

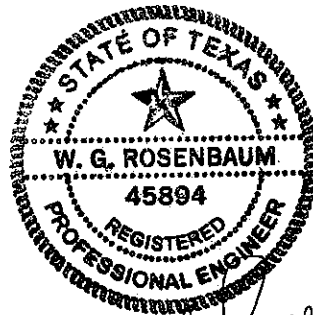
Infrastructure Master Plan

and

Impact Fee Determination

2007-2017

City of Tomball



William J. Rosenbaum
10-22-08

Prepared by:



Lockwood, Andrews
& Newnam, Inc.
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**INFRASTRUCTURE MASTER PLAN AND
IMPACT FEE DETERMINATION 2007-2017
CITY OF TOMBALL**

1.0 PLAN OBJECTIVES

The objectives of the 2007-2017 City of Tomball Infrastructure Master Plan and Impact Fee Determination are to estimate the growth within the City Limits and within the City's Extraterritorial Jurisdiction (ETJ) from 2007 to 2017 and at Ultimate Buildout, to determine the infrastructure needs to accommodate that growth, and to estimate the cost and impact fees related to those infrastructure improvements.

The City has used Infrastructure Master Plans for some time as a tool to guide the growth and sequencing of its water, wastewater, drainage, parks and roadway infrastructure systems. Previous Master Plans were published in 1969, 1982, 1986, 1996, 1999 and 2002.

Growth typically occurs both from a conversion of undeveloped properties to a developed state and from redevelopment of an existing land use. Current land use and redevelopment trends are important factors in the projected growth. The ETJ also plays a significant factor in the projected growth because this is the area that may one day be annexed into the City Limits and therefore may be eligible for City services. Thus this study presents the projected development of the land within the City Limits and ETJ and the corresponding demand on the infrastructure systems along with projected improvements to meet those demands.

The steps used to develop this Master Plan are summarized below:

- Estimate the land use by category in 2007 within the City and ETJ
- Estimate the 2007 population within the City and ETJ
- Estimate the future in land use within the City and ETJ during the study period
- Estimate the future population and service needs as a result of those land use changes
- Determine the Infrastructure improvements needed as a result of those changes
- Estimate the cost of the those Improvements
- Determine the Impact Fees related to those costs

2.0 LAND USE PROJECTIONS

Currently the City of Tomball comprises approximately 7,429 acres (11.6 square miles). Another 5,905 acres are contained within the City's Extraterritorial Jurisdiction which extends beyond the City limits and contains property that may one day be annexed into the City, as shown in **Exhibit 2-1**. The total area within the City and ETJ is 13,334 acres (20.8 square miles).

The land uses within the City limits and the ETJ are monitored by the City Planning and Public Works staff. City staff uses a Geographic Information System (GIS) to record and update changes to its land use base mapping system. The current GIS files delineate the City into five sub-areas and further identify each specific property into one of a multiple of land use categories. For the purposes of this study, some of the land use categories were combined as shown in **Table 2-1**, page 3. For the Exhibits, land use categories were aggregated into the following six categories:

- single-family
- multi-family
- commercial/retail/office
- industrial
- public
- drainage

The land uses within the City, the ETJ and within the five sub-areas are shown in **Exhibits 2-2 thru 2-6**. City staff has provided information on new and potential projects that are likely to be developed within the 2007-2017 timeframe. Those properties are shown as "Future" land uses in the Exhibits.

The area of each 2007 land use category within the City limits and ETJ is additionally summarized in **Table 2-2**, pages 4 and 5; **Table 2-3**, pages 6 and 7 summarizes the 2017 land uses; and **Table 2-4**, page 8 summarizes the land uses at Ultimate Buildout.

Table 2-1		
Land Use Categories		
The City of Tomball Land Use Categories	- are shown in the Land Use Exhibits as	-and are listed in the Land Use Tables as
Single Family	Single Family	Single Family, Average or Large Lots
Single Attached	Single Family	Single Family, Average Lots
Two Family	Single Family	Single Family, Average Lots
Multi-Family	Multi-Family	Multi-Family & Mobile Home
Commercial / Retail / Office	Commercial / Retail / Office	Commercial / Retail / Office
Industrial	Industrial	Industrial
Institutional	In Multi-Family, Commercial & Public	Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)
Institutional	Public	Schools / Hospital
Parks / Open Space	Public	Parks / Open Space / Utilities
Utilities	Public	Parks / Open Space / Utilities
Drainage	Drainage	Drainage (HCFCD Right-of-Ways)
Vacant		Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)

Table 2-2							
Land Use, 2007							
Within the City Limits	Sub Area 1	Sub Area 2	Sub Area 3	Sub Area 4	Sub Area 5	Total Area	
	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
Single Family, Average Lots	149	166	113	184	122	734	(2)
Single Family, Large Lots	334	273	95	121	0	823	(1)
Multi-Family & Mobile Home	42	9	0	39	0	90	(2)
Commercial / Retail / Office	107	74	56	204	162	603	(2)
Industrial	11	7	91	34	2	145	(2)
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	5	9	0	24	0	38	(5)
Institutional (Schools / Hospital / Churches)	414	80	90	177	4	765	(2)
Parks / Open Space / Utilities	52	46	54	30	0	182	(2)
Drainage (HCFCD Right-of-Ways)	34	47	2	37	0	120	(2)
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	<u>718</u>	<u>1,076</u>	<u>673</u>	<u>990</u>	<u>472</u>	<u>3,929</u>	(4)
Total City	1,866	1,787	1,174	1,840	762	7,429	(2)
Within the ETJ	Sub Area 1	Sub Area 2	Sub Area 3	Sub Area 4	Sub Area 5	Total Area	
	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
Single Family, Average Lots	0	16	239	0	45	300	(1)
Single Family, Large Lots	55	235	27	22	712	1,051	(1)
Multi-Family & Mobile Home	0	0	0	0	0	0	(2)
Commercial / Retail / Office	0	50	0	1	184	235	(2)
Industrial	0	27	12	0	0	39	(2)
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	0	0	0	0	0	0	(5)
Institutional (Schools / Hospital)	0	0	0	0	0	0	(2)
Parks / Open Space / Utilities	8	0	7	0	5	20	(2)
Drainage (HCFCD Right-of-Ways)	0	0	0	78	19	97	(2)
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	<u>866</u>	<u>1,362</u>	<u>377</u>	<u>359</u>	<u>1,199</u>	<u>4,163</u>	(4)
Total ETJ	929	1,690	662	460	2,164	5,905	(2)
(1) The total area of single family large lot subdivisions has not increased since the 2002 Masterplan. The total area of all single family lots within the City Limits as shown in the GIS files is 1,583 acres.							
(2) From City of Tomball 2007 GIS shape files							
(3) From City of Tomball 2002 Masterplan							
(4) Balance of total							
(5) Assumed							

Table 2-2						
Land Use, 2007						
Within Combined City and ETJ	Sub Area 1	Sub Area 2	Sub Area 3	Sub Area 4	Sub Area 5	Total Area
	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
Single Family, Average Lots	149	182	352	184	167	1,034
Single Family, Large Lots	389	508	122	143	712	1,874
Multi-Family & Mobile Home	42	9	0	39	0	90
Commercial / Retail / Office	107	124	56	205	346	838
Industrial	11	34	103	34	2	184
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	5	9	0	24	0	38
Institutional (Schools / Hospital / Churches)	414	80	90	177	4	765
Parks / Open Space / Utilities	60	46	61	30	5	202
Drainage (HCFCD Right-of-Ways)	34	47	2	115	19	217
<u>Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)</u>	<u>1,584</u>	<u>2,438</u>	<u>1,050</u>	<u>1,349</u>	<u>1,671</u>	<u>8,092</u>
Total City and ETJ	2,795	3,477	1,836	2,300	2,926	13,334

Table 2-3						
Projected Land Use, 2017						
City Limits & ETJ Combined	Sub Area 1	Sub Area 2	Sub Area 3	Sub Area 4	Sub Area 5	Total Area
	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)
Single Family, Average Lots	400	990	494	355	281	2,520
Single Family, Large Lots	<u>389</u>	<u>490</u>	<u>122</u>	<u>143</u>	<u>712</u>	<u>1,856</u>
Single Family Total	789	1,480	616	498	993	4,376
Multi-Family & Mobile Home	42	23	0	39	0	104
Commercial / Retail / Office	152	327	104	398	796	1,777
Industrial	11	38	375	58	2	484
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	5	9	0	38	0	52
Institutional (Schools / Hospital / Churches)	450	80	180	218	4	932
Parks / Open Space / Utilities	60	46	61	30	5	202
Drainage (HCFCD Right-of-Ways)	34	47	2	115	67	265
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	<u>1,252</u>	<u>1,427</u>	<u>498</u>	<u>906</u>	<u>1,059</u>	<u>5,142</u>
Total City & ETJ	2,795	3,477	1,836	2,300	2,926	13,334

3.0 POPULATION PROJECTIONS

The last official population census of the City was conducted by the U. S. Census Bureau in conjunction with the 2000 Census. The population within the city boundaries in the year 2000 was estimated at 9,089.

The Houston-Galveston Area Council (HGAC) and the Texas Water Development Board (TWDB) routinely prepare population projections for many communities within Texas. HGAC has prepared population projections for Census Tract 5554 (Tomball) for each year from 2007 to 2035. Additionally, the TWDB prepared a Regional Water Plan in 2006 which included population projections for the City of Tomball for each decade from 2010 thru 2060.

The population projections from these studies are graphed on **Exhibit 3-1**. The population for the years 2000, 2010, 2020 and 2030 with linear interpolations for years 2007 and 2017 are shown in **Table 3-1**, page 10. The 2007 population range is 11,168 to 11,765 and the 2017 population range is 13,783 to 14,418.

Independent population projections for the 2007 population within the City limits and the ETJ have been made using the area of each category of Land Use in 2007 as previously determined in **Table 2-1**, with the Land Use Densities assumptions from the 2002-2012 City of Tomball Masterplan and the Population Densities from the 2000 U.S. Census Bureau for Tomball shown in **Table 3-2**, page 11.

Table 3-3, page 12, shows the 2007 projection for the City population as 10,753, the ETJ as 3,633 and the combined total as 14,386.

As shown in **Table 3-4**, page 13, the projected population for the City in 2017 is 21,285, for the ETJ is 5,040 and for the combined total is 26,325.

**Exhibit 3-1
City of Tomball Population Projections**

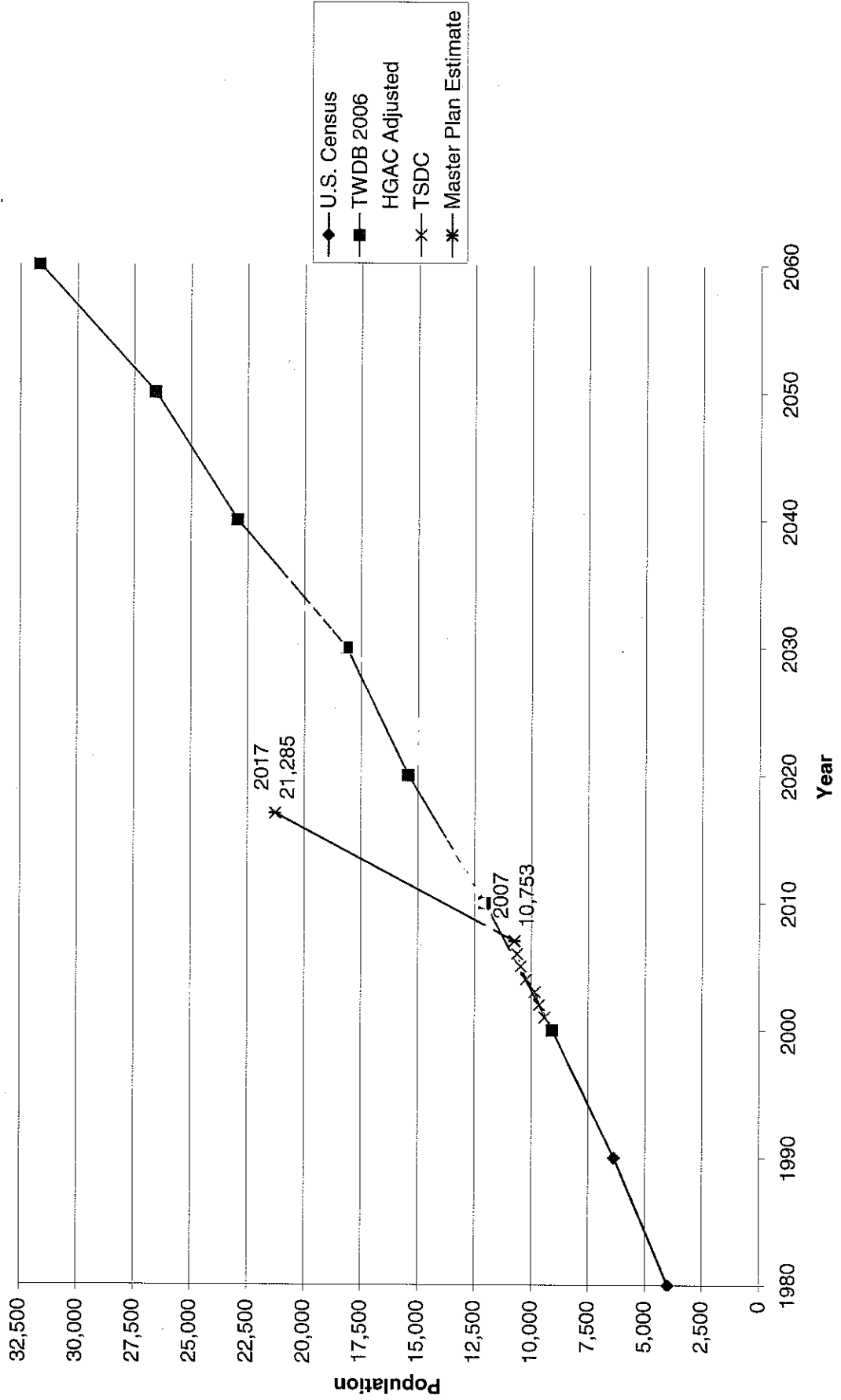


Table 3-1								
Population Projection Comparisons, 2000-2030								
Within the Tomball City Limits								
Study / Year	2000	2007	2010	2012	2017	2020	2030	
HGAC Projections for Tract 5554 (1)	9,089	11,765	12,256	12,819	13,783	14,690	18,563	
TWDB 2006 Regional Water Plan Population Projections for the City of Tomball	9,089	11,168	(2) 12,059	12,733	(2) 14,418	(2) 15,429	18,150	
(1) The boundary of Census Tract 5554 is slightly different than the City of Tomball boundary. An adjustment was made to the population in year 2000 to match the City Census population and the adjustment was carried forward								
(2) Linear interpolation								

**Table 3-2
Census Data, 2000**

<u>2000 Census Data</u>	
Owner occupied housing units	1531
Renter occupied housing units	2029
<u>Vacant housing units</u>	<u>449</u>
Total housing units	4009
Average Household Size	2.43
Ave Household size Owner Occupied Unit	2.66
Ave Household size Renter Occupied Unit	2.26
Population	9089

% Vacancy of Total Housing Units =	11.2%
% of Total Housing Units Occupied =	88.8%

**Tomball Master Plan, 2002
Land Use Density**

Single Family, Average Lots	2.8
Single Family, Large Lots	0.5
MultiFamily & Mobile Home	15

Table 3-3								
Population Projections, 2007								
Within the City Limits	Total Area		Land Use Density				Population Density	
	(Acres)		(Units/ac)			Units	(People/Unit)	Population
Single Family, Average Lots	734	(1)	2.8	(3)	2055	2.66	(3)	5,466
Single Family, Large Lots	823	(1)	0.5	(3)	412	2.66	(3)	1,096
Multi-Family & Mobile Home	90	(2)	15	(3)	1350	2.26	(3)	3,051
Commercial / Retail / Office	603	(2)						
Industrial	145	(2)						
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	38	(5)	20.0	(5)	760	1.5	(3)	1,140
Schools / Hospital	765	(2)						
Public Parks / Open Space / Utilities	182	(2)						
Drainage (HCFCD Right-of-Ways)	120	(2)						
<u>Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)</u>	<u>3,929</u>	<u>(4)</u>	-					
Total City	7,429	(2)			4577			10,753
Within the ETJ	Total Area		Land Use Density				Population Density	
	(Acres)		(Units/ac)			Units	(People/Unit)	Population
Single Family, Average Lots	300	(1)	2.8	(3)	840	2.66	(3)	2,234
Single Family, Large Lots	1,051	(1)	0.5	(3)	526	2.66	(3)	1,399
Multi-Family & Mobile Home	0	(2)	15	(3)	0	2.26	(3)	0
Commercial / Retail / Office	235	(2)						
Industrial	39	(2)						
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	0	(5)	20.0	(5)	0	1.5	(3)	0
Schools / Hospital	0	(2)						
Public Parks / Open Space / Utilities	20	(2)						
Drainage (HCFCD Right-of-Ways)	97	(2)						
<u>Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)</u>	<u>4,163</u>	<u>(4)</u>	-					
Total ETJ	5,905	(2)						3,633
Total City and ETJ	13,334							14,386
(1) From the City of Tomball 2007 GIS shape files and assuming no increase in the large lot subdivision acreage								
(2) From City of Tomball 2007 GIS shape files								
(3) From City of Tomball 2002 Masterplan								
(4) Balance of total								
(5) Assumed								
(6) From the 2000 Census Data for the City of Tomball								

Table 3-4							
Population Projections, 2017							
Within the City Limits	Total Area		Land Use Density			Population Density	
Land Use Type	(Acres)		(Units/ac)		Units	(People/Unit)	Population
Single Family, Average Lots	2,028		2.8	(3)	5678	2.66	(6) 15,103
Single Family, Large Lots	823	(1)	0.5	(3)	412	2.66	(6) 1,096
Multi-Family & Mobile Home	104	(2)	15	(3)	1560	2.26	(6) 3,526
Commercial / Retail / Office	1,125	(2)					
Industrial	445	(2)					
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	52	(2)	20.0	(5)	1040	1.5	(3) 1,560
Schools / Hospital	842	(2)					
Public Parks / Open Space / Utilities	182	(2)					
Drainage (HCFCD Right-of-Ways)	134	(2)					
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	1,694	(4)	-				
Total City	7,429	(2)					21,285
Within the ETJ	Total Area		Land Use Density			Population Density	
	(Acres)		(Units/ac)		Units	(People/Unit)	Population
Single Family, Average Lots	492		2.8	(3)	1378	2.66	(6) 3,665
Single Family, Large Lots	1,033	(1)	0.5	(3)	517	2.66	(6) 1,375
Multi-Family & Mobile Home	0	(2)	15	(3)	0	2.26	(6) 0
Commercial / Retail / Office	652	(2)					
Industrial	39	(2)					
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	0	(5)	20.0	(5)	0	1.5	(3) 0
Schools / Hospital	90	(2)					
Public Parks / Open Space / Utilities	20	(2)					
Drainage (HCFCD Right-of-Ways)	131	(2)					
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	3,448	(4)	-				
Total ETJ	5,905	(2)					5,040
Total City and ETJ	13,334						26,325
(1) From the City of Tomball 2007 GIS shape files and assuming no increase in the large lot subdivision acreage							
(2) From City of Tomball 2007 GIS shape files							
(3) From City of Tomball 2002 Masterplan							
(4) Balance of total							
(5) Assumed							
(6) From the 2000 Census Data for the City of Tomball							

4.0 WATER SYSTEM

4.1 EXISTING WATER SYSTEM

The City Water System consists of two Water Supply, Storage and Pumping facilities (Water Plants), two Elevated Storage Tanks and an extensive Water Distribution System. The two Water Plants, one located on Pine Street and other on Baker Drive, the two Elevated Storage Tanks and the network of Water Distribution lines are shown on **Exhibit 4-1**.

4.1.1 Water Supply, Storage and Pumping Facility Details

The Pine Street Water Plant has two on-site water wells and an off-site water well. Onsite Well #1 pumps from the Chicot Aquifer and currently has a capacity of **544 gallons per minute (gpm)**. Onsite Well #2, located a distance of approximately 200 feet from Well #1, pumps from the Evangeline Aquifer and currently has a capacity of **1,689 gpm**. Offsite Well #3, located on School Street, pumps from the Chicot Aquifer to the Pine Street Water Plant directly and currently has a capacity of **559 gpm**.

This water plant also has 400,000 gallons of ground storage, 750,000 gallons of elevated storage, three booster pumps rated at 1662 gpm, 1586 gpm and 1067 gpm and related disinfection and metering equipment.

The Baker Street Water Plant has an on-site well that pumps from the Evangeline Aquifer and currently has a capacity of **889 gpm**. This well originally had a capacity of 1,200 gpm but has been operated at a reduced rate in order to minimize the withdrawal of gas with the groundwater.

This facility also has 200,000 gallons of elevated storage, but because the tank bowl is below the operating pressure plane it essentially operates as a ground storage tank. This facility also has three booster pumps rated at 600 gpm, 500 gpm and 500 gpm and related disinfection and metering equipment.

The Ulrich Road Elevated Storage Tank is a 500,000 gallon storage facility is the primary "control" tower for the pressure pumping operations for both Water Plants. The existing capacities of the Water Plants are shown in **Table 4-1**, page 18.

4.1.2 Water Distribution System Details

The City's water distribution system consists of approximately 86 miles of 1.5 inch to 12-inch diameter water lines. Existing water line pipe materials consist of iron, steel and polyvinylchloride. The systems oldest lines were initially constructed in the late 1950's. The water distribution system is shown on **Exhibit 4-1**.

4.2 HISTORICAL WATER USE

The City has been tracking water usage each month by land use category - residential, commercial, public municipal and flushed/emergency. Beginning in 2002, the City separated the residential water use category into single family and multi family water usage.

The City also been tracking the number of meters by land use category i.e. residential (single family and multi family combined), commercial and public. The number of multi family master meters was known to be 95 in 2002 and is known today to be 96. By separating the meter counts into single family and multi family, an average water usage by meter (or gpd per unit) for single family and multi family can be calculated. Additionally, using the 2000 Census Data for Percent Occupancy and the Population per Housing Unit from **Table 3-2**, an estimation of the population can be made for each year.

The actual water use for the City of Tomball for years 2002 thru 2006 is shown in **Table 4-2**, page 19 along with the actual single family and multi family meter count (unit count) and the estimated population.

As shown in the table, the Average Daily Water Demand per Meter (or Unit) for single family usage ranges from 313-365 gpd. Thus the estimated average usage of 340 gpd increased by 10% to **374 gpd per single family meter** (living unit equivalent), as developed in the 2002 Master Plan, appears to be very representative and will be used throughout this report.

4.3 STATE DESIGN CRITERIA

The Texas Commission on Environmental Quality (TCEQ) criteria, which is specified in TAC, Title 30, Part I, Chapter 290, Subchapter D, Rules and Regulations for Public Water System, 9/13/00, provides minimum acceptable design and construction practices to ensure that facilities are properly sized to produce and distribute a safe potable water. The following criteria are used in this report:

Connection - A single residential unit or each commercial or industrial establishment to which drinking water is supplied from the system (§290.38).

Maximum Daily Demand - 2.4 times average daily demand (§290.38).

Peak Hourly Demand - 1.25 times maximum daily demand (prorated to an hourly rate) (§290.38).

Minimum Water System Capacity Requirements (§290.45)

Wells

2 or more - total capacity of 0.6 gallons per minute (gpm) per connection.

Storage

Total capacity of 200 gallons per connection, including elevated storage of 100 gallons per connection

Booster Pumps, the lesser of

Two or more pumps with total capacity of 2 gpm per connection, or Minimum of 1,000 gpm with capacity to meet peak hourly demands with the largest pump out of service

Nominal Operating Pressure

35 psi throughout system
20 psi minimum during firefighting

4.4 ADEQUACY OF EXISTING SYSTEM

The water supply, storage, and booster pumps are required to have minimum capacities based on the number of connections served and the delivery of water at minimum pressures. The existing water system capacities, shown on **Table 4-1**, page 18, were compared with minimum TCEQ criteria and the results are presented below:

	<u>Existing Capacity</u>	<u>Required Capacity</u>	<u>Adequacy</u>
Wells	3,681 gpm	3,582 gpm	OK
Firm Booster Pump Capacity	4,253 gpm	4,651 gpm	-511 gpm
Total Storage	1,850,000 gal	1,193,859 gal	OK
Elevated Storage	1,250,000 gal	596,929 gal	OK

All system elements, except booster pump capacity, currently meet the minimum TCEQ criteria.

4.5 PROPOSED IMPROVEMENTS

In order to determine the minimum TCEQ requirements thru 2017 and at Ultimate Buildout, a projection of the water demand must be made. **Table 4-3**, page 20, shows the Water Demand Factors on a Per Acre Basis from the 2002 Tomball Master Plan. **Table 4-4**, page 21, shows the Water Demand Factors per Land Use Type also from the 2002 Master Plan. These water demand factors will be used throughout this report.

The Land Use areas in 2007 from Table 2-2 were combined with the Water Demand Factors on a Per Acre Basis from Table 4-3 to produce an estimated Water Demand within the City Limits in 2007 of 815 million gallons (MG), as shown in **Table 4-5**, page 22.

Likewise, the projected Land Use areas in 2017 from Table 2-3 were combined with the Water Demand Factors from Table 4-3 to estimate the Water Demand for 2017 which resulted in a demand of 1,509 MG within the City and 1,905 MG within the City and ETJ combined, as shown in Table 4-6, page 23. Table 4-7, page 24, shows the projected Water Demand at Ultimate Buildout.

Table 4-8, pages 25 and 26, shows the projected Water Demand from 2007 to 2017 within the City Limits only, the Water System Capacities and the Improvements needed to meet that demand.

Table 4-9, pages 27 and 28, shows the projected Water Demand from 2007 to 2017 within the City Limits and ETJ combined, the Water System Capacities and the Improvements needed to meet that demand.

Below is a summary of TCEQ required capacities to serve the City and ETJ in 2017, the existing capacities in 2007 and the minimum additional capacity needed:

<u>Component</u>	<u>Min. Cap. Required Per TCEQ in 2017</u>	<u>Capacity in 2007</u>	<u>Min. Additional Capacity Needed</u>
Wells (gpm)	8,374	3,681	4,693
Firm Booster Capacity (gpm)	10,874	4,253	6,621
Total Storage (gallons)	2,791,200	1,850,000	941,200
Elevated Storage (gallons)	1,750,000	1,250,000	500,000

The additional capacities have been rounded to the next nominal capacity level and are listed below:

<u>Component</u>	<u>Additional Capacity Proposed</u>
Wells (gpm)	5,000
Firm Booster Capacity (gpm)	7,000
Total Storage (gallons)	1,300,000
Elevated Storage (gallons)	500,000
Ground Storage (gallons)	800,000

In addition to the water supply improvements, additional water mains will be needed to provide service in the future. Table 4-10, page 29 shows Unit Cost Data in 2007 Dollars, used to estimate the construction cost of the future Water Line projects. Table 4-11, pages 30 and 31, lists the Water Line Projects needed from 2007 to 2017 and using the Unit Cost Data from Table 4-10 shows the estimated project costs.

Table 4-12, pages 32 through 37, lists the combined Water Supply System and Water Line Projects needed from 2007 to 2017 and the estimated construction costs in 2007 dollars.

Table 4-1						
Water Supply System Capacities, 2007						
Component	Water Wells (gpm)	Ground Storage Tanks (gallons)	Elevated Storage Tanks (gallons)	Total Storage (gallons)	Booster Pumps (gpm)	Booster Pumps w/largest pump out of service (gpm)
Pine Street Water Plant						
Water Well #1 - Onsite	544					
Water Well #2 - Onsite	1,689					
Water Well #3 - Offsite	559					
Storage Tanks		400,000	750,000			
Booster Pump #1					1,662	
Booster Pump #2					1,586	1586
Booster Pump #3					1,067	1067
Pine Street Water Plant Totals	2,792	400,000	750,000	1,150,000	4,315	2,653
Baker Drive Water Plant						
Water Well #1 - Onsite	889					
Storage Tanks		200,000				
Booster Pump #1					600	600
Booster Pump #2					500	500
Booster Pump #3					500	500
Baker Drive Water Plant Totals	889	200,000	0	200,000	1,600	1,600
Ulrich Road Facility						
			500,000	500,000		
Total Capacities	3,681	600,000	1,250,000	1,850,000	5,915	4,253
Total Capacities in LUE	6,135		12,500	9,250		5,458

Table 4-2, Historical Use

Year	Component	No. of Meters	Number of Units	Annual Water Demand (MG)	Ave. Daily Water Demand (MG)	% of Units Occupied	Ave Daily Water Demand / Unit (gpd)	Ave House-hold (pop/unit)	Ave. Daily Demand per Person (gpcd)	Est. Pop.	Annual Rainfall (inches)
2002	<u>Tomball Meter Count & Usage</u>										
	single family all categories	1991 act	1991 act	210.16 act	0.576 act	88.8% act	326 act	2.66 (2)	123 (2)	4,703	
	multi-family all categories	95 act	2358 (1)	82.46 act	0.226 act	88.8% est	108 est	2.26 (2)	48 (2)	4,732	
	Total Residential	2086 act	4349	292.62 act	0.802 act					9,435	
2002	<u>Other all categories</u>	743 act		450.13 act	1.007 est		1356 est				
	Total	2829 Dec		660.29 act	1.809 act						52
2003	<u>Tomball Meter Count & Usage</u>										
	single family all categories	2060 act	2060 act	209.10 act	0.573 act	88.8% act	313 act	2.66 (2)	118 (2)	4,866	
	multi-family all categories	95 act	2358 (1)	89.00 act	0.244 act	88.8% est	116 est	2.26 (2)	51 (2)	4,732	
	Total Residential	2155 act	4418	298.10 act	0.817 act					9,598	
2003	<u>Other all categories</u>	802 act		446.06 act	0.978 est		1220 est				
	Total	2957 Dec		655.16 act	1.795 act						45
2004	<u>Tomball Meter Count & Usage</u>										
	single family all categories	2104 act	2104 act	249.03 act	0.682 act	88.8% act	365 act	2.66 (2)	137 (2)	4,970	
	multi-family all categories	96 act	2383 (3)	79.68 act	0.218 act	88.8% est	103 est	2.26 (2)	46 (2)	4,782	
	Total Residential	2200 act	4487	328.71 act	0.901 act					9,752	
2004	<u>Other all categories</u>	844 act		425.21 act	0.947 est		1122 est				
	Total	3044 Dec		674.24 act	1.847 act						58
2005	<u>Tomball Meter Count & Usage</u>										
	single family all categories	2125 act	2125 act	248.26 act	0.680 act	88.8% act	360 act	2.66 (2)	135 (2)	5,019	
	multi-family all categories	96 act	2383 (3)	77.52 act	0.212 act	88.8% est	100 est	2.26 (2)	44 (2)	4,782	
	Total Residential	2221 act	4508	325.78 act	0.893 act					9,802	
2005	<u>Other all categories</u>	811 act		501.26 act	1.161 est		1431 est				
	Total	3032 act		749.52 act	2.053 act						34
2006	<u>Tomball Meter Count & Usage</u>										
	single family all categories	2328 act	2328 act	249.77 act	0.684 act	88.8% act	331 act	2.66 (2)	124 (2)	5,499	
	multi-family all categories	96 act	2383 (3)	72.68 act	0.199 act	88.8% est	94 est	2.26 (2)	42 (2)	4,782	
	Total Residential	2424 act	4711	322.45 act	0.883 act					10,281	
2006	<u>Other all categories</u>	812 act		480.49 act	1.117 act		1376 act				
	Total	3236 act		730.26 act	2.001 act						59

(1) City utility records in 2000 of total number of multi-family units, page 2-3, 2002 City of Tomball Masterplan
 (2) From the 2000 U.S. Bureau of Census Data for Tomball
 (3) According to City staff, only 1 apartment project has been developed since 2000.

Table 4-3

Water Demand Factors, Per Acre Basis

Land Use	Average Daily Demand Water Factors from 2002 Masterplan Table 6-4 (gal/ac)	Land Use Density Table 3-3 (Units/ac)	Average Daily Water Demand per Unit (gpd)	Max. Daily Water Demand = 2.4 x Average Daily Water Demand (gal/ac)	Peak Hourly Water Demand = 1.25 x Max. Daily Water Demand (gal/ac)
Single Family, Average Lots	1045	2.8	374	2508	3135
Single Family, Large Lots	187	0.5	374	448.8	561
Multi-Family & Mobile Home	3960	15	264	9504	11880
Commercial / Retail / Office	440			1056	1320
Industrial	660			1584	1980
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	715	20	36	1716	2145
Schools / Hospital	715			1716	2145
Public Parks / Open Space / Utilities	110			264	330
Drainage (HCFCD Right-of-Ways)					
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)					

Table 4-4				
Water Demand Factors per Land Use Type				
Land Use	Average Daily Water Use Factors from 2002 Masterplan Table 6-4 (gal/ac)	Average Units per Acre (units/ac)	Average Daily Water Use per Unit of Land Use Type	Living Unit Equivalent (LUE) = 374 gpd
Single Family, Average Lots	1045	2.8	374	1.0
Single Family, Large Lots	187	0.5	374	1.0
Multi-Family & Mobile Home	3960	15	264	0.7
Commercial / Retail / Office	440			
Industrial	660			
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	715	20	36	0.1
Schools / Hospital	715			
Public Parks / Open Space / Utilities	110			
Drainage (HCFCO Right-of-Ways)				
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)				

Table 4-5					
Water Demand, 2007					
Within the City Limits	Total Area	Average Daily Water Use Factors from 2002 Masterplan Table 6-4	Ave. Daily Demand	Ave. Annual Demand	Living Unit Equivalent (LUE) Connections based on 374 gpd/conn
	(Acres)	(gal/ac)	(gpd)	(MG)	(LUE)
Single Family, Average Lots	734	1045	767,030	279.97	
Single Family, Large Lots	823	187	153,901	56.17	
Single Family Total	1,557			336.14	
Multi-Family & Mobile Home	90	3960	356,400	130.09	
Commercial / Retail / Office	603	440	265,320	96.84	
Industrial	145	660	95,700	34.93	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	38	715	27,170	9.92	
Schools / Hospital	765	715	546,975	199.65	
Total Commercial	1,551			341.34	
Parks / Open Space / Utilities	182	110	20,020	7.31	
Flushing and System Losses					
Drainage (HCFCD Right-of-Ways)	120				
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	3,929				
Total City	7,429		2,232,516	814.87	5,969
Within the ETJ	Total Area	Average Daily Water Use Factors from 2002 Masterplan Table 6-4	Ave. Daily Demand	Ave. Annual Demand	Living Unit Equivalent (LUE) Connections based on 374 gpd/conn
	(Acres)	(gal/ac)	(gallons)	(MG)	(LUE)
Single Family, Average Lots	300	1045	313,500	114.43	
Single Family, Large Lots	1,051	187	196,537	71.74	
Multi-Family & Mobile Home	0	3960	0	0.00	
Commercial / Retail / Office	235	440	103,400	37.74	
Industrial	39	660	25,740	9.40	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	0	715	0	0.00	
Schools / Hospital	0	715	0	0.00	
Public Parks / Open Space / Utilities	20	110	2,200	0.80	
Drainage (HCFCD Right-of-Ways)	97		0	0.00	
Vacant Land (Developable Land, Flood Zones, ROW)	4,163		0	0.00	
Total ETJ	5,905		641,377	234.10	1,715
Total City and ETJ	13,334		2,873,893	1,049	7,684
Peak Day Demand (gpm)			4,790		
Peak Hour Demand (gpm)			5,987		

Table 4-6					
Projected Water Demand, 2017					
Within the City Limits	Total Area	Average Daily Water Use Factors from 2002 Masterplan Table 6-4	Ave. Daily Demand	Ave. Annual Demand	Living Unit Equivalent (LUE) Connections based on 374 gpd/conn
	(Acres)	(gal/ac)	(gpd)	(MG)	(LUE)
Single Family, Average Lots	2,028	1045	2,119,260	773.53	
Single Family, Large Lots	823	187	153,901	56.17	
Multi-Family & Mobile Home	104	3960	411,840	150.32	
Commercial / Retail / Office	1,125	440	495,000	180.68	
Industrial	445	660	293,700	107.20	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	52	715	37,180	13.57	
Schools / Hospital	842	715	602,030	219.74	
Public Parks / Open Space / Utilities	182	110	20,020	7.31	
Drainage (HCFCD Right-of-Ways)	134		0	0.00	
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	1,694		0	0.00	
Total City	7,429		4,132,931	1,508.52	11,051
Within the ETJ	Total Area	Average Daily Water Use Factors from 2002 Masterplan Table 6-4	Ave. Daily Demand	Ave. Annual Demand	Living Unit Equivalent (LUE) Connections based on 374 gpd/conn
	(Acres)	(gal/ac)	(gallons)	(MG)	
Single Family, Average Lots	492	1045	514,140	187.66	
Single Family, Large Lots	1,033	187	193,171	70.51	
Multi-Family & Mobile Home	0	3960	0	0.00	
Commercial / Retail / Office	652	440	286,880	104.71	
Industrial	39	660	25,740	9.40	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	0	715	0	0.00	
Schools / Hospital	90	715	64,350	23.49	
Public Parks / Open Space / Utilities	20	110	2,200	0.80	
Drainage (HCFCD Right-of-Ways)	131		0	0.00	
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	3,448		0	0.00	
Total ETJ	5,905		1,086,481	396.57	2,905
Total City and ETJ	13,334		5,219,412	1,905.09	13,956

Table 4-7**Projected Water Demand, Ultimate Buildout**

Within the City Limits & ETJ	Total Area (Acres)	Average Daily Water Use Factors from 2002 Masterplan Table 6-4 (gal/ac)	Ave. Daily Demand (gpd)	Ave. Annual Demand (MG)	Living Unit Equivalent (LUE) Connections based on 374 gpd/conn (LUE)
Single Family, Average Lots	4,380	1045	4,577,518	1,670.79	
Single Family, Large Lots	1,874	187	350,438	127.91	
Single Family Total	6,254				
Multi-Family & Mobile Home	122	3960	482,724	176.19	
Commercial / Retail / Office	2,978	440	1,310,496	478.33	
Industrial	868	660	572,748	209.05	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	70	715	49,979	18.24	
Schools / Hospital	1,146	715	819,176	299.00	
Public Parks / Open Space / Utilities	202	110	22,220	8.11	
Drainage (HCFCD Right-of-Ways)	265				
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	1,429				
Total City & ETJ	13,334		8,185,298	2,987.63	21,886

Table 4-8

Water Supply System - Projected Demand and Capital Improvements Needed to serve the City only

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
WATER SYSTEM - PROJECTED DEMAND (1)											
Within the current City Limits Only	LUE	5,969	6,477	6,986	7,494	8,002	8,510	9,018	9,526	10,035	11,051
WATER SYSTEM - PROJECTED IMPROVEMENTS											
Water Well Capacity											
Existing Pine Street Water Plant											
Water Well #1 - Onsite	gpm	544	544	544	544	544	544	544	544	544	544
Water Well #2 - Onsite	gpm	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689
Water Well #3 - Offsite	gpm	559	559	559	559	559	559	559	559	559	559
Existing Baker Drive Water Plant											
Water Well #1 - Onsite	gpm	889	889	889	889	889	889	889	889	889	889
Additional Water Well Capacity											
Total Water Well Capacity	gpm	0	1,000	1,000	1,000	2,000	2,000	2,000	3,000	3,000	3,000
Total LUE's that can be served	LUE	6,135	7,802	7,802	7,802	9,468	9,468	11,135	11,135	11,135	11,135
LUE balance	LUE	166	1,324	816	308	1,466	450	1,609	1,100	592	84
Capacity needed for Demand only	gpm	3,582	3,886	4,191	4,496	4,801	5,411	5,716	6,021	6,326	6,631
Booster Pump Capacity											
Existing Pine Street Booster Pumps	gpm	4,315	4,315	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Existing Baker Drive Booster Pumps	gpm	1,600	1,600	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Additional Booster Pump Capacity	gpm	0	1,000	2,000	2,000	2,000	3,000	4,000	4,000	4,000	5,000
Total Booster Pump Capacity	gpm	5,915	6,915	6,500	6,500	6,500	7,500	8,500	8,500	8,500	9,500
Total Booster Pump Capacity w/Largest Pump Out of Service	gpm	4,253	5,253	6,253	6,253	6,253	7,253	8,253	8,253	8,253	9,253
Total LUE's that can be served											
LUE balance	LUE	5,458	6,742	8,025	8,025	8,025	9,309	10,592	10,592	10,592	11,876
Capacity needed for Demand only	gpm	(511)	264	1,040	531	23	799	1,066	557	49	825
Capacity needed for Demand only	gpm	4,651	5,047	5,443	5,839	6,235	6,631	7,027	7,423	7,819	8,611

Table 4-8

Water Supply System - Projected Demand and Capital Improvements Needed to serve the City only

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
WATER SYSTEM - PROJECTED DEMAND (1)											
Within the current City Limits Only	LUE	5,969	6,477	6,986	7,494	8,002	8,510	9,018	9,526	10,035	11,051
Total Water Tank Storage Capacity											
Pine Street Ground Storage Tank	gal	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Pine Street Elevated Storage Tanks	gal	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000
Baker Dr, Ground Storage Tank	gal	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Ulrich Drive Elevated Storage Tank	gal	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
Additional Ground Storage Tanks	gal.										
Additional Elevated Storage Tanks	gal										
Total Water Storage Tank Capacity	gal	1,850,000	1,850,000	1,850,000	1,850,000	1,850,000	1,850,000	1,850,000	2,050,000	2,250,000	2,250,000
Total LUE's that can be served	LUE	9,250	9,250	9,250	9,250	9,250	9,250	9,250	10,250	11,250	11,250
LUE balance	LUE	3,281	2,773	2,264	1,756	1,248	740	232	724	215	199
Capacity needed for Demand only	gal	1,193,859	1,295,493	1,397,127	1,498,761	1,600,395	1,702,029	1,803,664	1,905,298	2,006,932	2,210,200
Ground Tank Storage Capacity											
Pine Street Ground Storage Tank	gal	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Baker Dr, Ground Storage Tank	gal	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Additional Ground Storage Tanks	gal										
Total Water Storage Tank Capacity	gal	600,000	600,000	600,000	600,000	600,000	600,000	600,000	800,000	1,000,000	1,000,000
Total LUE's that can be served	LUE	3,000	3,000	3,000	3,000	3,000	3,000	3,000	4,000	5,000	5,000
LUE balance	LUE	3,000	3,000	3,000	3,000	3,000	3,000	3,000	4,000	5,000	5,000
Capacity needed for Demand only	gal	0	0	0	0	0	0	0	0	0	0
Elevated Storage Tank Capacity											
Pine Street Elevated Storage Tanks	gal	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000
Ulrich Drive Elevated Storage Tank	gal	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
Additional EST Tanks	gal										
Total EST Capacity	gal	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Total LUE's that can be served	LUE	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500
LUE balance	LUE	6,531	6,023	5,514	5,006	4,498	3,990	2,974	2,465	1,957	1,449
Capacity needed for Demand only	gal	596,929	647,746	698,564	749,381	800,198	851,015	901,832	952,649	1,003,466	1,054,283

(1) Assumes straight line growth between 2007 and 2017

Table 4-9

Water Supply System - Projected Demand and Capital Improvements Needed to serve the City & ETJ

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Ultimate
WATER SYSTEM - PROJECTED DEMAND												
City Limits and ETJ Combined	LUE	7,684	8,311	8,939	9,566	10,193	10,820	11,447	12,074	13,329	13,956	21,886
WATER SYSTEM - PROJECTED IMPROVEMENTS												
Water Well Capacity												
Pine Street Water Plant												
Water Well #1 - Onsite	gpm	544	544	544	544	544	544	544	544	544	544	544
Water Well #2 - Onsite	gpm	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689	1,689
Water Well #3 - Offsite	gpm	559	559	559	559	559	559	559	559	559	559	559
Baker Drive Water Plant												
Water Well #1 - Onsite	gpm	889	889	889	889	889	889	889	889	889	889	889
Additional Water Well Capacity	gpm	0	2,000	2,000	3,000	3,000	4,000	4,000	5,000	5,000	5,000	10,000
Total Water Well Capacity	gpm	3,681	5,681	5,681	6,681	6,681	7,681	7,681	8,681	8,681	8,681	13,681
Total LUEs that can be served	LUE	6,135	9,468	9,468	11,135	11,135	12,802	12,802	14,468	14,468	14,468	22,802
LUE balance	LUE	(1,549)	1,157	530	1,569	315	1,354	727	1,767	1,140	512	916
Capacity needed for Demand only	gpm	4,611	4,987	5,363	5,739	6,116	6,492	7,245	7,621	7,997	8,374	13,132
Booster Pump Capacity												
Pine Street Booster Pumps	gpm	4,315	4,315	4,315	4,315	4,315	4,315	4,315	4,315	4,315	4,315	4,315
Baker Drive Booster Pumps	gpm	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
Additional Booster Pump Capacity	gpm	0	3,000	3,000	4,000	5,000	5,000	6,000	6,000	7,000	7,000	13,000
Total Booster Pump Capacity	gpm	5,915	8,915	8,915	9,915	10,915	10,915	11,915	11,915	12,915	12,915	18,915
Total Booster Pump Capacity w/Largest Pump Out of Service	gpm	4,253	7,253	7,253	8,253	9,253	9,253	10,253	10,253	11,253	11,253	17,253
Total LUEs that can be served	LUE	5,458	9,309	9,309	10,592	11,876	11,876	13,159	13,159	14,442	14,442	22,143
LUE balance	LUE	(2,226)	998	370	1,026	1,683	428	1,084	457	1,114	486	257
Capacity needed for Demand only	gal	5,987	6,476	6,965	7,453	7,942	8,431	8,919	9,397	9,885	10,374	17,053

Table 4-9

Water Supply System - Projected Demand and Capital Improvements Needed to serve the City & ETJ

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Ultimate	
WATER SYSTEM - PROJECTED DEMAND													
City Limits and ETJ Combined	LUE	7,684	8,311	8,939	9,566	10,193	10,820	11,447	12,074	12,702	13,329	13,956	21,886
Total Water Tank Storage Capacity													
Pine Street Ground Storage Tank	gal	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Pine Street Elevated Storage Tank	gal	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000
Baker Dr, Ground Storage Tank	gal	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Ulrich Drive Elevated Storage Tank	gal	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
Additional Ground Storage Tanks	gal		400,000	400,000	400,000	400,000	400,000	400,000	800,000	800,000	800,000	800,000	1,600,000
Additional Elevated Storage Tanks	gal							0	0	500,000	500,000	500,000	1,000,000
Total Water Storage Tank Capacity	gal	1,850,000	2,250,000	2,250,000	2,250,000	2,250,000	2,250,000	2,250,000	2,650,000	3,150,000	3,150,000	3,150,000	4,450,000
Total LUEs that can be served	LUE	9,250	11,250	11,250	11,250	11,250	11,250	11,250	13,250	15,750	15,750	15,750	22,250
LUE balance		1,566	2,939	2,311	1,684	1,057	430	(824)	548	2,421	1,794	364	
Capacity needed for Demand only	gal	1,536,841	1,662,200	1,787,713	1,913,149	2,038,585	2,164,021	2,289,456	2,414,892	2,540,328	2,665,764	2,791,200	4,377,200
Ground Storage Tank Capacity													
Pine Street Ground Storage Tank	gal	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Baker Dr, Ground Storage Tank	gal	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Additional Ground Storage Tanks	gal		400,000	400,000	400,000	400,000	400,000	400,000	800,000	800,000	800,000	800,000	1,600,000
Total Water Storage Tank Capacity	gal	600,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,400,000	1,400,000	1,400,000	1,400,000	2,200,000
Total LUEs that can be served	LUE	3,000	5,000	5,000	5,000	5,000	5,000	5,000	7,000	7,000	7,000	7,000	11,000
LUE balance		3,000	5,000	5,000	5,000	5,000	5,000	5,000	7,000	7,000	7,000	7,000	11,000
Capacity needed for Demand only	gal	0	0	0	0	0	0	0	0	0	0	0	0
Elevated Storage Tank Capacity													
Pine Street Elevated Storage Tanks	gal	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000
Ulrich Drive Elevated Storage Tank	gal	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
Additional Elevated Storage Tanks	gal							0	500,000	500,000	500,000	500,000	1,000,000
Total Elevated Storage Tank Capacity	gal	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	1,750,000	1,750,000	1,750,000	1,750,000	2,250,000
Total LUEs that can be served	LUE	12,500	12,500	12,500	12,500	12,500	12,500	12,500	17,500	17,500	17,500	17,500	22,500
LUE balance	LUE	4,816	4,189	3,561	2,934	2,307	1,680	426	4,798	4,171	3,544	614	
Capacity needed for Demand only	gal	768,421	831,100	893,856	956,574	1,019,292	1,082,010	1,144,728	1,207,446	1,270,164	1,332,882	1,395,600	2,188,600

**Table 4-10
Water System Unit Cost Data**

8-inch Water Line		Unit	Unit Price
8-inch Water Line		LF	\$ 40.00
Fire Hydrant(1)		LF	\$ 5.71
Trench Safety		LF	\$ 1.00
Subtotal			\$ 47.00
Augering & Roadway Repairs	15%	LF	\$ 7.05
Easement Acquisition	15%	LF	\$ 7.05
Pipeline Relocation	30%	LF	\$ 14.10
Contingencies	15%	LF	\$ 7.05
Engineering & Surveying	25%	LF	\$ 11.75
Total 8-inch Water Line per LF			\$ 94.00

12-inch Water Line		Unit	Unit Price
12-inch Water Line		LF	\$ 50.00
Fire Hydrant(1)		LF	\$ 5.71
Trench Safety		LF	\$ 1.00
Subtotal			\$ 57.00
Augering & Roadway Repairs	15%	LF	\$ 8.55
Easement Acquisition	15%	LF	\$ 8.55
Pipeline Relocation	30%	LF	\$ 17.10
Contingencies	15%	LF	\$ 8.55
Engineering & Surveying	25%	LF	\$ 14.25
Total 12-inch Water Line per LF	100%		\$ 114.00

Miscellaneous Items Used in Water Lines above

Fire Hydrant Assembly	EA	\$ 2,000.00
-----------------------	----	-------------

Water Well

A 1000 gpm water well	EA	\$ 1,000,000.00
Cost per gpm (including contingencies)	gpm	\$ 1,000.00
Cost per gpm (with Engineering)	gpm	\$ 1,250.00

Elevated Storage Tanks

A 500,000 gallon Elevated Storage Tank	EA	\$ 1,000,000.00
Cost per gallon (including contingencies)	gal	\$ 2.00
Cost per gallon (with Engineering)	gal	\$ 2.50

Ground Storage Tanks

An 800,000 gallon Ground Storage Tank	EA	\$ 550,000.00
Cost per gallon (including contingencies)	gal	\$ 0.69
Cost per gallon (with Engineering)	gal	\$ 0.86

Booster Pump Capacity

3000 gpm pump capacity with building	LS	\$ 240,000.00
In 1000 gpm increments (incl. contg.)	EA	\$ 80,000.00
In 1000 gpm increments w/ Engineering	EA	\$ 100,000.00

(1) Assumes Fire Hydrants are spaced every 350 feet

Table 4-11**Water Line Projects, 2007 to 2017**

Proj. No.	Description	Priority (1)	Quantity	Units	Unit Cost	Total Cost
1	12-inch Water Line along Zion Road and E. Hufsmith Road from Neal Street to F.M. 2978	1	6,500	LF	\$ 114.00	\$741,000
2	12-inch Water Line along Future Brown-Hufsmith Road from SH 249 to Quinn Road	1	3,000	LF	\$ 114.00	\$342,000
3	12-inch Water Line along Tomball Cemetery Road North of 2920	1	2,300	LF	\$ 114.00	\$262,200
4	12-inch Water Line along F.M. 2978 from F.M. 2920 to E. Hufsmith Road	2	6,800	LF	\$ 114.00	\$775,200
5	12-inch Water Line along E. Hufsmith Road from Ulrich Road to Zion Road	2	7,900	LF	\$ 114.00	\$900,600
6	12-inch Water Line through new developments between Ulrich Road and Zion Road	2	7,000	LF	\$ 114.00	\$798,000
7	12-inch Water Line along S. Persimmon Street south of Agg Road to Holderrieth Road	3	5,100	LF	\$ 114.00	\$581,400
8	12-inch Water Line along S. Persimmon Street from Lizzie Lane to Agg Road	3	3,600	LF	\$ 114.00	\$410,400
9	8-inch Water Line along S. Pitchford Road	3	3,700	LF	\$ 94.00	\$347,800
10	8-inch Water Line between S. Pitchford Road and S. Persimmon Street just south of Lizzie Lane	3	1,100	LF	\$ 94.00	\$103,400
11	12-inch Water Line along Agg Road from S. Pitchford Road to S. Persimmon Street	3	1,100	LF	\$ 114.00	\$125,400
12	12-inch Water Line along Future Brown-Hufsmith Road from Quinn Road to Baker Drive	3	2,000	LF	\$ 114.00	\$228,000
13	12-inch Water Line along Calvert Road and Alice Road from F.M. 2920 to SH 249	3	7,300	LF	\$ 114.00	\$832,200
14	12-Inch Water Line along Agg Road from Mulberry Street to S. Pitchford Road (includes Railroad Crossing)	3	1,800	LF	\$ 114.00	\$205,200
15	12-Inch Water Line along the Future Medical Complex Drive from S. Holderrieth to S. Cherry Street	3	3,700	LF	\$ 114.00	\$421,800
16	12-Inch Water Line along the Future Bypass from S. Cherry Street to Agg Road	3	2,600	LF	\$ 114.00	\$296,400
17	12-Inch Water Line along the Future Bypass from S. Persimmon Street to Hufsmith-Kohrville Road	3	2,100	LF	\$ 114.00	\$239,400

Table 4-11

Water Line Projects, 2007 to 2017

Proj. No.	Description	Priority (1)	Quantity	Units	Unit Cost	Total Cost
18	8-inch Water Line along the Future Michel Road extension from Commercial Park Drive to School Street	3	3,100	LF	\$ 47.00	\$145,700
19	12-Inch Water Line along the Future Bypass east of Hufsmith-Kohrville Road	4	2,500	LF	\$ 114.00	\$285,000
20	12-inch Water Line along Quinn Road from Baker Drive to Inwood Street	4	2,900	LF	\$ 114.00	\$330,600
21	8-inch Water Line between Quinn Road and Julia Street of Hunterwood	4	1,400	LF	\$ 94.00	\$131,600
22	8-inch Water Line between Medical Complex Drive and Commercial Park Drive	5	900	LF	\$ 94.00	\$84,600
23	12-Inch Water Line along Park Road from FM 2920 to Brown Road	5	4,200	LF	\$ 114.00	\$478,800
24	12-Inch Water Line along Ulrich Road north of Zion to replace existing 6-inch Water Line	5	4,500	LF	\$ 114.00	\$513,000
25	8-inch Water Line along Randolph Road	5	3,500	LF	\$ 94.00	\$329,000
26	12-Inch Water Line along Brown Road from Park Road to Orchard Grove Drive	5	4,000	LF	\$ 114.00	\$456,000
Totals			94,600			\$10,364,700

(1) Priority Rating of 1 is highest priority and 5 is lowest priority

Table 4-12						
Water System Summary Requirements						
Total Connections in City				in 2007 =	5,969	LUE
Total Connections in City & ETJ				in 2007 =	7,684	LUE
New Connections during Period						
2007 Existing System serving City Only						
System Component	Size	Unit	Outstanding Bond Amount (1)	Capacity in LUE's	Demand in LUE's	LUE Excess or (Deficit)
Water Well Capacity						
Pine Street Water Plant Well #1 - Onsite	544	gpm		907		
Pine Street Water Plant Well #2 - Onsite	1,689	gpm	\$600,000	2,815		
Pine Street Water Plant Well #3 - Offsite	559	gpm		932		
Baker Drive Water Plant Well #1- Onsite	889	gpm		1,482		
Total Existing Water Well Capacity	3,681	gpm		6,135	5,969	166
Add. Water Well Capacity (2007 - 2017)		gpm				
Add. Water Well Capacity (2007 - Ult)						
Total Water Well Capacity	3,681	gpm		6,135	5,969	166
Booster Pump Capacity						
Pine Street Booster Pumps	4,315	gpm				
Baker Drive Booster Pumps	1,600	gpm				
Total Existing Booster Pump Capacity	5,915	gpm	\$0			
Existing Firm Booster Pump Capacity	4,253	gpm	\$0	5,458	5,969	(511)
Additional Booster Pump Cap. (2007-2017)						
Additional Booster Pump Cap. (2017- Ult)						
Total Firm Booster Pump Capacity	4,253	gpm		5,458	5,969	(511)
Total Water Tank Storage Capacity						
Existing Pine Street Ground Storage Tank	400,000	gal		2,000		
Existing Baker Dr. Ground Storage Tank	200,000	gal		1,000		
Total Existing GST Capacity	600,000	gal		3,000		
Add. Ground Storage Tanks (2007-2017)		gal				
Add. Ground Storage Tanks (2017-Ult)		gal				
Total Existing & Future GST Capacity	600,000	gal		3,000		
Existing Pine St. Elevated Storage Tank	750,000	gal				
Existing Ulrich Dr. Elevated Storage Tank	500,000	gal				
Existing EST Capacity	1,250,000	gal		12,500	5,969	6,531
Add. Elevated Storage Tank (2007-2017)		gal				
Add. Elevated Storage Tank (2017-Ult)						
Total Existing & Future EST Capacity	1,250,000	gal	\$1,200,000	12,500	5,969	6,531
Total Water Storage Tank Capacity	1,850,000	gal	\$1,200,000	9,250	5,969	3,281

Table 4-12						
Water System Summary Requirements						
Total Connections in City				in 2007 =	5,969	LUE
Total Connections in City & ETJ				in 2007 =	7,684	LUE
New Connections during Period						
	2007 Existing System serving City Only					
System Component	Size	Unit	Outstanding Bond Amount (1)	Capacity in LUE's	Demand in LUE's	LUE Excess or (Deficit)
<u>Distribution Lines</u>						
Misc Distribution Lines			\$732,090	21,648	5,969	15,679
<u>Additional Distribution Lines</u>						
Distribution Line Total			\$732,090	21,648	5,969	15,679
TOTAL						
(1) From Table 9-13, 2002 Tomball Masterplan.						

Table 4-12						
Water System Summary Requirements						
Total Connections in City				in 2007 =	5,969	LUE
Total Connections in City & ETJ				in 2017 =	13,956	LUE
New Connections during Period					7,987	LUE
2007 to 2017 Improvements serving the City & ETJ						
System Component	Size	Unit	Cost	Capacity in LUE's	Demand in LUE's	LUE Excess or (Deficit)
Water Well Capacity						
Pine Street Water Plant Well #1 - Onsite						
Pine Street Water Plant Well #2 - Onsite						
Pine Street Water Plant Well #3 - Offsite						
Baker Drive Water Plant Well #1- Onsite						
Total Existing Water Well Capacity	3,681	gpm		6,135	6,135	0
Add. Water Well Capacity (2007 - 2017)	5,000	gpm	\$6,250,000	8,333	7,821	512
Add. Water Well Capacity (2007 - Ult)						
Total Water Well Capacity	8,681	gpm	\$6,250,000	14,468	13,956	512
Booster Pump Capacity						
Pine Street Booster Pumps						
Baker Drive Booster Pumps						
Total Existing Booster Pump Capacity						
Existing Firm Booster Pump Capacity	4,253	gpm		5,458	5,458	0
Additional Booster Pump Cap. (2007-2017)	7,000	gpm	\$700,000	8,984	8,498	486
Additional Booster Pump Cap. (2017- Ult)						
Total Firm Booster Pump Capacity	11,253	gpm	\$700,000	14,442	13,956	486
Total Water Tank Storage Capacity						
Existing Pine Street Ground Storage Tank	400,000	gal				
Existing Baker Dr. Ground Storage Tank	200,000	gal				
Total Existing GST Capacity	600,000	gal		3,000	3,000	
Add. Ground Storage Tanks (2007-2017)	800,000	gal	\$687,500	4,000	4,000	
Add. Ground Storage Tanks (2017-Ult)		gal				
Total Existing & Future GST Capacity	1,400,000	gal	\$687,500	7,000	7,000	0
Existing Pine St. Elevated Storage Tank	750,000	gal		7,500		
Existing Ulrich Dr. Elevated Storage Tank	500,000	gal		5,000		
Existing EST Capacity	1,250,000	gal		12,500	12,500	0
Add. Elevated Storage Tank (2007-2017)	500,000	gal	\$1,250,000	5,000	1,456	3,544
Add. Elevated Storage Tank (2017-Ult)		gal				
Total Existing & Future EST Capacity	1,750,000	gal	\$1,250,000	17,500	13,956	3,544
Total Water Storage Tank Capacity	3,150,000	gal	\$1,937,500	15,750	13,956	1,794

Table 4-12						
Water System Summary Requirements						
Total Connections in City				in 2007 =	5,969	LUE
Total Connections in City & ETJ				in 2017 =	13,956	LUE
New Connections during Period					7,987	LUE
2007 to 2017 Improvements serving the City & ETJ						
System Component	Size	Unit	Cost	Capacity in LUE's	Demand in LUE's	LUE Excess or (Deficit)
Distribution Lines						
Misc Distribution Lines						
<u>Additional Distribution Lines</u>			<u>\$10,364,700</u>	<u>21,886</u>		
Distribution Line Total			\$10,364,700			
TOTAL			\$19,252,200			
(1) From Table 9-13, 2002 Tomball Master						

Table 4-12						
Water System Summary Requirements						
Total Connections in City	and ETJ			in 2017 =	13,956	LUE
Total Connections in City & ETJ				at Ultimate Buildout =	21,886	LUE
New Connections during Period					7,930	LUE
2017 to Ultimate Buildout serving the City & ETJ						
System Component	Size	Unit	Cost	Capacity in LUE's	Demand in LUE's	LUE Excess or (Deficit)
Water Well Capacity						
Pine Street Water Plant Well #1 - Onsite						
Pine Street Water Plant Well #2 - Onsite						
Pine Street Water Plant Well #3 - Offsite						
Baker Drive Water Plant Well #1- Onsite						
Total Existing Water Well Capacity	3,681	gpm		6,135	6,135	0
Add. Water Well Capacity (2007 - 2017)	5,000	gpm		8,333	8,333	0
Add. Water Well Capacity (2007 - Ult)	5,000	gpm	\$6,250,000	8,333	7,418	916
Total Water Well Capacity	13,681	gpm	\$6,250,000	22,802	21,886	916
Booster Pump Capacity						
Pine Street Booster Pumps						
Baker Drive Booster Pumps						
Total Existing Booster Pump Capacity						
Existing Firm Booster Pump Capacity	4,253	gpm		5,458	5,458	0
Additional Booster Pump Cap. (2007-2017)	7,000	gpm		8,984	8,984	0
Additional Booster Pump Cap. (2017- Ult)	6,000	gpm	\$600,000	7,701	7,444	257
Total Firm Booster Pump Capacity	17,253	gpm	\$600,000	22,143	21,886	257
Total Water Tank Storage Capacity						
Existing Pine Street Ground Storage Tank	400,000	gal				
Existing Baker Dr. Ground Storage Tank	<u>200,000</u>	<u>gal</u>				
Total Existing GST Capacity	600,000	gal		6,000	6,000	0
Add. Ground Storage Tanks (2007-2017)	800,000	gal		8,000	8,000	0
Add. Ground Storage Tanks (2017-Ult)	800,000	gal	\$687,500	8,000	7,886	114
Total Existing & Future GST Capacity	2,200,000	gal	\$687,500	22,000	21,886	114
Existing Pine St. Elevated Storage Tank	750,000	gal		7,500		
Existing Ulrich Dr. Elevated Storage Tank	<u>500,000</u>	<u>gal</u>		<u>5,000</u>		
Existing EST Capacity	1,250,000	gal		12,500	12,500	0
Add. Elevated Storage Tank (2007-2017)	500,000	gal		5,000	2,500	2,500
Add. Elevated Storage Tank (2017-Ult)	500,000	gal	\$1,250,000	5,000	6,886	0
Total Existing & Future EST Capacity	2,250,000	gal	\$1,250,000	22,500	21,886	614
Total Water Storage Tank Capacity	4,450,000	gal	\$1,937,500	22,250	21,886	364

Table 4-12						
Water System Summary Requirements						
Total Connections in City	and ETJ			in 2017 =	13,956	LUE
Total Connections in City & ETJ				at Ultimate Buildout =	21,886	LUE
New Connections during Period					7,930	LUE
2017 to Ultimate Buildout serving the City & ETJ						
System Component	Size	Unit	Cost	Capacity in LUE's	Demand in LUE's	LUE Excess or (Deficit)
Distribution Lines						
Misc Distribution Lines						
Additional Distribution Lines						
Distribution Line Total						
TOTAL			\$8,787,500			
(1) From Table 9-13, 2002 Tomball Master						

5.0 WASTEWATER SYSTEM

5.1 EXISTING WASTEWATER SYSTEM

The Tomball wastewater collection system is made up of a network of gravity lines and lift stations with force mains. Old lines in the central core were constructed in the late 1950's along with the north wastewater treatment plant. New lines and plant expansions have been added as the city grew. A relatively new trunk sewer system and treatment plant serves the south side of the city.

The city has some topographic relief being hilly in the northwest area and relatively flat in the south. The highest elevation in the city is 225 feet with low areas of 150 feet at Spring Creek and Willow Creek. For areas east of S.H. 249, the approximate north-south drainage divide in the city is F.M. 2920. West of S.H. 249, the divide is close to Brown Road.

5.1.1 Wastewater Treatment Plants

The City has two wastewater treatment plants – the north and south plant. The north plant is located in the north central part of the city and discharges into Spring Creek. The first phase of the plant (0.75 MGD) was completed in 1974. The plant was expanded to 1.5 MGD in the late 1980's. This facility operates as a complete mix plant with four mixing basins and two clarifiers. Future expansion of the plant is possible. The average daily flow in 2006 was 0.64 MGD as shown in **Table 5-1**, page 41.

The south wastewater treatment plant is a 1.5-MGD facility serving the south part of the city. The South Plant, placed into service in 1999, operates as an extended aeration, oxidation ditch facility with one aeration channel, two clarifiers, and associated units. This facility is currently permitted to treat 1.5 MGD. The average daily flow in 2006 was 0.86 MGD as shown in **Table 5-1**, page 41. **Exhibit 5-1** shows the locations of these plants.

5.1.2 Lift Stations

The City of Tomball presently has nine lift stations in operation, not including the plant lift stations. There are also numerous private lift stations serving individual tracts of land which do not yet have public sewer service. The public lift stations and their capacities are shown in **Table 5-2**, page 42.

5.1.2 Collection System

The City wastewater collection system consists of approximately 54.5 miles of gravity sewer lines ranging in diameter from 4 inches through 36 inches. The lines are shown on **Exhibit 5-1**.

5.2 HISTORICAL WASTEWATER FLOWS

The historical wastewater flows from the north and south plants from 2002 thru 2006 are shown on **Table 5-1**, page 41. Both plants are currently operating below their maximum capacities.

5.3 STATE DESIGN CRITERIA

The design criteria outlined in Chapter 217 of the Texas Commission on Environmental Quality regulations titled "Design Criteria for Sewerage Systems" have been used to evaluate the adequacy of the existing system and to size new system components. The criteria include the following items:

- Estimation of wet weather flows as 400 percent of average day flow rates.
- The layout of collection lines are placed to provide flexibility toward future land use changes and economical considerations.
- Maximum sewer capacities were calculated for pipes flowing full at not less than 2 feet per second using standard grades based on Manning's formula with an assumed "n" factor of 0.013.
- In order to avoid under-designs, which can occur without long-range planning, trunk line sizes were based upon consideration of the size of an area and an allowance for full development. The interim improvements for the study period consider future growth and provide a base system for ultimate improvements.

5.4 ADEQUACY OF THE EXISTING SYSTEM

The existing wastewater system adequately serves the current properties and population within the City limits.

5.5 PROPOSED IMPROVEMENTS

The previously presented Table 4-3 shows the water demand factors by land use type on a per acre basis as developed in the 2002 Master Plan. Using the factors in this table and assuming a 76.9% return of wastewater to be treated (100 gpd wastewater per capita/130 gpd water per capita), wastewater demand factors by land use type on a per acre basis can be derived as shown on **Table 5-3**, page 43.

Using the wastewater demand factors in Table 5-3 and the land use areas in Table 2-4, wastewater demand for the north and south service areas, within the City Limits only, are derived and shown in **Table 5-4**, page 44. The north wastewater treatment service area is comprised in subareas 1 and 2 with very little exception. The south wastewater treatment service area is comprised of subareas 3, 4 and 5.

Likewise, the wastewater demand for the City Limits and ETJ combined in 2007 are shown in **Table 5-5**, page 45. The demand for the City Limits Only in 2017 are shown in **Table 5-6**, page 46. And the wastewater demand for the City Limits and ETJ combined in 2017 are shown in **Table 5-7**, page 47. The wastewater demand for the City Limits and ETJ combined at ultimate buildout are shown in **Table 5-8**, page 48.

Table 5-9, page 49 shows the projected wastewater demand for the north and south service areas for the **City Limits and ETJ** from 2007 thru 2017. An additional 1.5 MGD of wastewater treatment capacity will be needed in each service area before 2017.

Per TCEQ rules, when the plant flow reaches 75% of its capacity the design of an expansion must commence. Likewise, when the plant flow reaches 90% of its capacity, the construction of an expansion must commence. In the North Service Area, it is projected that demand within the City will exceed 75% of the plant capacity by 2011 and 90% by 2013. In the South Service Area, these milestones are projected in 2012 and 2015.

In addition to the wastewater capacity, new sanitary sewer lines will be needed to provide service as shown on **Exhibit 5-1**. The estimated service areas used to size the proposed sanitary sewer lines are also shown on **Exhibit 5-1**. **Exhibit 5-2** shows the future Water and Wastewater Lines. **Table 5-10**, pages 50 and 51, shows Unit Cost Data in 2007 Dollars, used to estimate the construction cost of the future Sanitary Sewer projects.

Table 5-11, pages 52 through 54, lists the **Sanitary Sewer Line Projects needed from 2007 to 2017** and using the Unit Cost Data from **Table 5-10** shows the estimated project costs.

Table 5-12, pages 55 through 57, lists the combined **Wastewater System Improvements needed from 2007 to 2017**, thru Ultimate Buildout and the estimated construction costs in 2007 dollars.

Table 5-1						
Historical Wastewater Treatment Plant Flows						
	2002	2003	2004	2005	2006	Projected
						2007
North Wastewater Treatment Plant						
Annual Flow (MG)	244.0	227.8	275.0	247.6	235.0	
Average Daily Flow (MGD)	0.668	0.624	0.753	0.678	0.644	
Plant Capacity (MGD)	1.500	1.500	1.500	1.500	1.500	
% of Total Plant Capacity Used	44.6%	41.6%	50.2%	45.2%	42.9%	
South Wastewater Treatment Plant						
Annual Flow (MG)	301.4	259.74	307.8	286.7	315.6	
Average Daily Flow (MGD)	0.826	0.712	0.843	0.785	0.865	
Plant Capacity (MGD)	1.500	1.500	1.500	1.500	1.500	
% of Total Plant Capacity Used	55.1%	47.4%	56.2%	52.4%	57.6%	
Total Average Daily Flow (MGD)	1.494	1.336	1.597	1.464	1.508	1.717
LUE	5412					5983
Average Daily Flow per LUE (gpd)	276					287
Total Water Demand						
Annual Water Demand (MG)	660.29	655.16	674.24	749.52	730.26	
Average Daily Demand (MGD)	1.809	1.795	1.847	2.053	2.001	
% of Wastewater Treated vs Water Pumped	82.6%	74.4%	86.4%	71.3%	75.4%	

Table 5-2	
Existing Lift Station Capacities	
Lift Station Name	Firm Capacity (1) (gpm)
Northstar	250
Sherwood	380
Hunterwood	175
Hufsmith	350
Tomball Hills	225
Persimmon	108
Snook Lane	200
Jergens Park	36
Mattheson Park	125
North WWTP	4500
South WWTP	4475
FM 2920 & Park Rd	340
(1) Lift station capacity with largest pump out-of-service	

Table 5-4

Wastewater Demand by WWTP Service Area, City Limits Only, 2007

Land Use	Sub Area (Acres)		Sub Area (Acres)	Sub Area (Acres)	Total Area (Acres)	Average Daily Wastewater Factors from Table 5-3 (gal/ac)	Ave. Daily Flow (gpd)	LUE
	1	2						
North WWTP Service Area								
Single Family, Average Lots	149	166			315	804	253,260	
Single Family, Large Lots	334	273			607	144	87,408	
Multi-Family & Mobile Home	42	9			51	3046	155,346	
Commercial / Retail / Office	107	74			181	338	61,178	
Industrial	11	7			18	508	9,144	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	5	9			14	550	7,700	
Institutional (Schools / Hospital)	414	80			494	550	271,700	
Parks / Open Space / Utilities	52	46			98	85	8,330	
Drainage (HCFCD Right-of-Ways)	34	47			81			
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	718	1,076			1,794			
North WWTP Service Area Total	1,866	1,787			3,653		854,066	2,968
South WWTP Service Area								
Single Family, Average Lots	113	184	122	5	419	804	336,876	
Single Family, Large Lots	95	121	0	0	216	144	31,104	
Multi-Family & Mobile Home	0	39	0	0	39	3046	118,794	
Commercial / Retail / Office	56	204	162	2	422	338	142,636	
Industrial	91	34	2	0	127	508	64,516	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	0	24	0	0	24	550	13,200	
Schools / Hospital	90	177	4	0	271	550	149,050	
Parks / Open Space / Utilities	54	30	0	0	84	85	7,140	
Drainage (HCFCD Right-of-Ways)	2	37	0	0	39			
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	673	990	472	0	2,135			
South WWTP Service Area Total	1,174	1,840	762	0	3,776		863,316	3,001
North & South Service Area Totals					7,429		1,717,382	5,969

Table 5-5

Wastewater Demand by WWTP Service Area, City Limits & ETJ, 2007

Land Use	Sub Area (Acres)		Sub Area (Acres)		Sub Area (Acres)		Sub Area (Acres)		Total Area (Acres)	Average Daily Wastewater Factors from Table 5-3 (gal/ac)	Ave. Daily Flow (gpd)	LUE
	City Limits Only	ETJ	City Limits Only	ETJ	City Limits Only	ETJ	City Limits Only	ETJ				
North WWTP Service Area	1	2	1	2								
Single Family, Average Lots	149	166	0	16					331	804	266,124	
Single Family, Large Lots	334	273	55	235					897	144	129,168	
Multi-Family & Mobile Home	42	9	0	0					51	3046	155,346	
Commercial / Retail / Office	107	74	0	50					231	338	78,078	
Industrial	11	7	0	27					45	508	22,860	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	5	9	0	0					14	550	7,700	
Institutional (Schools / Hospital)	414	80	0	0					494	550	271,700	
Parks / Open Space / Utilities	52	46	8	0					106	85	9,010	
Drainage (HCFCD Right-of-Ways)	34	47	0	0					81	0	0	
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	718	1,076	866	1,362					4,022	0	0	
North WWTP Service Area Total	1,866	1,787	929	1,690					6,272	0	939,986	3,266
South WWTP Service Area	3	4	5	3	4	5	4	5				
Single Family, Average Lots	113	184	122	239	0	45	0	45	703	804	565,212	
Single Family, Large Lots	95	121	0	27	22	712	22	712	977	144	140,688	
Multi-Family & Mobile Home	0	39	0	0	0	0	0	0	39	3046	118,794	
Commercial / Retail / Office	56	204	162	2	1	184	1	184	609	338	205,842	
Industrial	91	34	2	12	0	0	0	0	139	508	70,612	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	0	24	0	0	0	0	0	0	24	550	13,200	
Schools / Hospital	90	177	4	0	0	0	0	0	271	550	149,050	
Parks / Open Space / Utilities	54	30	0	7	0	5	0	5	96	85	8,160	
Drainage (HCFCD Right-of-Ways)	2	37	0	0	78	19	0	19	136	0	0	
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	673	990	472	377	359	1197	359	1197	4,068	0	0	
South WWTP Service Area Total	1,174	1,840	762	664	460	2,162	460	2,162	7,062	0	1,271,558	4,418
North & South Service Area Totals	3,040	3,627	1,691	2,354	460	2,162	460	2,162	13,334		2,211,544	7,684

Table 5-6

Wastewater Demand by WWTP Service Area, City Limits Only, 2017

Land Use	Sub Area (Acres)		Sub Area (Acres)		Sub Area (Acres)		Sub Area (Acres)		Total Area (Acres)	Average Daily Wastewater Factors from Table 5-3 (gal/ac)	Ave. Daily Flow (gpd)	LUE
	1	2	1	2	1	2	1	2				
North WWTP Service Area	City Limits Only		ETJ									
Single Family, Average Lots	400	858	0	0	0	0	0	0	1,258	804	1,011,432	
Single Family, Large Lots	334	273	0	0	0	0	0	0	607	144	87,408	
Multi-Family & Mobile Home	42	23	0	0	0	0	0	0	65	3046	197,990	
Commercial / Retail / Office	152	82	0	0	0	0	0	0	234	338	79,092	
Industrial	11	11	0	0	0	0	0	0	22	508	11,176	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	5	9	0	0	0	0	0	0	14	550	7,700	
Institutional (Schools / Hospital)	450	80	0	0	0	0	0	0	530	550	291,500	
Parks / Open Space / Utilities	52	46	0	0	0	0	0	0	98	85	8,330	
Drainage (HCFCD Right-of-Ways)	34	47	0	0	0	0	0	0	81	0	0	
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	386	358	0	0	0	0	0	0	744	0	0	
North WWTP Service Area Total	1,866	1,787	0	0	0	0	0	0	3,653	0	1,694,628	
South WWTP Service Area	City Limits Only		ETJ									
Single Family, Average Lots	223	355	192	0	0	0	0	0	770	804	619,080	
Single Family, Large Lots	95	121	0	0	0	0	0	0	216	144	31,104	
Multi-Family & Mobile Home	0	39	0	0	0	0	0	0	39	3046	118,794	
Commercial / Retail / Office	83	397	411	0	0	0	0	0	891	338	301,158	
Industrial	363	58	2	0	0	0	0	0	423	508	214,884	
Institutional (Group Quarters - Nursing Homes, Assisted Living Homes)	0	38	0	0	0	0	0	0	38	550	20,900	
Schools / Hospital	90	218	4	0	0	0	0	0	312	550	171,600	
Parks / Open Space / Utilities	54	30	0	0	0	0	0	0	84	85	7,140	
Drainage (HCFCD Right-of-Ways)	2	37	14	0	0	0	0	0	53	0	0	
Vacant Land (Developable Land, Undevelopable Land, Flood Zones, Street ROW)	264	547	139	0	0	0	0	0	950	0	0	
South WWTP Service Area Total	1,174	1,840	762	0	0	0	0	0	3,776	0	1,484,660	
North & South Service Area Totals	3,040	3,627	762	0	0	0	0	0	7,429	0	3,179,288	11,051