-rata Treated Water Facilities Capital Contribution deposits shall be kept by Houston in an account. Houston shall spend money from the account only for Treated Water Facilities Capital Costs and/or debt service.

Within ninety (90) days of the acceptance of the completed construction of the subject Treated Water Facilities, Houston shall cause an accounting to be made of the Treated Water Facilities Capital Costs. Houston shall engage an independent certified public accounting firm to audit its accounting. As soon as the firm has completed the audit, Houston shall submit the audited accounting to the Authority. The accounting shall state the difference between the estimated Treated Water Facilities Capital Costs that were paid by the Authority and the actual Treated Water Facilities Capital Costs.

If the actual Treated Water Facilities Capital Costs, as determined by the audited accounting, are less than the estimated Treated Water Facilities Capital Costs paid by the Authority, resulting in an overpayment by the Authority of its pro-rata share, Houston shall refund such difference with actual interest accrued, within ninety (90) days of the date of the receipt of the accounting by the Authority.

If the actual Treated Water Facilities Capital Costs, as determined by the accounting, are more than the estimated Treated Water Facilities Capital Costs paid by the Authority, resulting in an underpayment by the Authority of its pro-rata share, the Authority shall pay Houston, within ninety (90) days of the date of the receipt of the accounting by the Authority, such difference with interest calculated at the actual interest rate of the debt incurred by Houston in order to pay for such difference, running from the time Houston paid for the Authority's pro-rata share of Treated Water Facilities Capital Costs (resulting from such Authority underpayment) to the time such underpayment is paid to Houston by the Authority.

The Treated Water Facilities applicable to the Authority are shown on Exhibits "B" and "D" and the corresponding Treated Water Facilities Capital Contribution calculations for such Treated Water Facilities are shown on Exhibit "F."

ARTICLE IV

Operation and Maintenance Charges

Section 4.01 In General

It is expressly understood by the Authority that it shall directly reimburse Houston on a periodic basis for the expenses incurred in producing and treating the Water delivered to the Authority. The Authority pledges to enact rates and fees for its customers sufficient to pay the O&M Expenses.

Section 4.02 O&M Expenses Calculation

For the purposes of this Contract, the yearly O&M Expenses for the Authority are computed according to the following formula:

$$\text{O\&M Expenses} = \frac{(A \times C)}{B} + \frac{(A \times D)}{E} + F$$

Where: "A" is the amount of Water (in millions of gallons) taken by the Authority at the Point(s) of Delivery, as measured by the measuring equipment pursuant to Article VII, during the given year.

"B" is the total amount (in millions of gallons) of Water produced by the Plant Facilities during the given year.

"C" means all costs and expenses incurred by Houston during the given year (whether incurred by Houston through its own staff or independent contractors) for the maintenance and operation of the Plant Facilities, including (i) chemicals, labor, power, testing, permits, insurance, and other related costs, necessary for the efficient maintenance and operation of the Plant Facilities in full compliance with this Contract and all applicable regulatory requirements and the preparation costs of the Annual Audit; (ii) necessary repairs and replacements to the Plant Facilities; and (iii) improvements and betterments to maintain the Plant Facilities in proper operation and to comply with this Contract and all applicable regulatory requirements. The above costs and expenses include a proportionate share of administrative costs for management and support, resource management, planning and operations, the Office of the Director of Public Works as well as other indirect costs in the allocation percentage included in Houston's most recent finalized independent rate study. (The portion of such study showing such allocation percentage is attached hereto as Exhibit "G.") At the time of execution of this Contract, this allocation is 26.84% Except as provided herein, no cost of Houston's government not directly related to the maintenance and operation of the Plant Facilities shall be included in the factor "C."

"D" means all costs and expenses incurred by Houston during the given year (whether incurred by Houston through its own staff or by independent contractors) for the maintenance and operation of the Untreated Water Facilities,

including, (i) chemicals, labor, power, testing, permits, insurance, and other related costs, necessary for the efficient maintenance and operation of the Untreated Water Facilities in full compliance with this Contract and all applicable regulatory requirements and the preparation costs of the Annual Audit; (ii) necessary repairs and replacements to the Untreated Water Facilities; and (iii) improvements and betterments to maintain the Untreated Water Facilities in proper operation and to comply with this Contract and all applicable regulatory requirements. No cost of Houston's government not directly related to the maintenance and operation of the Untreated Water Facilities shall be included in the factor "D".

"E" is the total amount of untreated surface water (in millions of gallons) sold to Houston's water customers during the given year, including such untreated surface water received at Houston's water treatment plants as well as the billable quantity (including any take-or-pay amounts) taken by Houston's untreated surface water customers, but excluding untreated surface water loss by evaporation or leakage.

"F" is the Authority's pro rata share of the cost during the given year of (i) Major Rehabilitations and (ii) the repair and/or replacement of any portion of the Transmission Facilities. As used in this definition, the ratio for determining the share of the cost borne by the Authority is a fraction, the numerator of which is the Authority's then-current Treated Water Facilities Demand Allocation (in MGD) and the denominator of which is the total capacity (in MGD) of the entire facility subject to the Major Rehabilitation, repair, or replacement. The reasonable cost for such repairs, replacements and/or rehabilitations includes the same classes of costs identified in factor "C" above. Except as provided herein, no cost of Houston's government not directly related to the Major Rehabilitations or the repair and/or replacement of any portion of the Transmission Facilities shall be included in the factor "F." The capacities (in MGD) of the Plant Facilities and Transmission Facilities are shown in Exhibit "HB."

Section 4.03 Annual O&M Budget

Ninety (90) days prior to the commencement of delivery of Water under this Contract, and ninety (90) days prior to the beginning of each Houston fiscal year thereafter, Houston shall provide the Authority for its review and comment the proposed Annual O&M Budget showing (i) an estimate of the Authority's O&M Expenses for the coming fiscal year, (ii) the proposed monthly payments to be paid by the Authority for the fiscal year (1/12 of the Annual O&M Budget), and (iii) the amount of the O&M Reserve. Houston will also include in the proposed and final Annual O&M Budget the estimated water production by the Plant Facilities and the Untreated Water Facilities as well as the anticipated amount of Water to be sold to the Authority.

The Authority will have sixty (60) days to review and comment on the proposed Annual O&M Budget, and Houston agrees to provide such records and cost documents in its possession as the Authority may reasonably require. At the end of the 60-day period Houston will consider

the Authority's comments and issue the final Annual O&M Budget ("Annual O&M Budget") and invoice.

Section 4.04 Payments of Authority O&M Expenses

Within thirty (30) days of its receipt of Houston's invoice and final Annual O&M Budget, the Authority shall pay Houston the O&M Reserve and the first monthly payment of O&M Expenses. Each month thereafter, the Authority shall make monthly payments to Houston in such equal amounts as required in the applicable Annual O&M Budget. Payments shall be due on the first of each month, and any payment more than thirty (30) days late shall bear interest at the rate applicable under Chapter 2251, Texas Government Code. Houston shall maintain the O&M Reserve in an interest-bearing account, which interest shall be credited to the account of the Authority. Any portion of a monthly O&M Expenses payment made by the Authority in excess of the actual monthly O&M Expenses incurred by Houston shall be credited to the account of the Authority in the O&M Reserve.

Houston may use funds from the O&M Reserve only for O&M Expenses. Houston will use the funds out of the O&M Reserve to pay O&M Expenses only if the monthly O&M Expenses payment made by the Authority is less than the actual monthly O&M Expenses incurred by Houston or if the payment of the monthly O&M Expenses is not timely made to Houston by the Authority. Houston may invoice the Authority for any shortfall in the O&M Reserve in order for the O&M Reserve to equal the amount established in the Annual O&M Budget, provided that any such invoice must include an accounting to justify the additional payment to the O&M Reserve. The Authority shall pay such invoices within sixty (60) days of its receipt of Houston's accounting and invoice for replenishment of the O&M Reserve.

Section 4.05 Major Rehabilitations

Houston shall perform such Major Rehabilitations as necessary for the operation and maintenance of the Plant Facilities and Transmission Facilities. Except for emergencies involving health or safety, Houston shall submit plans and specifications for such Major Rehabilitations to the Authority for review and comment at least sixty (60) days prior to Houston advertising the project for bids. Costs for Major Rehabilitations shall be paid by the Authority in the ratio of its Treated Water Facilities Demand Allocation to the capacity of the facility requiring the Major Rehabilitation, as applicable. Provided, however, the Authority shall never be required to pay for any portion of replacements, additions or improvements to facilities that provide capacity or Water solely to other customers.

Section 4.06 Annual Audit

Within one hundred eighty (180) days of the close of each Houston fiscal year, Houston shall prepare an accounting of the O&M Expenses ("Annual Audit"). Houston shall engage an independent certified public accounting firm to audit the accounting of costs of the O&M Expenses. As soon as the firm has completed the audit, Houston shall submit the audited accounting to the Authority. Houston and the Authority agree to "true-up" the previous payments made for O&M Expenses during the fiscal year such that if the Authority has underpaid it will make timely payment of all O&M Expenses owed in the next monthly billing following the audit, and Houston agrees to give credit to the Authority if it has overpaid O&M Expenses for the fiscal year, such credit, including any interest accrued in the O&M Reserve on such overpayments, shall be given on the next monthly billing(s) following the audit.

Houston agrees to provide both the independent auditor and the Authority all expenses, meter readings and cost data required for the audit. The audit must include an itemization for the Authority of all costs and meter recordings used to compute the O&M Expenses.

ARTICLE V

Term Provision

Section 5.01 Term.

The Contract shall be in force and effect from and after the execution hereof by the Houston Controller and shall expire at noon on the fortieth (40th) anniversary of the date of countersignature by Houston's Controller. To the extent authorized by law, as amended, Houston agrees, if requested in writing by the Authority, to execute a written extension of the term of this Contract for an additional twenty (20) years beyond such forty (40) year term. The Houston Mayor shall be authorized to execute such written extension. At such time as this Contract is no longer in force and effect, if requested in writing by the Authority, Houston agrees to continue to provide water services to the Authority upon the payment of reasonable rates and charges therefor which take into account the capital payments paid by the Authority to Houston pursuant to this Contract and subject to the availability of Water. The immediately preceding sentence shall survive the expiration or termination of this Contract.

ARTICLE VI

Performance by the Parties

Section 6.01 Construction and Maintenance of Certain Facilities between the Point(s) of Delivery and Point(s) of Measurement.

With respect to Water handling facilities, if any, located between the Point(s) of Delivery and the Point(s) of Measurement shown in Exhibit "C," the Authority and Houston specifically agree:

- (1) That all such facilities, other than the measurement equipment itself, shall be and remain the property of the Authority.
- (2) That the Authority shall take all responsible steps to maintain such facilities and to prevent leaks or discharges from such facilities and shall not suffer, permit, cause or allow any water to be taken or used from such facilities, except through the measuring equipment.
- (3) That the Authority shall repair any such leak or discharge at once upon receiving notice thereof and pay Houston the cost of any Water lost by reason of such a leak or discharge. The Authority shall make payment to Houston for such Water only by Houston including the amount of such Water in the factor "A" defined in Section 4.02. Calculation of the amount of Water lost by reason of such leak shall be estimated on a basis mutually agreed to between the Authority and the Utility Official.
- (4) That the Authority shall correct or repair any damage caused by any such leak or discharge.

Section 6.02 Tap and Meter.

The Authority shall construct, at its sole cost, water connection taps at the Point(s) of Delivery and set the water meter(s) at the Point(s) of Measurement under the mutual approval and inspection of the Utility Official and the Authority. The Authority also agrees to provide a telephone and electronic connection accessible at the Point(s) of Measurement and allow Houston to connect remote meter reading equipment to such telephone line.

Before any connection, the Authority System shall be chlorinated in accordance with requirements approved by the Utility Official.

Section 6.03 Delivery Limitations.

The Authority shall not be guaranteed any specific quantity or pressure of Water whenever Houston's water supply is limited or when Houston's equipment may become

inoperative due to unforeseen breakdown or scheduled maintenance and repairs. Should delivery of Water be limited as a result of scheduled maintenance or repairs, Houston shall provide written notification of such scheduled maintenance or repairs at least 30 days prior to same. Houston is in no case to be held to any liability for failure to furnish any specific amount or pressure of Water; provided, however, that Houston shall use reasonable efforts to deliver the Water required by this Contract and to maintain sufficient pressure at the Point(s) of Delivery in order for the Authority to receive the Water it is entitled to under this Contract. Notwithstanding the other provisions of this Section 6.03, Houston may reduce the supply of Water only in accordance with the laws of the State of Texas, particularly Section 11.039(a) of the Texas Water Code, as may be amended from time to time.

Section 6.04 Backflow Requirements.

On or before the commencement of delivery of Water to the Authority pursuant to this Contract, the Authority shall have installed an air gap or backflow prevention device, in accordance with the specifications approved by the Utility Official, at either: (i) at or near the Point of Delivery; or (ii) at each location where the Authority System connects to the water system of an Authority customer. The Authority and the Utility Official shall agree in writing as to the location of all air gaps or backflow prevention devices installed by the Authority.

Section 6.05 Water Conservation.

The Authority shall approve and implement a water conservation program as required by the Texas Commission on Environmental Quality pursuant to 30 T.A.C. § 288, as may be amended from time to time.

Section 6.06 Inspections.

The Authority agrees that Houston may conduct inspections from time to time to determine that no conditions exist in the Authority System and connections to its customers' premises which would or might adversely affect the Houston System. Houston shall notify the Authority should such condition exist. Such notification shall be provided in writing and shall be made within forty-eight (48) hours of discovering any such condition.

Section 6.07 Inspection of Records.

With reasonable notice, either party shall allow the other the opportunity to examine records from the other party for the purpose of evaluating the costs for which payments are requested or required hereunder.

Section 6.08 Payment.

In the event the Authority fails to timely tender payment of any amount within the periods established herein, and such failure continues for sixty (60) days after the notice to the Authority of such default, Houston may suspend delivery of Water, but the exercise of such right shall be in addition to any other remedy available to Houston.

Section 6.09 Title to and Responsibility for Water.

Title to, possession, and control of Water shall remain with Houston until it passes through the Point(s) of Delivery, where title to, possession, and control of the Water shall pass from Houston to the Authority.

ARTICLE VII

Measuring Equipment

Section 7.01 In General.

At the Authority's own cost and expense, the Authority shall provide for installation at the Point(s) of Measurement, measuring equipment, properly equipped with meters and devices of standard type for measuring accurately the quantity of Water delivered under this Contract, with ability to measure the quantity of Water delivered within the accuracy tolerance of two percent (2%). Such measuring equipment shall be approved by the Authority and the Utility Official, but shall become the property of Houston after installation.

Section 7.02 Access.

During any reasonable hours, Houston and the Authority shall have access to all measuring equipment. The Authority shall have access to all records pertinent to determining the measurement and quantity of Water actually delivered, but the reading of the meters for purposes of the calculation of any payment required from the Authority under this Contract shall be done by Houston.

Section 7.03 Testing of Meter.

Houston shall maintain the measuring equipment within the accuracy tolerance specified in Section 7.04 by periodic tests. Houston shall conduct such tests at least once every twelve (12) months and shall notify the Authority at least forty-eight (48) hours in advance of the time and location at which such tests are to be made. If the Authority requests an additional test within twelve (12) months, Houston shall charge the Authority an amount equal to Houston's cost to perform such test, unless the test reveals that the equipment registers greater than one hundred and two percent (102%) for a given flow rate. In addition, the Authority shall have the right to independently check, at its own cost, said measuring equipment at any time upon forty-

eight (48) hours written notification to the Utility Official, providing the opportunity for the Utility Official to witness such tests.

Section 7.04 Results of Tests.

Should the test of the measuring equipment in question show that the equipment registers either more than one hundred two percent (102%) or less than ninety-five percent (95%) of the Water delivered for a given flow rate, the total quantity of Water delivered to the Authority will be deemed to be the average daily consumption as measured by the measuring equipment when in working order, and the meter shall be calibrated to the manufacturer's specifications (in the case of Venturi meters) or the AWWA specifications (for all other types of meters) for the given rate of flow, or replaced by Houston with accurate measuring equipment that is tested before it is placed in service. This adjustment shall be for a period extending back to the time when the inaccuracy began, if such time is ascertainable; and if such time is not ascertainable, for a period extending back to the last test of the measuring equipment or one hundred twenty (120) days, whichever is shorter.

As used in this paragraph, the expression "given rate of flow" means one of the following selected by the Utility Official for each calibration or test:

- (1) the total quantity of Water delivered during the preceding period (usually a calendar month) as reflected by the totalizer, converted to gallons per minute;
- (2) high, low, and intermediate rates of flow in the flow range, as reflected by the flow recording devices; or
- (3) AWWA-specified test flow rates for that size and type of meter.

Section 7.05 Disputes as to Testing.

In the event of a dispute between Houston and the Authority as to the accuracy of the testing equipment used by Houston to conduct the accuracy test, an independent check may be mutually agreed upon between the Authority and the Utility Official to be conducted by an independent measuring equipment company suitable to both the Authority and the Utility Official. The cost of such test will be at the Authority's sole expense.

The Utility Official shall accept the test results of the independent measuring equipment company, provided that the calibration procedure and test equipment are mutually agreeable to the Authority and to the Utility Official.

Section 7.06 Check Meters.

The Authority may install, at its own cost and expense, such check meters in the Authority's pipeline; but Houston shall have the right of ingress and egress to such check meters

during all reasonable hours; provided, however, that billing computations shall be on the basis of the results of the measuring equipment set forth above.

ARTICLE VIII

Miscellaneous Provisions

Section 8.01 Quality of Water.

Houston shall provide Water meeting all applicable Texas and Federal regulations regarding water quality, including the Safe Drinking Water Act, as same may be amended from time to time.

EXCEPT AS PROVIDED IN SECTIONS 6.03 AND 8.01, HOUSTON MAKES NO WARRANTY, EXPRESSED OR IMPLIED, REGARDING THE QUALITY OR DELIVERY PRESSURE OF THE WATER, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

THE AUTHORITY HEREBY RELEASES AND DISCHARGES HOUSTON FROM ANY AND ALL FINES, DEMANDS, JUDGMENTS, LIABILITIES OR CLAIMS ARISING BY REASON OF OR IN CONNECTION WITH THE DELIVERY OF WATER WHICH MEETS THE REQUIREMENTS OF SECTIONS 6.03 AND 8.01.

Section 8.02 Ingress and Egress.

During the term of this Contract, and upon the giving of prior notification to the Authority, Houston shall have the right of ingress and egress in, upon, under and over any and all land, easements and rights-of-way of the Authority on which Houston, with the Authority's consent, constructs facilities to deliver Water to the Authority.

Section 8.03 Assignments.

This Contract shall bind and benefit the respective parties and their legal successors, but shall not otherwise be assignable, in whole or in part, by either party without first obtaining written consent of the other. "Assignment" as used herein means assignment in law or otherwise.

Section 8.04 Subject to Law.

This Contract shall be subject to all present and future valid laws, orders, rules and regulations of the United States of America, the State of Texas, any regulatory body having jurisdiction and the Charter and Ordinances (to the extent the Ordinances are not inconsistent with this Contract) of the City of Houston, Texas. In order to protect the Houston System it is specifically agreed that the Authority System shall be constructed and operated to comply with the rules promulgated by the Texas Commission on Environmental Quality, or any successor

agency, the Houston Plumbing Code, and the policy of requirements of the Utility Official regarding backflow prevention and cross connections. Should a condition in violation of these requirements be discovered, the Authority shall promptly cure same.

Section 8.05 No Additional Waiver Implied.

The failure of either party hereto to insist, in any one or more instances, upon performance of any of the terms, covenants or conditions of this Contract, shall not be construed as a waiver or relinquishment of the future performance of any such term, covenant or condition by the other party hereto, but the obligation of such other party with respect to such future performance shall continue in full force and effect.

Section 8.06 Merger.

This instrument and the Pumpage Fee and Pump Station Capacity Contract effective on or about the same date as this Contract contain all the agreements made between the parties regarding the matters addressed herein.

Section 8.07 Notices.

Until the Authority is otherwise notified in writing by Houston, the address of Houston is and shall remain as follows:

City of Houston
Utility Official of Public Works and Engineering Department
P.O. Box 1560
Houston, Texas 77251-1560

Until Houston is otherwise notified in writing by the Authority, the address of the Authority is and shall remain as follows:

North Fort Bend Water Authority
c/o Allen Boone Humphries Robinson LLP
Attn: Joe B. Allen
3200 Southwest Freeway, Suite 2600
Houston, Texas 77027

All written notices, statements and payments required or permitted to be given under this Contract from one party to the other shall be deemed given by the deposit in a United States Postal Service mailbox or receptacle of certified or registered mail, with proper postage affixed thereto, addressed to the respective other party at the address set forth above or at such other address as the parties respectively shall designate by written notice.

Section 8.08 Authorship.

The parties agree that this Contract shall not be construed in favor of or against either party on the basis that the party did or did not author this Contract.

Section 8.09 Parties in Interest.

This Contract shall be for the sole and exclusive benefit of the parties hereto and shall not be construed to confer any rights upon any third party. Houston shall never be subject to any liability in damages to any customer of the Authority for any failure to perform under this Contract.

Section 8.10 Sale of Water Outside Boundaries.

In entering into this Contract the parties contemplate that the Authority will sell the Water to inhabitants and commercial customers within the Authority. Therefore, the Authority may sell Water purchased hereunder outside its boundaries only if such sale is approved in writing by the Utility Official. The Utility Official shall grant any such request if the area is outside Houston's city limits and is not then provided Water service by Houston.

Section 8.11 Captions.

The captions appearing at the first of each numbered section in this Contract are inserted and included solely for convenience and shall never be considered or given any effect in construing this Contract, or any provisions hereof, or in connection with the duties, obligations, or liabilities of the respective parties hereto or in ascertaining intent, if any questions of intent should arise.

Section 8.12 Enforcement.

The City Attorney or his or her designee shall have the right to enforce all legal rights and obligations under this Contract without further authorization.

Section 8.13 Approvals.

Unless otherwise provided for herein, any consent or approval of the parties shall be made by the governing body of each party.

Section 8.14 Force Majeure.

In the event either party is rendered unable, wholly or in part, by Force Majeure, to carry out any of its obligations under this Contract, it is agreed that upon such party's giving notice and full particulars of such Force Majeure in writing to the other party as soon as possible after the occurrence of the Force Majeure, the obligations of the party giving such notice, to the extent it is affected by Force Majeure and to the extent that due diligence is being used to resume performance, shall be suspended for the duration of the Force Majeure. Such cause shall, as far as possible, be remedied with all reasonable dispatch.

Section 8.15 Force Majeure Defined.

The term "Force Majeure," as used herein, shall include, but not be limited to, acts of God, strikes, lockouts or other industrial disturbances, acts of the public enemy, war, blockades, insurrections, riots, epidemics, landslides, lightning, earthquakes, fires, storms, floods, washouts, droughts, tornadoes, hurricanes, arrests and restraints of government and people, explosions, breakage or damage to machinery, pipelines or canals, and any other inability of either party, whether similar to those enumerated or otherwise, and not within the control of the party claiming such inability, which by the exercise of due diligence and care such party could not have avoided.

Section 8.16 Default and Remedies.

Default shall occur only in the event either party fails to adhere to its respective obligations hereunder. In such event, the non-defaulting party shall give the defaulting party: (i) written notice describing such default and the necessary cure therefor; and (ii) the opportunity to cure such default within no less than thirty (30) days of receipt of such notice. If the default is cured within the specified time period to the satisfaction of the non-defaulting party, then no further action shall be taken by the non-defaulting party. If the default is not cured within the specified time period to the satisfaction of the non-defaulting party, the non-defaulting party may pursue any available remedies existing at law or in equity. This Section 8.16 shall not be considered as specifying the exclusive remedy or procedure for remedy for any default, and all remedies existing at law and in equity are to be available to either party; provided, however, that the parties may submit their dispute in good faith to non-binding mediation, the costs of which will be shared equally by the parties, prior to either party filing suit for any default under this Contract.

Section 8.17 Advisory Committee.

Houston shall establish an Advisory Committee comprised of: (i) one (1) representative of Houston, selected by the Utility Official; (ii) one (1) representative of the Authority, selected by the Authority, (iii) one (1) representative of the North Harris County Regional Water Authority and one (1) representative of the West Harris County Regional Water Authority. Such representatives may be members of the governing bodies of such entities or such other persons as such entities may designate. The function of the Advisory Committee shall be to inform and consult with Houston concerning: (i) Annual O&M Budget matters, (ii) surface water system operational issues, (iii) upcoming or ongoing surface water projects, (iv) long-term surface water

planning issues, and (v) other surface water related issues. The Advisory Committee shall make reasonable efforts to meet at least once per calendar year.

Section 8.18 Responsibility for Groundwater Reduction Plan.

The Authority shall be responsible for adopting, obtaining FBSD approval of and administering its Groundwater Reduction Plan (the "GRP"). Houston shall be responsible for adopting, obtaining FBSD approval of and administering its GRP.

Section 8.19 Payment Dates.

If the Authority and the Utility Official mutually agree in writing, the due dates of any payments due under this Contract within any particular calendar year may be modified such that such payments become due on the same date within each calendar year.

Section 8.20 Severability.

The provisions of this Contract are severable, and if any provision or part of this Contract or the application thereof to any person or circumstance shall ever be held by any court of competent jurisdiction to be invalid or unconstitutional for any reason, the remainder of this Contract and the application of such provision or part of this Contract to other persons or circumstances shall not be affected thereby.

Section 8.21 Exhibits.

Exhibits "A" through "HG" attached to this Contract are hereby incorporated herein for all purposes.

[EXECUTION PAGE FOLLOWS]

IN WITNESS WHEREOF, the parties hereto have executed this Fort Bend Authority Contract in multiple copies, each of which shall be deemed to be an original, effective on the date of countersignature indicated below.

"Houston"

"Fort Bend Authority"

CITY OF HOUSTON, TEXAS

**NORTH FORT BEND WATER
AUTHORITY**

By: _____
Mayor

By: _____
President, Board of Directors

Executed for and on behalf of City pursuant to authority granted by the City Council Ordinance No. _____, passed _____, _____, 20____, a copy of which is attached hereto for reference.

ATTEST/SEAL

By: _____
Secretary, Board of Directors

ATTEST/SEAL

City Secretary

APPROVED:

Director, Department of Public Works
and Engineering

APPROVED AS TO FORM:

Sr. Assistant City Attorney
L.D. File No. 0800700146-001

COUNTERSIGNED BY:

City Controller

DATE COUNTERSIGNED: _____

EXHIBITS

- Exhibit "A" - Existing Untreated Water Facilities
- | Exhibit "B" - Plant and Pump Station Facilities
- Exhibit "C" - Point(s) of Delivery/Point(s) of Measurement
- Exhibit "D" - Transmission Facilities
- Exhibit "E" - Initial Untreated Water Facilities Demand Allocation, Outstanding Debt and Amount of Factor "B" for Payment for Existing Untreated Water Facilities under Section 3.02(a)
- Exhibit "F" - Capital Contribution Calculations for Treated Water Facilities applicable to the Authority
- Exhibit "G" - Houston's Most Recent Finalized Independent Rate Study
- | ~~Exhibit "H" - Capacities of the Plant Facilities and Transmission Facilities~~

EXHIBIT A: Houston's Existing Untreated Water Facilities

1. Costal Water Authority
2. Trinity/Lynchburg Pump Stations
3. Conveyance System
4. Trinity River Authority
5. Lake Livingston Improvements
6. Lake Houston Dam/Reservoir
7. Wallisville Lake Project
8. Dayton Canal
9. Allen's Creek Reservoir Purchase
10. Water Rights

EXHIBIT B: Plant & Pump Station Facilities

East Water Purification Plant (EWPP)

Located at 2300 Federal Road

Firm Pumping Capacity: 350 MGD

Southwest Repump Station (SWRS)

Located at 4410 Westpark

Firm Pumping Capacity: 130 MGD

Exhibit C
Point of Delivery & Measurement

-  Existing water line
 -  Water pump station
 -  Freeway
 -  Major roads
 -  Local roads
-  Not to Scale
 Feb 14, 2008

Points of Delivery and Measurement

Bellaire Braes Pump Station

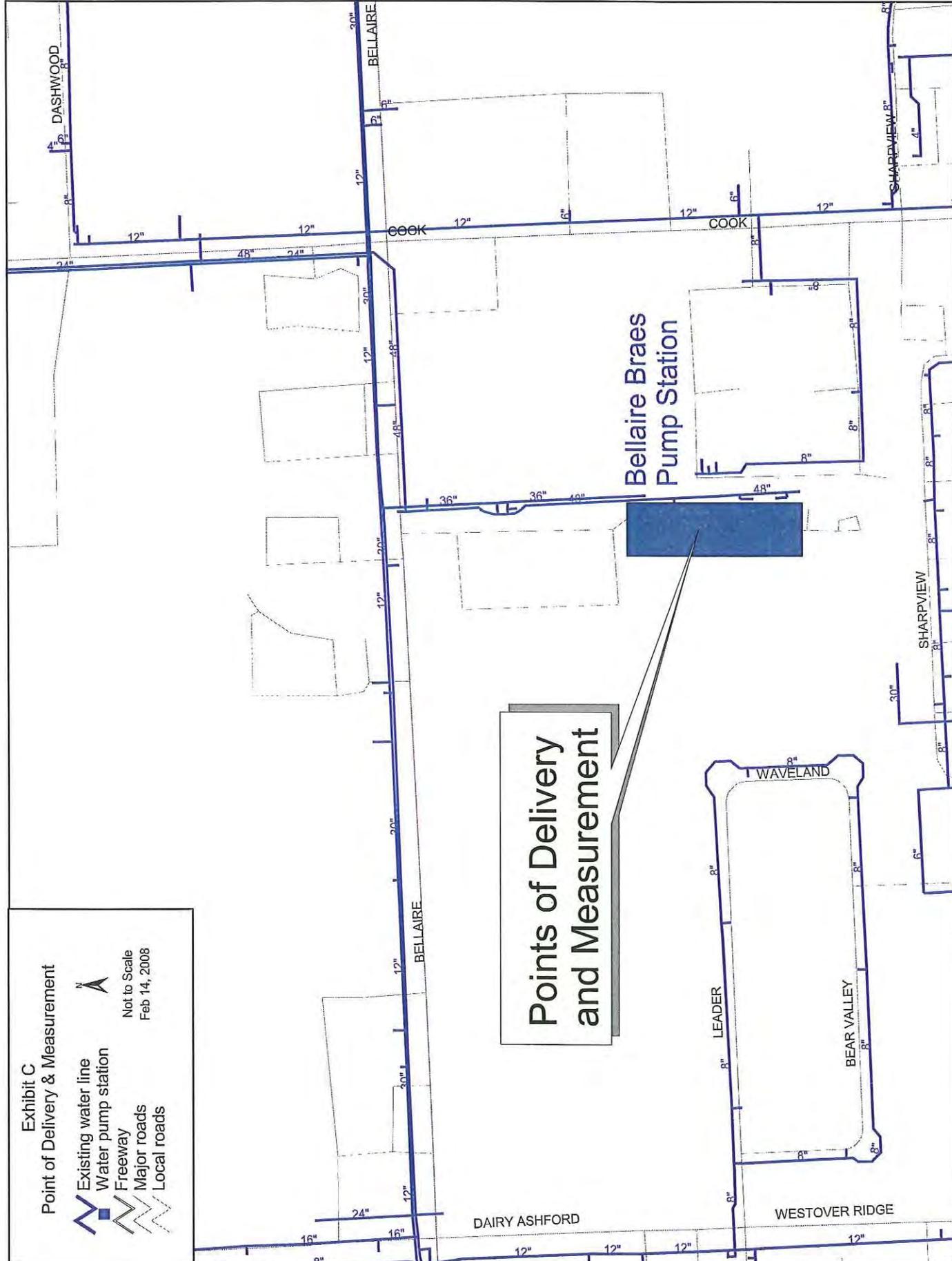


Exhibit D Transmission Facilities

Note: The Bellaire Braes Pump Station is shown for identification and reference only.

February 6, 2008
Not to Scale



EXHIBIT E: Initial Untreated Water Facilities Demands Allocation to be purchased by the Authority, Outstanding Debt, and the total amount (in MGD) of Factor "B"

NFBWA's Prorata Share of Houston's Untreated Water Facilities Current Outstanding Debt for Initial Demand Allocation

in year 2010 (A/B) C = \$ 13,712,603 where

Factor A = Portion of Initial Untreated Water Facilities Demand Allocation to be Purchased

No later than	Year 2010	Portion Purchased (MGD) 19.5
----------------------	--------------	---------------------------------

Factor B = Surface Water Average Daily Production (MGD)

Untreated Water Sold to Customers in fiscal year ending June 30, 2001:	235.51
Water Production at SEWTP in fiscal year ending June 30, 2001:	68.55
Water Production at EWTP in fiscal year ending June 30, 2001:	215.92
	519.98
 Surface Water Average Daily Production (MGD):	 519.98

Factor C = Houston's Untreated Water Facilities Outstanding Debt

<u>Facility Component</u>	<u>Outstanding Debt</u>
1. Costal Water Authority	\$254,187,160
2. Trinity River Authority Total Water Debt:	\$ 13,000,000
3. Costal Water Authority (Proposed Trinity/Lynchburg Upgrade)	\$ 40,385,000
4. Trinity River Authority- Current Lake Livingston	\$ 17,996,000
5. Allen' s Creek Land Purchase	\$ 14,000,000
6. Lake Houston Dam/Reservoir Improvements	\$ 10,356,486
7. Wallisville Lake Project	\$ 10,580,707
8. Dayton Canal	\$ 5,150,000
Total	\$365,655,353

Note:

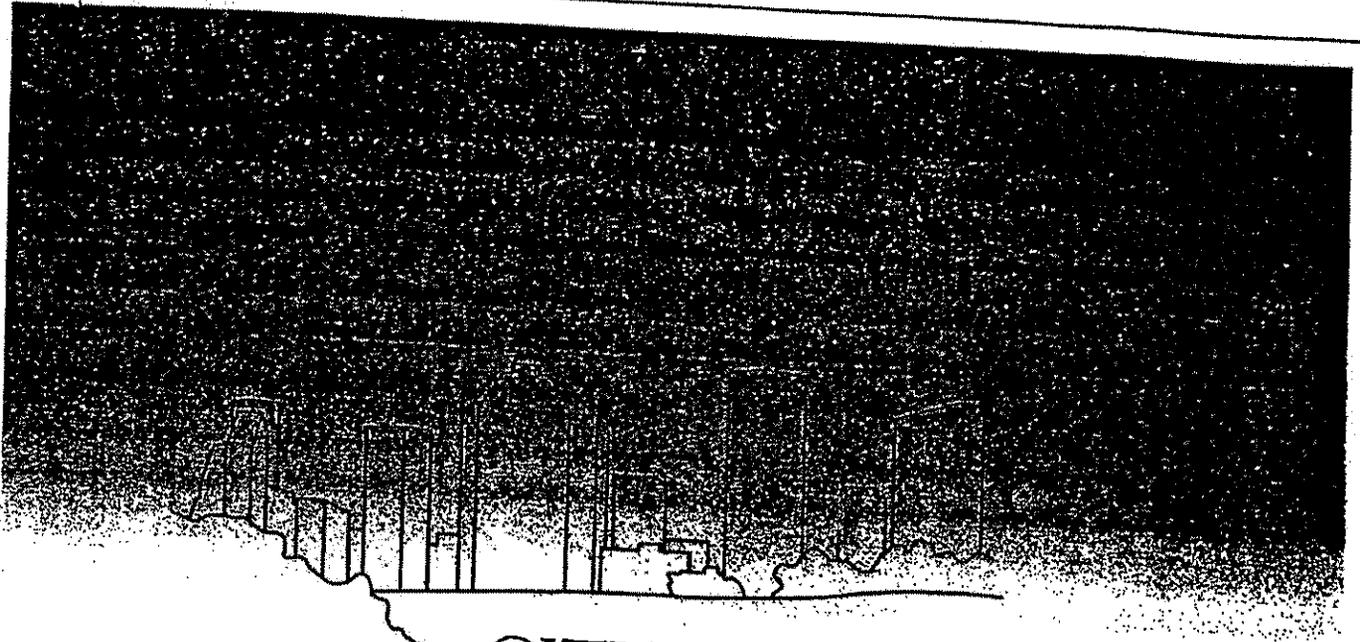
Items 1, 2, 7 & 8 represent actual "Outstanding Debt" as of June 30, 2001.

Items 3 through 6 represent estimated "Outstanding Debt."

Factor "C" will be revised per "actual" Outstanding Debt of the Untreated Water Facilities shown above, as provided in Sections 3.02 (a) of the Contract.

EXHIBIT "F"

Capital Contribution Calculations for Treated Water Facilities applicable to the Authority



CITY OF HOUSTON
Water and Sewer Rate Study

April 1999

BLACK & VEATCH

Exhibit G Page 2 of 3

Table W-9

Water Utility Allocation of Maintenance & Operation Expenses 2000 Test Year Thousands of Dollars

Line No.	Description	(1) M&O Expenses	(2) Common to Surface Water	(3) Common to All Utility		(4) Common to Treated Water			(5) Common to Retail			(6) Direct SE Plant Participants
				Meters	Billing	Base	Extra Capacity	Base	Extra Capacity	Base	Extra Capacity	
					Max Day	Max Hour	Max Day	Max Hour	Max Day	Max Hour		(11)
1	Source of Supply - Surface Water											
2	Resource Management	42,080	37,766									4,315
		42,080	37,766									4,315
3	Meter Maintenance	4,523		4,523								
4	Other Customer Service	12,229			12,229							
5	Customer Service	16,732		4,523	12,229							
6	SE Plant Participants	4,315										4,315
7	Ground Water	982				717	265					
8	Pumping	20,991				10,203	3,771	6,977				
9	Treatment	10,803				7,886	2,917					
10	Water Production	37,050				18,806	6,933	6,977				
11	Distribution Water Storage	2,673				1,302	481	890				
12	Water Pipe											
13	Transmission	8,280				6,944	2,236					
14	Distribution	8,046										
15	Water Services	207							3,918	1,448	2,680	
16	Water Meters	122										
	Utilities Maintenance	19,328										4,315
						7,346	2,717	890	3,918	1,448	2,680	
17	Management & Support	6,912										
18	Planning & Operations	4,849										
19	Office of the Director	715										
20	Inventory Support	3,655										
21	Resource Management	16,365										
22	Non-capitalized Equipment	1,316										
23	General & Administrative	33,832	12,846	1,481	3,733	7,983	2,932	2,401	1,196	462	818	
24	Total M&O Expenses	149,062	50,612	6,333	15,962	34,135	12,632	10,368	5,114	1,890	3,698	8,629
25	Total M&O Cost of Service	159,992	54,551	6,826	17,204	36,792	13,604	11,067	5,512	2,037	3,770	8,629

Exhibit G Page 3 of 3

Calculation of General and Administrative Cost per 1999 Black & Veatch Rate Study Water Utility

(1) General and Administrative	\$ 33,852
(2) Total M & O Cost of Service	\$ 159,992
(3) Total M & O excluding General & Administrative Cost	\$ 126,140
(4) % of General & Administrative to Total M & O excluding General & Administrative Cost	26.84%

Note: The following is an example of the application of the above 26.84% (which percentage may change depending upon Houston's then most recent finalized independent rate study) under factor "C" of Section 4.02 of the Contract:

If the total costs and expenses incurred by Houston during a given year for maintenance and operation of the Plant Facilities (not including any Houston administrative costs for management and support, resource management, planning and operations, or the Office of the Director of Public Works and Engineering, or other related indirect Houston costs) is \$1,000,000, then \$268,400 ($\$1,000,000 \times 26.84\%$) shall be added for such Houston administrative related costs, thereby causing factor "C" to equal a total of \$1,268,400 for such year.

APPENDIX G

ADOPTED this 28th day of November, 2007.



President, Board of Directors

ATTEST



Asst. Secretary, Board of Directors
(SEAL)

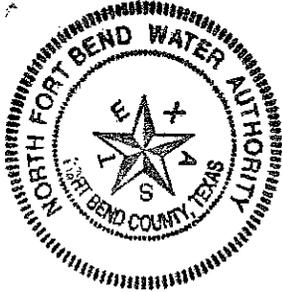


Exhibit A
NORTH FORT BEND WATER AUTHORITY
Pumpage and Billing Form

Name of Well Owner: _____

Check the billing period for which this report is being filed

	Billing Period	Rate	Due Date
<input type="checkbox"/>	January 1-31, 2008	\$0.30	February 28, 2008
<input type="checkbox"/>	February 1-28, 2008	\$0.30	March 31, 2008
<input type="checkbox"/>	March 1-31, 2008	\$0.30	April 30, 2008
<input type="checkbox"/>	April 1-30, 2008	\$0.30	May 31, 2008
<input type="checkbox"/>	May 1-31, 2008	\$0.30	June 30, 2008
<input type="checkbox"/>	June 1-30, 2008	\$0.30	July 31, 2008
<input type="checkbox"/>	July 1-31, 2008	\$0.30	August 31, 2008
<input type="checkbox"/>	August 1-31, 2008	\$0.30	September 30, 2008
<input type="checkbox"/>	September 1-30, 2008	\$0.30	October 31, 2008
<input type="checkbox"/>	October 1-31, 2008	\$0.30	November 30, 2008
<input type="checkbox"/>	November 1-30, 2008	\$0.30	December 31, 2008
<input type="checkbox"/>	December 1-31, 2008	\$0.30	January 31, 2009

Gallons of Water Pumped for Billing Period

FBSD* Well ID #	Start Meter Reading	End Meter Reading	Total
Well #1			
Well #2			
Well #3			
Well #4			
For additional wells, attach a second reporting form and put total from all wells below.			
ALL			

1	Enter total gallons of water pumped	
2	Divide by 1,000	
3	Total fee due (multiply line 2 x 0.30)	
4	Add late payment penalty, if applicable (5% if more than 10 days after due date, 10% if more than 30 days after due date)	
5	Add late payment interest, if more than 10 days after due date (12% per annum)	
6	Total due	

I declare that the above information is true and correct to the best of my knowledge and belief.

Dated: _____

By: _____

Name: _____

Title: _____

Make check payable to:
 North Fort Bend Water Authority c/o AVANTA Services
 5635 Northwest Central Drive, Suite 104E
 Houston, TX 77092
 Phone: (713) 934-9110; Fax: (713) 934-9443

If your monthly fee is less than \$1.00, your payment is deferred until your cumulative fees equal or exceed \$1.00. You are required to complete and submit this form monthly even if you owe no funds for that month.

APPENDIX H

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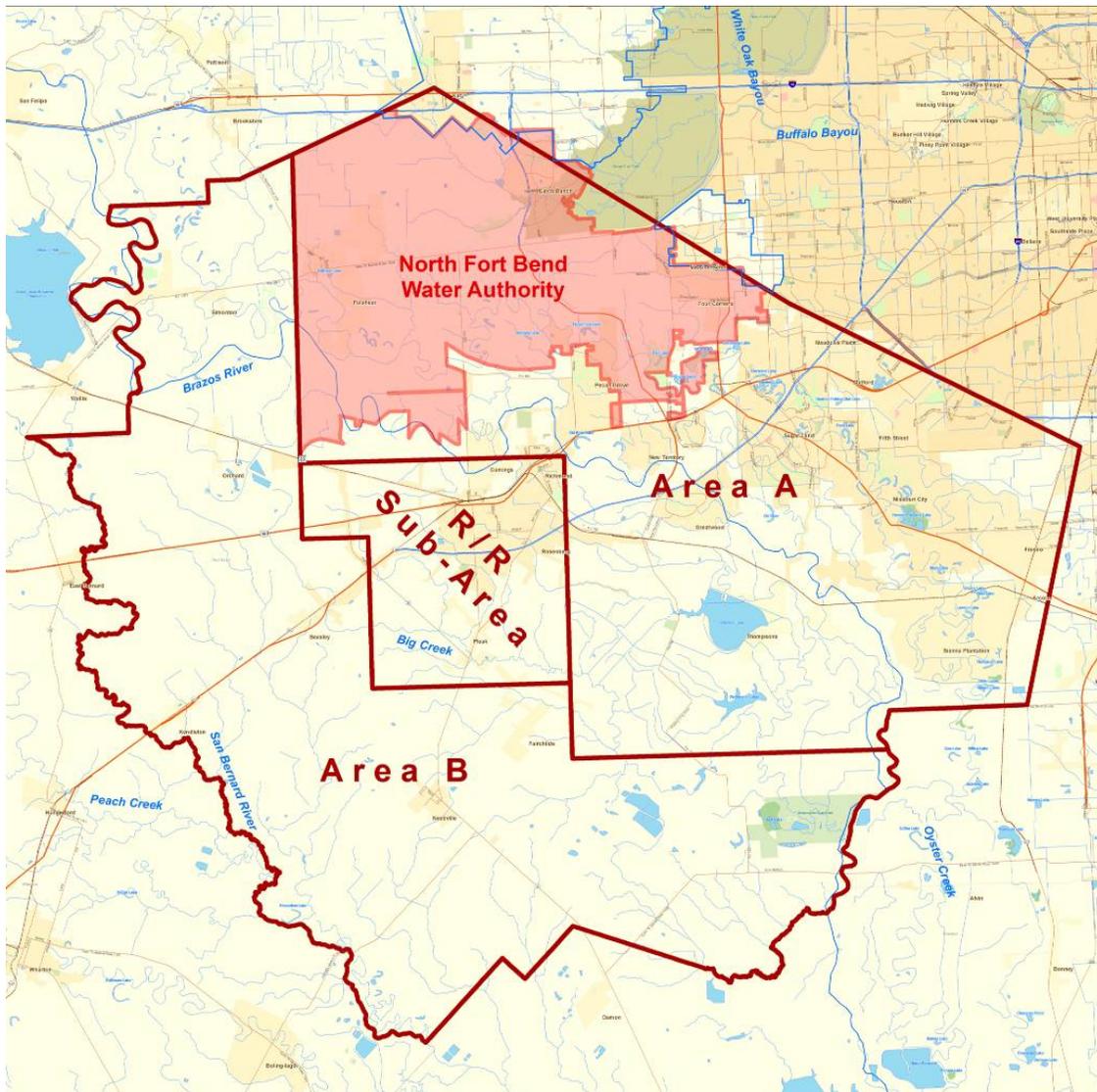
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Exhibit 1 NFBWA Service Area and Utility Districts

Section 1 Introduction

The service area of the North Fort Bend Water Authority (the Authority) is located in the northern portion of Fort Bend County. The Fort Bend Subsidence District (FBSD) divided Fort Bend County into three distinct areas in the 2003 District Regulatory Plan (DRP). These areas have different conversion goals and requirements. The Authority is located in Area A.

**Figure 1
FBSD Regulatory Areas**



Entities within Regulatory Area A are required to submit a Groundwater Reduction Plan (GRP) beginning in 2008 in anticipation of regulations requiring the reduction of groundwater use starting in 2013. Beginning in 2013, groundwater use will be limited to 70% of the producer's total water demand. This amount will decrease to 40% by 2025. Regulation within the Richmond/Rosenberg Sub-Area will be delayed until 2015 but will follow the same patterns outlined for Area A. There are currently no regulations on groundwater use in Area B except that this water cannot be transferred into Area A. As shown in *Figure 1*, The Authority is contained within Area A, meaning that a water source other than groundwater will be required to meet 30% and 60% of the total water demand beginning in 2013 and 2025, respectively. These restrictions are intended to decrease permittee's dependence on groundwater in order to eliminate subsidence.

The Authority territory is shown in Exhibit 1 NFBWA Service Area and Utility Districts. The Authority was created to enable compliance with the FBSD's 2003 Regulatory Plan (Plan). The Authority is bounded on the west by the Regulatory Area A boundary, the Richmond and Rosenberg extraterritorial jurisdiction (ETJ) and the Sugar Land ETJ to the south, the Fort Bend County Line and a portion of Houston to the east and the City of Katy to the north. The Authority is approximately 147 square miles with an estimated population of 107,000 residents in 2005.

A significant milestone for the Authority involves the creation and submittal of a Groundwater Reduction Plan (GRP) describing the strategy to meet the FBSD's groundwater reduction mandates. The Authority has identified the City of Houston (COH) as its source of water for long-term surface water supply. Included within the GRP is a Water Conservation Plan. This document serves as that plan.

Section 2 Historic and Projected Water Use

2.1 Water Use

The first step to determine existing and future water demands is to accurately predict the population. Houston-Galveston Area Council (H-GAC) and Municipal Information Services (MIS) data were used to determine existing population as well as to predict projected growth. Population within the Authority was projected to be approximately 205,000 in 2015; 289,000 in 2025; and 365,000 in 2035 at the end of H-GAC’s current population forecast. The growth rate in H-GAC’s forecast was used to project a future population of 429,000 in 2045 and 481,000 in 2055.

Residential use comprises the majority of groundwater consumption in the Authority. By dividing groundwater pumpage by the estimated population, the average water demand in the Authority based on the existing water usage information was determined to be approximately 170-gcpd and the water demand in a dry year is expected to be approximately 210-gcpd. For the purpose of evaluating water conservation goals, an average value of 190 gcpd will be used as a baseline metric. The demand estimated and identified spatially by grid cell was associated with the utility districts using GIS techniques. Areas that are outside the limits of existing utility districts and regions that are primarily undeveloped were also accounted for and grouped together.

Table 1 summarizes the total estimated demand for the Authority. Total demands are subject to the addition of GRP participants from outside of the Authority.

**Table 1
Total Estimated Water Demand for the Authority**

		Projected Water Demand (mgd)					
		2013	2015	2025	2035	2045	2055
Projected NFBWA Population (Thousands)		174	205	289	365	429	481
Water Demands	NFBWA Utility Districts	33.5	35.5	49.3	62.0	65.9	70.0
	NFBWA Undeveloped Areas	2.9	5.2	8.7	11.9	21.9	30.9
	George Ranch	0	0	10.0	15.0	15.0	15.0
	Total	36.4	40.7	68.0	88.9	102.8	115.9

2.2 Water System Overview

To reduce groundwater consumption, the Authority has identified the City of Houston (COH) as its source of water for long-term surface water supply.

Until 2025, surface water will be received in the vicinity of Bellaire Boulevard and South Dairy Ashford Street near the western perimeter of the COH water system. Starting in 2025, a pipeline with shared capacity between the Authority and the West Harris County Regional Water Authority (WHCRWA) will be utilized to supplement the water supply. The pipeline will carry water from the COH across town to the Katy area, north of the Authority. The Authority's distribution system will undergo expansion from the 2013 service area to a larger system that will be capable of meeting the more stringent groundwater regulations imposed in 2025. This larger system will be designed to maintain necessary water supply through 2055.

2.3 Water Accountability

Water meter readings will be recorded at the point of delivery for wholesale supply to the Authority, as well as the Authority's delivery points to its customers. The Authority's customers will also be reporting monthly groundwater pumpage amounts to ensure compliance with groundwater reduction requirements. Consequently the Authority will be tracking all water use by customer. This monitoring will enable early detection of unaccounted water use and promote necessary Authority system modifications. Additionally, water audits and leak detection programs will be implemented to uphold water conservation efforts as appropriate. The Authority will have an economic incentive to carefully monitor surface water usage and avoid FBSD disincentive fees, and extra COH charges for water use.

It is anticipated that the Authority's system will provide a high level of water accountability given the newness of the system. However, the Authority will also cooperate with the districts participating in the GRP to promote leak detection as a way of improving accountability in the individual systems. This is described in further detail in *Section 4.1.1.2*. The individual GRP participants will have an economic incentive to account for all their water use as a result of the increased water rates.

Section 3

Conservation Goals

The goal of the Authority is to provide and maintain a safe potable water supply for its customers while meeting the regulations of the FBSD. The goals of the Water Conservation Plan (WCP) are to:

- Reduce water consumption from the levels that would prevail without conservation efforts.
- Reduce the loss and waste of water.
- Improve efficiency in the use of water.
- Document the level of reuse, which is replacing potable water supply.

Beginning in 2013, a minimum of 30 percent of the water demand in the Authority must be converted to surface water. By 2025, surface water infrastructure will be expanded so that 60 percent of the anticipated 2055 demand may be supplied from surface water.

An effective method to achieve conservation is to reduce unaccounted water use. Unaccounted water use reflects the difference between the quantity of water that is withdrawn from a supply source and the amount that is delivered to the customer. The Authority's goal is to limit unaccounted water to less than 10 percent of total reported water usage. This effort will begin with the delivery of surface water through the Authority system, which is anticipated to begin by 2013. This plan also sets forth specific goals at five and ten year points.

At five years (2018), the Authority aims to:

- Reduce the level of unaccounted water losses to 10 percent of total production.

At ten years (2023), the Authority aims to:

- Reduce the level of unaccounted water losses to 8 percent of total production.

Reuse has been identified by the Authority as an opportunity to reduce the demand for importing new surface water supplies to meet groundwater reduction goals. The Authority has adopted a policy to promote the development of reuse projects..

Section 4

Conservation Strategies

The WCP serves as a plan to effectively reduce the amount of water used, minimize the amount of unaccounted water use, maintain or improve water use efficiency, and increase recycling and reuse strategies for water consumption.

4.1 Operational Strategies

The following operational strategies are considered for implementation:

- Effective use of groundwater and surface water
- Methods to Monitor Effectiveness and Efficiency
- Wastewater Reclamation and Reuse

4.1.1 Role of the Authority

The Authority will take the lead in conservation strategies for their system; however it is important to note that the retail providers and the individual users may also play a role in conservation. The Authority may evaluate requiring a water conservation and drought contingency plan from its retail participants.

4.1.1.1 Universal Metering, Meter Repair and Replacement Programs

The Authority will meter all of its surface water supply. The retail water providers will deliver water to the end users through their existing systems. The Authority's increased water rates will provide economic incentive to the retail providers to meter most water. The Authority will also encourage utilities to adopt appropriate meter repair and replacement programs.

The Authority will implement a meter repair and replacement program to ensure accuracy in its monitoring program. Routine testing and calibration of the Authority's meters will ensure accurate measurement of water and reduce lost revenue. The Authority will also implement a formal strategy for record management and testing of its water meters. This accuracy is critical to providing income to the Authority and avoiding FBSD disincentive fees that may apply.

4.1.1.2 Water Audits and Leak Detection Programs

To identify leakage as effectively as possible, regular and frequent water meter readings will be taken at the point of delivery for wholesale supply to the Authority and at the Authority's

delivery point to its customers. Monitoring will detect unaccounted water use and enable its prevention, thus resulting in a reduction of cost to the Authority.

Water audits and leak detection programs provide effective conservation strategies for water systems in addition to offering cost savings to both the retail supplier and the Authority. An estimated daily loss of revenue given an assumed amount of 10% water leakage based on total projected water usage for years 2013, 2025 and 2055 is shown below in *Table 2*.

Table 2
Projected Average Daily Water Losses

Description	2013	2015	2025	2035	2045	2055
Total Yearly Demand (mgd) ¹	36.4	40.7	68.0	88.9	102.8	115.9
Estimated Water Loss (mgd) ²	3.7	4.2	6.9	9.0	10.4	11.7
Estimated Revenue Loss (dollars) ³	\$1,274	\$1,425	\$2,380	\$3,112	\$3,598	\$4,057
Total Estimated Daily Revenue Losses After Leak Detection and Repair (dollars)⁴	\$637	\$712	\$1,190	\$1,556	\$1,799	\$2,028

Source: AWWA Leak Detection Committee. 1999, pp 5-33. *Water Audits and Leak Detection*. Manual of Water Supply Practice. (M36). American Water Works Association: Denver, CO.

¹ Total projected daily demands based on Table No. 1.

² Assumes 10% unaccountable water usage due to leaks, system losses, etc.

³ Based on estimated \$0.35 / 1000 gallons fee imposed by wholesale water provider.

⁴ Estimated 50% recoverable leakage due to leak detection system and repairs.

Using similar methodology to that of *Table 2*, an estimated annual loss of revenue due to water leakage is shown below in *Table 3*.

Table 3
Projected Average Annual Water Losses

Description	2013	2015	2025	2035	2045	2055
Total Yearly Demand (mgy)	13286.0	14855.5	24820.0	32448.5	37522.0	42303.5
Estimated Water Loss (mgy)	1328.6	1485.55	2482	3244.8	3752.2	4230.3
Estimated Revenue Loss (dollars) ³	\$465,010	\$519,943	\$868,700	\$1,135,698	\$1,313,270	\$1,480,623
Total Estimated Daily Revenue Losses After Leak Detection and Repair (dollars)⁴	\$232,505	\$259,971	\$434,350	\$567,849	\$656,635	\$740,311

Source: AWWA Leak Detection Committee. 1999, pp 5-33. *Water Audits and Leak Detection*. Manual of Water Supply Practice. (M36). American Water Works Association: Denver, CO.

³ Based on estimated \$0.35 / 1000 gallons fee imposed by wholesale water provider.

⁴ Estimated 50% recoverable leakage due to leak detection system and repairs.

The Authority does not anticipate unaccounted for water to be a problem given the newness of the infrastructure. However, it may be a significant problem for the retail providers serving water through older established systems. Through the Authority's water monitoring program, information will be collected and provided back to the retailers on a monthly basis

to allow them to monitor their overall water usage and identify potential problems in their accountability.

4.1.1.3 Drought Contingency Plan

A Drought Contingency Plan (DCP) is designed to respond to temporary and/or recurring water supply shortages. Drought conditions usually result from prolonged periods of minimal rainfall; but can also arise from equipment failure. An effective DCP is able to maintain water supplies for the highest priority use during times of limited water supply and preserve water for human consumption.

At this time, the Authority will not serve as the sole source of water for any of its GRP participants. During a drought, the retail providers may be forced to utilize their groundwater wells more than usual. The Authority will also encourage individual utilities to implement their respective drought contingency plans when needed.

The Authority's contract to receive water from the COH includes language regarding the expectations for the COH in the event of limited water supplies. As written, the contract indicates that there is no guarantee of water supply or pressure to the Authority from the COH system when supply is limited or when facilities become inoperative. However, the second supply source to the NFBWA will be available by 2025. Two sources of supply from the COH will create a stronger system operationally. Scheduled COH maintenance that will result in limited supply or pressure should be communicated to the Authority in writing at least 30 days prior to the event. This information will in turn be passed on to the respective utility districts as appropriate.

The Authority also has a joint use of facilities contract with the WHCRWA. Under the terms of that contract, either Authority will provide emergency water use to the other if water is available. The Authority may also look at a water transfer program by which one utility district shares excess water with another via the Authority system during times of drought or emergency.

4.1.2 Role of Individual Utility Districts

Just as several responsibilities for water conservation rest on the Authority, various duties for monitoring the efficient use of water will be conferred upon the individual districts.

4.1.2.1 Individual Conservation Plans and Drought Plans

The Authority may require permittees to submit both drought management and water conservation plans that include implementation measures to preserve and protect groundwater resources within the Authority's boundaries. Measures that can be implemented include, but are not limited to:

- Irrigation schedules to limit water consumption in a particular area

- Pricing policies that penalize excessive or wasteful water use practices
- Leak detection and water audits to improve system accountability
- Installation of water efficient appliances such as washers, dishwashers, low-flow toilets, etc.
- Use of retrofit kits which include low-flow shower heads, faucet aerators, shut-off valves, flow restrictors, and/or toilet leak detection dye tablets
- Adoption of educational programs such as Water Wise

4.1.2.2 Universal Metering, Meter Repair and Replacement Programs

Individual utility districts are required to monitor the rate of well production by the FBSD and by the Authority. Groundwater pumpage is currently reported monthly to the Authority and annually to the FBSD. FBSD has guidelines regarding metering equipment that apply. In addition, utility districts may be required to submit to the Authority information to verify that metering systems in place within their jurisdiction are functioning properly. Well meters that are not functioning properly will be identified and repaired or replaced as appropriate. Individual utilities will be encouraged to have a program of meter repair and replacement. A significant economic incentive to ensure compliance with metering will be the higher water usage rates.

4.1.2.3 Water Audits and Leak Detection Programs

Individual utilities have different approaches and levels of success with water audits and leak detection programs. Once surface water delivery commences a better understanding of the issues within each utility district's system will be identified and addressed as needed. To ensure ongoing compliance with conservation efforts, the Authority may require each retail supplier who purchases surface water to include in their WCP a water audit and leak detection program. Potentially each supplier would be responsible for supplying the Authority with forms detailing how they conduct a comprehensive, all-inclusive audit of their internal distribution system. Each form, sometimes referred to as an "audit worksheet," should consist of the following:

- Frequency of audit
- Techniques to determine the required water supply
- Means to quantify unauthorized metered use
- Means to quantify authorized metered use
- Summation of water losses
- Examination of water audit results

Additionally, each supplier may supply the Authority with a leak detection program, or "leak detection worksheet," which includes the following:

- Description of area surveyed for leaks
- List of procedures and equipment used during the leak detection process
- Leak detection cost, budget and repair schedule
- Means to track daily surveys or log books
- Means to monitor repair history of service lines
- Leak detection summary

The water audit details water losses, while the leak detection program will determine whether the losses are due to leaks or unauthorized withdrawals. Leaks should be located and promptly repaired and unauthorized withdrawal locations should be located and terminated.

4.2 Educational Strategies

Educational strategies have been developed to facilitate the integration of water conservation methods. These strategies are aimed at increasing public knowledge and involvement, specifically in limiting and reducing water consumption. Two such strategies are the Water Wise Program established by the FBSD and the Water is Life Program.

4.2.1 Support of the Water is Life Program

In an effort to increase public awareness of water shortages and the necessity of conservation methods, the Authority is sponsoring the Water is Life Program. The program was created to engage fifth grade students in water conservation initiatives. It includes the Mobile Teaching Lab, the 5th and 6th grade student book *Journey to Pansophigus*, the Reader's Guide, and the Teacher's Resource Guide, and the 2nd and 3rd grade coloring/activity books. NFBWA is a full sponsor of the program for Katy ISD in 2007 and has budgeted support for the program for 2008.

The Authority is also considering budget allocations for educational programs on water conservation in coordination with other school districts located within the Authority

4.2.2 Support of the Water Wise Program

To encourage water conservation and generate support for the Water Wise program, a water conservation credit program has been established by the FBSD to allow entities that sponsor students in the Water Wise program to receive a water conservation credit certificate worth 84,000 gallons per kit sponsored. The award winning program utilizes a specialized water conservation resource action program including instructor curriculum and resource materials, as well as a student kit which contains plumbing retrofit devices. The Authority has adopted a reimbursement policy that pays utilities that sponsor students inside the boundaries of the Authority the face value of those credits. The Authority budgeted money for reimbursement to entities for 1,300 kits in 2007 and has a budget for 1,500 kits in 2008.

4.2.3 Support of the Authority Website

As a means of supplying the public with pertinent information, the Authority maintains a website. This website includes background information on the NFBWA, water conservation, answers to frequently asked questions, financial and budgetary information, pictures and maps of the region, as well as monthly meeting minutes. In addition, the website enables those who are interested to subscribe to receive routine email updates regarding Authority activity, as well as provides contact information for questions.

4.2.4 Development of the Pumpage Reporting Online System (PRO System)

The Authority is also planning to provide an online pumpage reporting system to expedite and streamline groundwater tracking for well permittees. The preliminary system has been developed. Training is scheduled for January of 2008, and online reporting should begin in February.

4.2.5 Provide Information Related to Water Conserving Landscaping and Irrigation Systems

To further expand public involvement, brochures for distribution have been put together and can be found on the Authority website. These brochures focus on water use in the home and yard, as well as offer insight into how children can assist with water conservation efforts. A brochure detailing conservation methods for yard and garden is currently available for public view on the Authority website. Conservation ideas include, but are not limited to:

- Regularly check timing devices on sprinkler and irrigation systems to ensure that they are working properly.
- Use native plants and shrubs whenever possible to limit the water required for sustained growth.
- Zone plants according to water consumption requirement when original landscape planning is possible to enable prolonged watering in only those areas which require it.
- Apply fertilizer sparingly to avoid excessive growth.
- Avoid cutting grass too short, since longer blades will limit the amount of evaporation and reduce root stress.

4.2.6 Provide Information Related to Water Conserving Devices

A brochure detailing conservation methods for the home is currently available for public view on the Authority website. Conservation ideas include, but are not limited to:

- Limit shower times.
- Avoid running water while brushing teeth.

- Check toilets for leaks.
- Only run the dishwasher when full.

Additional suggestions for water conservation involving the use of retrofit kits are briefly discussed in the brochure, and are also included within the Water Wise program. The Authority offers information for water saving devices to customers, including:

- Low-flow shower heads
- Low-flow faucet aerators
- Automatic shutoff hose nozzles
- Leak detection tablets
- Toilet displacement bags
- Five-minute shower timers
- Toilet tank fill diverters
- Toilet flappers

Types of water conservation devices and their estimated unit water savings are shown below in *Table 4*.

Table 4
Estimated Unit Water Savings
Based on Selected Water Conservation Measures

Measure Description	Estimated Water Savings	Unit
Single Family Measures		
Toilet Retrofit	10.5	gallons / capita / day
Showerhead Retrofit	5.5	gallons / capita / day
High Efficiency Clothes Washer	5.6	gallons / capita / day
Irrigation Audits	50.0	gallons / home / day
Rainwater Harvesting (1,000 gal. storage)	21.6	gallons / home / day
Rain Barrels (75 gal. storage)	2.3	gallons / home / day
Multi-Family Measures		
Toilet Retrofit	10.5	gallons / capita / day
Showerhead Retrofit	5.5	gallons / capita / day
High Efficiency Clothes Washer	30.0	gallons / unit / day
Irrigation Audits	125.0	gallons / apartment complex / day
Rainwater Harvesting (10,000 gal. storage)	205.7	gallons / apartment complex / day
Commercial Measures		
Toilet Retrofit	26.0	gallons / toilet / day
High Efficiency Clothes Washer	24.0	gallons / washer / day
Irrigation Audits	125.0	gallons / business / day
Rainwater Harvesting (10,000 gal. storage)	205.7	gallons / business / day

Source: *Quantifying the Effectiveness of Various Water Conservation Techniques in Texas* by GDS Associates, Inc. for Texas Water Development Board (2002)

4.3 Incentive Strategies

The Authority has studied the potential for using reclaimed water to meet non-potable demands, such as landscape irrigation. The use of this water already has an intrinsic advantage to the reuser because of reduced costs associated with lower groundwater pumpage fees and reduced well operations and maintenance costs. Additionally, the Authority has moved to further encourage reuse through an incentive of \$0.39 per 1,000 gallons of metered reuse. Any reclaimed water reuse program initiated by the Authority will generate over-conversion credits under the program sponsored by FBSD.

Over-conversion involves the acquisition of conversion credits from the FBSD through the conversion of groundwater demand in excess of the required minimum conversion level. One gallon of over-conversion credit earned in one year can then be used in lieu of one gallon (one and one-half gallons for reclaimed water) of surface water in a subsequent year. These credits will be accumulated and used during years of unexpectedly high demand or to extend the conversion schedule as the second phase of conversion approaches. More detailed plans for these credits will be made as the surface water delivery system comes online and more is known about its operation and the growth trends within the Authority.

Section 5 Implementation Plans

5.1 Adoption of the Plan

Demonstration of the means for implementation and enforcement is required by the §288 rules by providing a copy of the resolution by the Authority adopting the WCP. This WCP will be formally adopted by the Authority once it is finalized. A copy of this resolution will be provided when available..

5.2 Coordination with the Regional Planning Group

The service area of the NFBWA is located within the Texas Water Development Board (TWBD) Region H planning area and the NFBWA will supply a copy of this water conservation plan to the Region H Water Planning Group.

5.3 Coordination with the Utility Districts

Individual districts are assumed to provide their own water throughout their service areas utilizing internal distribution systems. All utility districts within the Authority will be provided a copy of this water conservation plan. In turn, the participating districts will be encouraged to complete a WCP that includes the minimum specifications set forth in this WCP.

Coordination with the utility districts will be instrumental in meeting the goals outlined by this WCP and gauging the ability of the WCP to reduce water demands. Data provided by the individual utilities will be obtained and compiled in an ongoing effort to evaluate the reduction in water demands from both the reduction of per capita demands and the reduction in leakage prescribed in this plan.

Section 6 Plan Review and Update

6.1 Schedule

The Authority shall review and update its water conservation plan, as appropriate, at least every five years from the date of its adoption by the Board. Pursuant to §288, this five year schedule facilitates coordination with the Region H Water Planning Group.

6.2 Assessment

The Authority shall review their water conservation targets and adjust the targets as appropriate based on new information as part of each update cycle. The assessment will include an accounting of the proposed conservation objectives and the review of the methods used to achieve the targets as stated in the plan. If targets are not achieved, a revised implementation strategy should be proposed and considered for adoption. The revised plan will be made available to the Region H Water Planning Group for their consideration and use.