Groundwater Management Plan
Of The
Bluebonnet
Groundwater Conservation
District

TWDB Certification: November 18, 2004
Date of Adoption: July 21, 2004

Turner Collie & Braden Inc.

Groundwater Management Plan

Prepared for:

Bluebonnet Groundwater Conservation District
Austin, Grimes, and Walker Counties, Texas

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District Mission

The BGCD is committed to providing for the conservation, preservation, protection, recharging and prevention of waste of groundwater within the District by developing and implementing an efficient, economical and environmentally sound conservation program with full consideration and respect for the individual citizens of the District.

Purpose of Management Plan

In 1997 the 75th Texas Legislature established a statewide comprehensive regional water planning initiative with the enactment of Senate Bill 1 (SB1). Among the provisions of SB1 were amendments to Chapter 36 of the Texas Water Code requiring groundwater conservation districts to develop a groundwater management plan that shall be submitted to the Texas Water Development Board (TWDB) for certification as administratively complete. The groundwater management plan was specified to contain estimates on the availability of groundwater in the district, details of how the district would manage groundwater and management goals for the District. In 2001 the 77th Texas Legislature further clarified the water planning and management provisions of SB1 with the enactment of Senate Bill 2 (SB2).

The requirements of the Chapter 36 Texas Water Code provisions for groundwater management plan development are specified in 31 Texas Administrative Code Chapter 356 of the TWDB Rules. This plan fulfills all requirements for groundwater management plans in SB1, SB2, Chapter 36 Texas Water Code, and rules of the Texas Water Development Board.

Time Period of Management Plan

This plan shall be in effect for a period of ten years from the date of certification by TWDB, unless a new or amended management plan is adopted by the District Board of Directors and certified by TWDB.

Bluebonnet Groundwater Conservation District

The District was created in 2001 and consisted of Austin, Grimes, Waller, Washington, and Walker counties. The creation of the District is recorded in Chapter 1361 of the Acts of the 77th Texas Legislature (HB 3655). A local confirmation election for the District was held in November 2002. The District was confirmed in Austin, Grimes, and Walker Counties. The District was not confirmed in Waller and Washington Counties.

The District is located in Austin, Grimes, and Walker Counties, Texas. The District boundaries are the same as the area and extent of these three counties. The District is bounded by Colorado, Fayette, Washington, Brazos, Madison, Houston, Trinity, San Jacinto, Montgomery, Waller, Fort Bend, and Wharton Counties. As of the plan date, confirmed groundwater conservation districts (GCD) exist in Fayette, Brazos, Madison, Montgomery, Fort Bend, and Wharton counties. The GCDs neighboring the District are: Fayette County GCD, Brazos Valley GCD (Brazos), Mid-East Texas GCD (Madison), Lone Star GCD (Montgomery), Fort Bend Subsidence District (SD), and Coastal Bend GCD (Wharton). (Fig.1)

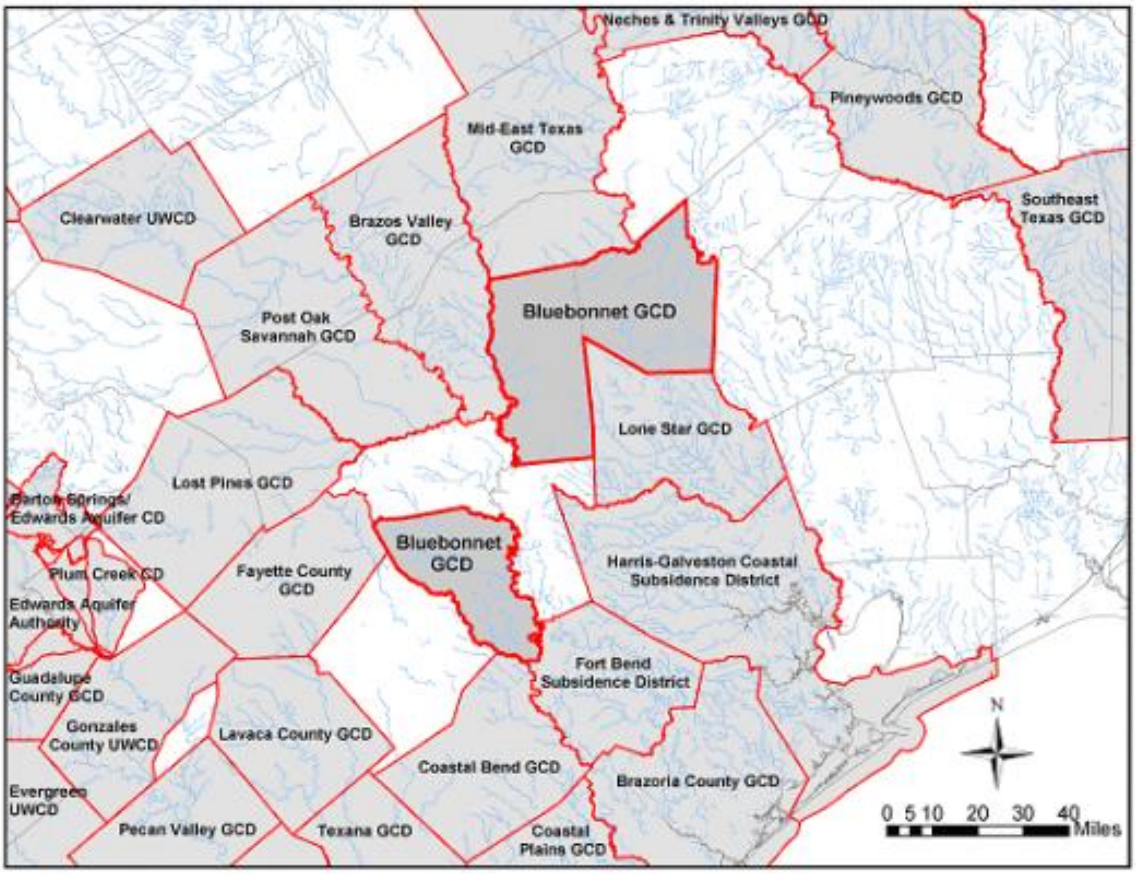

Figure 1, Neighboring Districts to the Bluebonnet Groundwater Conservation District

Most of the District is in Groundwater Management Area (GMA) 14, with the northern tip of the District in GMA 11. Chapter 36 of the Texas Water Code authorizes the District to co-ordinate its management of groundwater with other GCDs in both GMA 14 and GMA 11. The other GCDs that are located in GMA 14 are: Fort Bend SD, Brazoria County GCD, Harris-Galveston Coastal SD (Harris and Galveston), Lone Star GCD, and Southeast Texas GCD (Jasper and Newton). The other GCDs that are located in GMA 11 are: Anderson County Underground Water Conservation District, Neches and Trinity Valleys GCD (Anderson, Henderson, and Cherokee), Pineywoods GCD (Angelina and Nacogdoches), Rusk County GCD, and Upshur County GCD. (Fig. 2)

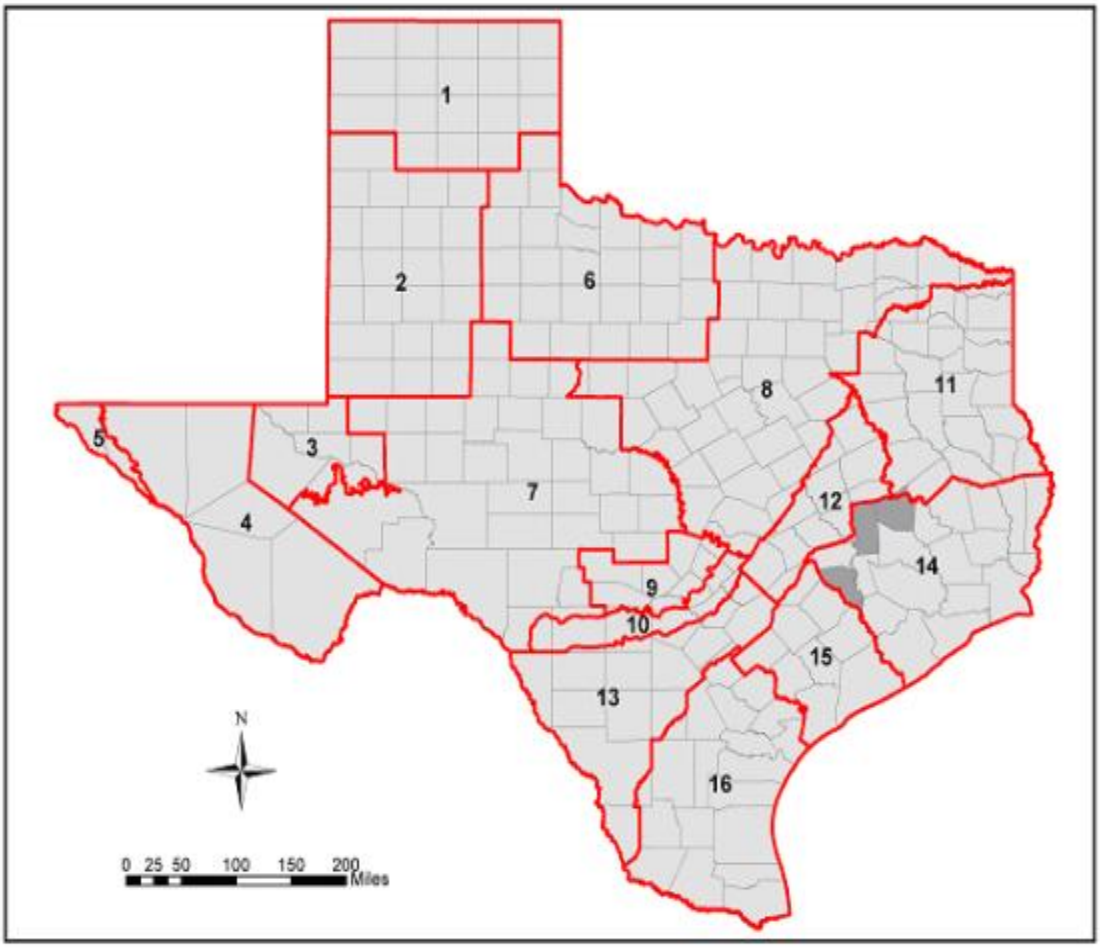

Figure 2, Groundwater Management Areas in Texas, Highlighting the Bluebonnet GCD

The District Board of Directors is composed of twelve members appointed to staggered four-year terms. The Commissioner's Court for each of the three counties appoints four directors representing the municipal, agriculture, industrial and rural water supply interest groups. The Board of Directors holds regular meetings in the City of Navasota in Grimes County, Texas. Meetings of the Board of Directors are public meetings noticed and held in accordance with public meeting requirements. Notices of the Board of Directors meetings are posted in each county of the District and are on-line at the District website www.bluebonnetgroundwater.org .

Authority of the District

The District derives its authority to manage groundwater use within the District by virtue of the powers granted and authorized in the District enabling act HB 3655 of the 77th Texas Legislature (Appendix A). The District, acting under authority of the enabling legislation, assumes all the rights and responsibilities of a groundwater conservation district specified in Chapter 36 of the Texas Water Code. The District has developed the rules specifying the bounds of due process governing District actions. The adopted rules of the District are available to the public at the District offices located at 303 E. Washington Street Suite D, Navasota, Texas 77868 (as of the date of adoption of this plan) and on-line at the District website www.bluebonnetgroundwater.org .

Groundwater Resources of the District

There are 6 sources of groundwater recognized by the TWDB in the District. Two of these sources; the Gulf Coast aquifer and the Carrizo-Wilcox aquifer are classified as major aquifers by the TWDB. (Fig. 3) The other four sources of groundwater: the Queen City aquifer, the Sparta aquifer, the Yegua-Jackson aquifer, and the Brazos River Alluvium aquifer are classified as minor aquifers by the TWDB. (Fig. 4) An additional source of groundwater in the District that has not yet been classified as a major or minor aquifer by TWDB is the San Bernard River Alluvium.

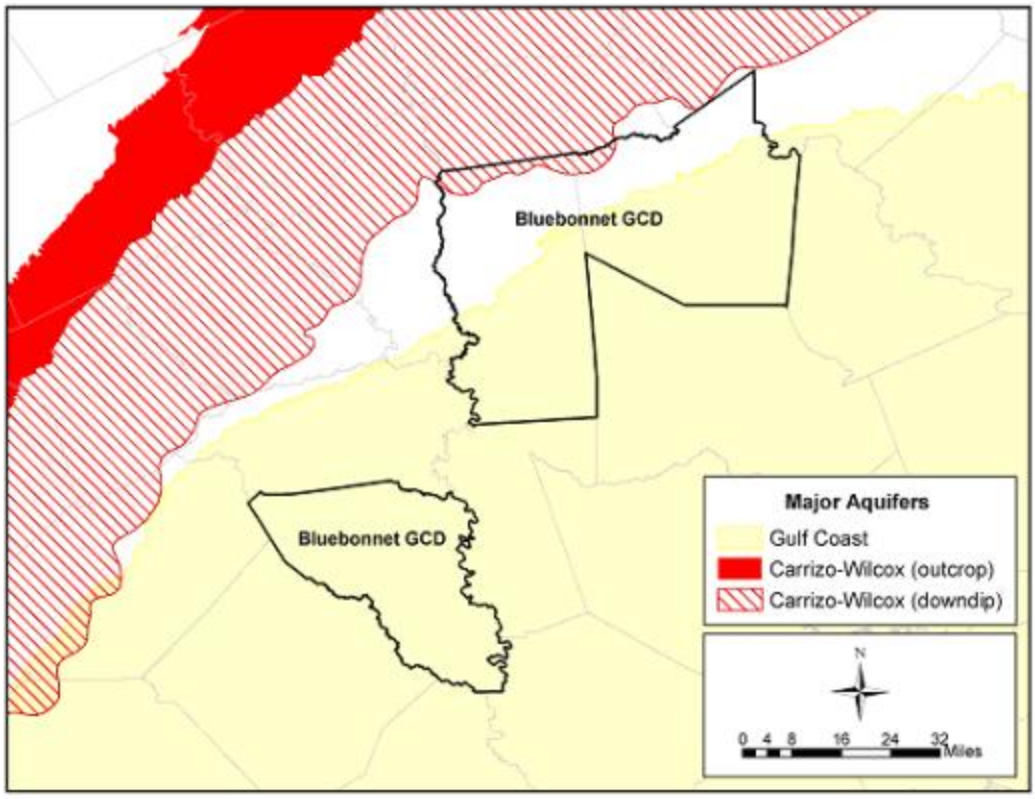

Figure 3, Major Aquifers Recognized by TWDB in the Bluebonnet GCD

A major aquifer is defined by the TWDB as a source of groundwater that is capable of producing large quantities of groundwater or that produces groundwater over a large area. A minor aquifer is defined as an aquifer that produces small quantities of groundwater or produces groundwater in a limited area. The TWDB distinction of a source of groundwater as a major or minor aquifer or whether a source of groundwater has been classified by TWDB may have no bearing on the importance of a source of groundwater to a particular locality.

The groundwater sources in the District may produce both fresh and moderately saline (brackish) water. The geologic origins of the groundwater sources of the District are relatively young in geologic age and of Tertiary and Quaternary ages. Listed in ascending order by geologic age, these sources are: Carrizo-Wilcox, Queen City, Sparta, Yegua-Jackson, Gulf Coast, Brazos River Alluvium and San Bernard River Alluvium aquifers.

Regional Geologic Structure and Aquifer Relationships in the District

The geologic formations of the District occur generally in northeast to southwest trending arcs that are roughly parallel to the Gulf of Mexico coastline. The formations generally dip and thicken towards the coast. Older formations dip more steeply than younger formations. Rates of dip may range from 200 feet per mile for older formations to 10 feet per mile for younger formations. Formations are of progressively more recent origin towards the coast and older formations are found at progressively greater depth. The regional geologic structure may be locally disrupted by faulting and piercement-type salt domes. The recent formations generally form plains near the coast and the older formations form eroded and dissected uplands. (Winslow, 1950; Wilson, 1967 and Baker and others, 1974)

Most of the aquifers in the District are aligned with the regional geologic structure and dip towards the coast. These aquifers are oriented in an inclined stack and may be separated by aquitards that restrict the vertical flow of water from one aquifer to another. Water is recharged by the percolation of rainfall in the outcrop areas. The majority of the groundwater infiltrating the outcrop area of many aquifers is lost to transpiration by plants or may move laterally and be discharged through seeps, springs or bank losses to streams. Groundwater which reaches long term storage in the aquifer generally moves down-dip (or gradient) from the outcrop areas and becomes increasingly mineralized with depth. Several of the aquifers occurring within the District have no outcrop within the District. These aquifers occur only in a buried and confined condition within the District. Springs and flowing wells are not uncommon. In some areas the base flow of streams may supported by springs or bank gains from the aquifer. (Winslow, 1950; Wilson, 1967; Baker and others, 1974 and Scanlon and others, 2002)

The aquifers in the District which do not conform to the regional geologic structure are the Brazos and San Bernard River Alluvium aquifer. These aquifers are aligned within the valleys of the rivers and dissect the outcrops of the aquifers that conform to the regional structure. (Fig. 4) The river alluviums aquifers are relatively limited in extent as compared to the other aquifers in the District. (Wilson, 1967; BEG, 1974 and Baker and others, 1974)

Aquifer Descriptions

Carrizo-Wilcox aquifer

The Carrizo-Wilcox aquifer occurs in the northern part of Grimes and Walker Counties but does not outcrop in either County. The aquifer lies approximately 1,700 feet to 2,600 feet below land surface in the District. It consists of the Carrizo Sand, which unconformably overlies the Wilcox Group. The Carrizo Sand is white to light gray in color, is approximately 140 to 220 feet thick and contains brackish to saline water. The Wilcox Group is of variable thickness that may reach 3,300 feet. It consists of clays and sands but may also contain lignite and glauconite. The Wilcox Group has been found to contain highly mineralized water by geophysical log interpretation. (Winslow, 1950 and Baker and others, 1974)

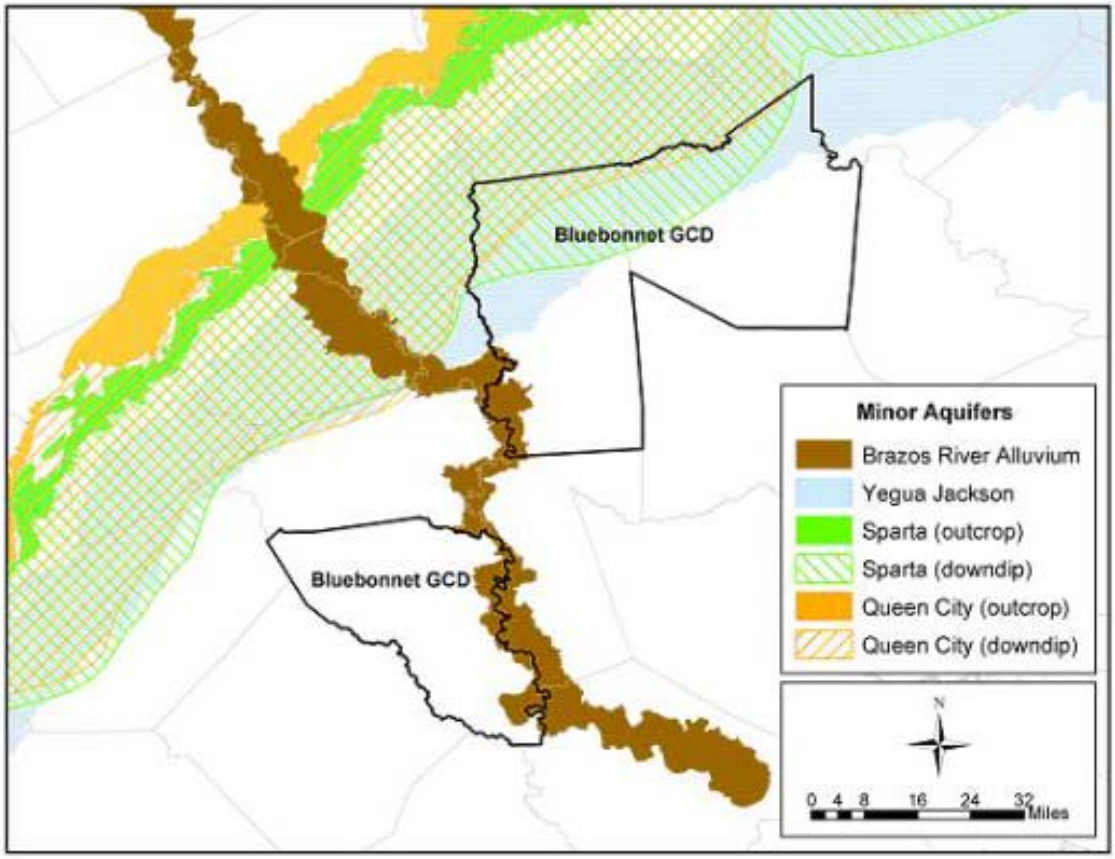

Figure 4, Minor Aquifers Recognized by TWDB in the Bluebonnet GCD

Queen City aquifer
The Queen City Sand occurs in the northern part of Grimes and Walker Counties but does not outcrop in either County. The aquifer lies approximately 1,000 feet to 2,100 feet below land surface in the District. It is approximately 350 to 400 feet maximum thickness. The Queen City Sand consists of gray to yellow orange sand that may be micaceous in Walker County or calcareous in Grimes County. It may contain fresh to brackish water in the lower portion of the aquifer with poorer quality water in the upper portion particularly in Grimes County. (Winslow, 1950 and Baker and others, 1974)

Sparta aquifer
The Sparta Sand occurs in the northern part of Grimes and Walker Counties but does not outcrop in either County. The aquifer lies approximately 700 feet to 2,700 feet below land surface in the District. The Sparta Sand consists of gray and buff colored sands with some clay interbeds with a thickness of approximately 120 to 350 feet. The water quality in Walker County may be saline but fresh to brackish in Grimes County. (Winslow, 1950 and Baker and others, 1974)

Yegua-Jackson aquifer

The Yegua-Jackson aquifer consists of the Yegua Formation and the overlying sands of the Jackson Group. The aquifer outcrops in the northern part of Grimes and Walker Counties in an outcrop belt that is approximately 9 miles wide in Walker County but may be up to 20 miles wide in Grimes County. The Yegua Formation consists of light gray calcareous or glauconitic sands interbedded with brown sandy clays and may contain pyrite, lignite or fossil wood. It reaches a maximum thickness of approximately 1,500 feet with water of fresh to moderately saline water. The Jackson Group consists of sands and sandstone, lignitic clay and tuffaceous siltstone that reach a maximum thickness of approximately 1,100 feet in Walker County and 1,600 feet in Grimes County. Some of the sandstones of the Jackson Group form prominent ridges. Water quality in the Yegua-Jackson aquifer ranges from fresh to moderately saline. (Winslow, 1950 and Baker and others, 1974)

Gulf Coast aquifer

The Gulf Coast aquifer is generally sub-divided into the Jasper, Evangeline and Chicot aquifers with the Jasper separated from the overlying Evangeline by an aquitard called the Burkeville Confining Zone. In Grimes and Walker Counties the Catahoula Sandstone could be considered part of the Gulf Coast aquifer. All sub-divisions outcrop in at least some portion of the District. The Catahoula Sandstone consists of sandy and tuffaceous mudstone in the upper portion and coarse quartz sands in the lower portion. The other sub-divisions of the Gulf Coast aquifer consist of geologic units that may differ from county to county. The Jasper aquifer generally has an upper and lower unit. The upper Jasper may have greater sand content and fresher water than the lower Jasper aquifer. The Burkeville Confining Zone consists mostly of clay but may have some sand in places. The Evangeline aquifer consists of alternating beds of sand and shale. The Chicot aquifer differs from the Evangeline mainly in having greater sand content. The Chicot aquifer may occur in the district only in southernmost Austin County. The maximum thickness of the Gulf coast aquifer may range from approximately 2,500 feet in southern Grimes and Walker Counties to approximately 3,800 feet in southern Austin County. The Gulf Coast aquifer is pierced by salt domes in Austin County. The salt domes of Austin County may be responsible for the highly irregular depth of the base of the Evangeline aquifer in that area. The water quality of the Gulf Coast aquifer ranges from fresh to slightly brackish in the District. (Winslow, 1950; Wilson, 1967 and Baker and others, 1974)

Brazos River Alluvium aquifer

The Brazos River Alluvium aquifer consists of the Recent-aged flood plain materials of the Brazos River exposed in a sinuous band in the Brazos River valley. The Brazos River Alluvium aquifer occurs in Grimes and Austin Counties in the District. The aquifer consists of silts and fine to coarse grained sands and gravels in lensatic deposits. Individual lenses of materials may grade horizontally or vertically into different materials. In Austin County the maximum thickness of the Brazos River Alluvium may be approximately 75 feet but may be more than 80 feet in Grimes County. (Wilson, 1967 and Baker and others, 1974)

<table>
<tr><th>System</th><th>Series</th><th colspan="3">Geologic Unit</th><th>Hydrologic Unit</th></tr>
<tr><td rowspan="2">Quaternary</td><td>Recent</td><td colspan="3">Alluvial Fill Material</td><td>Brazos River Alluvium
San Bernard River Alluvium</td></tr>
<tr><td rowspan="3">Pleistocene</td><td>Austin</td><td>Grimes</td><td>Walker</td><td rowspan="7">Gulf Coast aquifer</td></tr>
<tr><td>Beaumont Clay</td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>Montgomery Formation</td></tr>
<tr><td rowspan="5">Tertiary</td><td rowspan="2">Pliocene (?)</td><td>Bentley Formation</td></tr>
<tr><td>Willis Sand</td><td rowspan="2">Willis Sand</td><td rowspan="2">Willis Sand</td></tr>
<tr><td>Goliad Sand</td></tr>
<tr><td rowspan="2">Miocene</td><td>Fleming Formation</td><td>Fleming Formation</td><td>Oakville Sand and Lagarto Clay</td></tr>
<tr><td colspan="3">Catahoula Sandstone</td></tr>
<tr><td rowspan="5">Eocene</td><td colspan="3">Jackson Group</td><td rowspan="2">Yegua Jackson aquifer</td></tr>
<tr><td colspan="3">Yegua Formation</td></tr>
<tr><td colspan="3">Sparta Sand</td><td>Sparta aquifer</td></tr>
<tr><td colspan="3">Queen City Sand</td><td>Queen City aquifer</td></tr>
<tr><td colspan="3">Carrizo Sand</td><td rowspan="2">Carrizo-Wilcox aquifer</td></tr>
<tr><td colspan="3">Wilcox Group</td></tr>
</table>

Figure 5, Water-bearing Geologic and Hydrologic Units of Bluebonnet GCD, modified from (Baker and others, 1974), (Wilson 1967) and (Winslow, 1950)

San Bernard River Alluvium aquifer
The San Bernard River Alluvium aquifer occurs in Austin County but little information has been published about this source of water. The aquifer occurs in a sinuous band in the San Bernard River valley. The composition and thickness of the aquifer material is likely similar to the Brazos River Alluvium. The extent of the San Bernard River Alluvium as mapped on the Geologic Atlas of Texas is limited. (BEG, 1974)

Physiography of the District

Elevation of the District ranges from about 460 feet above mean sea level (amsl) in the northwest to about 120 feet amsl in the southeast. Austin and Walker counties are fairly level to the south with rolling hills to the west and north. Grimes County consists mostly of rolling hills. (TSHA 2003) Southern Austin County is within the Gulf Coast Prairies and Marshes natural region and the northern part of the county is within the Blackland Prairie natural region. Grimes County is within both the Oak Woods and Prairies region and the Blackland Prairies region. Most of Walker County is within the Oak Woods and Prairies region with the southern tip of the county within the Piney Woods natural region (Hatch and others, 1990 and LBJ, 1978). Most of Austin County is drained by the Brazos River with parts of the county drained by the San Bernard and Colorado Rivers (Greenwade, 1984). Grimes County is drained by the Navasota and Bravos Rivers in the west, the Trinity River and Bedias Creek in the northeast and the San Jacinto River in the southeast. (Greenwade, 1996) Walker County is drained by the Trinity River in the north and the San Jacinto River in the south. (TSHA, 2003)

Units of measure for Water Planning Estimates Used in this Plan Document

The District estimates of groundwater availability, annual use, projected water demands, projected water supplies and the water management strategies recommended in the TWDB Approved 2001 Regional Water Plans (Regions H and G) are expressed in acre-feet per year. An acre-foot is the equivalent volume of water of covering an acre of land to a depth of 1 foot. An acre-foot is equal to 325,851 gallons. Another common unit of measure for large volumes of water is a million (1,000,000) gallons or million gallons per day (Mgd). The relationship of an acre-foot to a million gallons or one Mgd can be expressed as follows; one million gallons equals approximately 3.069 acre-feet, 1 Mgd over one year equals 1,120.14 acre-feet per year.

Estimate of the Total Useable Amount of Groundwater in the District

The estimate of the total amount of useable groundwater in the District is an expression of the amount of groundwater in the District that is available for use. The District has chosen to express the estimate of the total amount of useable groundwater in the District as an annual rate at which groundwater may be sustainably used. The amount of useable groundwater available from the aquifers in the District is estimated to be 107,289 acre-feet per year. This estimate is based in part on the groundwater availability data in Exhibit B, Data Table 4 of the TWDB Approved 2001 Region H and Region G, Regional Water Plans. The estimates of the annual availability of the Yegua-Jackson and San Bernard River Alluvium aquifers are based on the District estimates of annual recharge. Details of the estimate of the groundwater availability are presented in Appendix C.

The District intends to use Region H and Region G estimates and the preliminary estimates developed by the District until the district has completed the well registration and permitting process and may base future estimates on the amounts of reported use in each aquifer or other information developed by the District. The District urges that caution should be exercised in utilizing this value to reach conclusions regarding future groundwater availability in the District.

Aquifer	Austin	Grimes	Walker	Total
Brazos River Alluvium	8,607	1,700	0	**10,307**
Carrizo-Wilcox	0	6,789	2,293	**9,082**
Gulf Coast	20,897	14,083	18,279	**53,259**
Queen City	0	462	75	**537**
Sparta	0	2,044	1,760	**3,804**
Yegua-Jackson	0	18,757	11,166	**29,923**
San Bernard River Alluvium	177	0	0	**177**
Other	0	0	200	**200**
Total in Acre-feet per year =	**29,681**	**43,835**	**33,773**	**107,289**

Table 1, Region H, Region G and District estimates of groundwater availability in Bluebonnet GCD in acre-feet per year (one acre-foot equals 325,851 gallons or approximately 0.326 Mgd)

Estimate of the Annual Amount of Groundwater Use in the District

To estimate the annual amount of groundwater being used in the District, the District has relied on the TWDB Annual Water use Survey Data. In past years, response to the TWDB survey was voluntary. As a result, the TWDB water use survey data is subject to variations in the completeness or accuracy of the data. The estimate of the amount of groundwater being used in the District on an annual basis is 23,214 acre-feet per year. The estimate is from the TWDB Annual Water Use Survey for the Year 2000, which is the most recent data available. TWDB data on estimated groundwater use is available from 1980 to 2000, excepting 1981 to 1983 when no data was collected. Details of the estimate of the total amount of groundwater use are presented in Appendix D.

The District has only recently begun operations and has not been able to undertake the process of developing estimates of groundwater use in the District based on site-specific locally generated data. The District has used the TWDB Annual Water Use Survey Data to comply with the statutory requirements for the administrative completeness certification of the District's groundwater management plans by TWDB.

Estimate of the Annual Amount of Natural or Artificial Recharge to the Groundwater Resources within the District

The estimated annual amount of recharge to the groundwater resources of the District is 125,261 acre-feet per year. The Carrizo-Wilcox, Queen City and Sparta aquifers occur within the District but do not outcrop in the District. The District considers that no recharge to these aquifers occurs within the District. The District developed the estimates of annual recharge to all other aquifers.

In the TWDB rules concerning groundwater management plans, recharge is defined as "The addition of water from precipitation or runoff by seepage or infiltration to an aquifer from the land surface, streams, or lakes directly into a formation or indirectly by way of leakage from another formation." This definition does not allow the inclusion of down-gradient movement of

water in an aquifer in the estimate of recharge. The estimates of annual recharge for all aquifers in the District were developed in accord with the TWDB definition of recharge.

Aquifer	Annual Recharge
Carrizo-Wilcox	**0***
Queen City	**0**
Sparta	**0**
Yegua-Jackson	**29,923**
Gulf Coast	**88,992****
San Bernard River Alluvium	**177**
Brazos River Alluvium	**6,169**
Total Annual Recharge =	**125,261****

Table 2, Annual recharge estimates for the aquifers in Bluebonnet GCD in acre-feet per year (one acre-foot equals 325,851 gallons or approximately 0.326 Mgd)

***Note**: the District estimate of recharge to the Carrizo-Wilcox aquifer is given as 0 acre-feet per year. The estimate was developed in a manner consistent with the TWDB Rules Ch. 356 definition of recharge and with consideration of the Central Carrizo-Wilcox aquifer Groundwater Availability Model (GAM). The GAM indicates that the amount of water recharging the Carrizo-Wilcox aquifer by seepage or infiltration in the District is 0 acre-feet per year. The District has not identified a published rate of inter-formation leakage for recharging to the Carrizo-Wilcox aquifer and the GAM does not consider that the Carrizo-Wilcox aquifer is recharged by inter-formation leakage.

****Note:** the District estimates of annual recharge to the groundwater resources in the District exceeds the estimate of the total amount of useable groundwater principally because the estimate of annual recharge to the Gulf Coast aquifer exceeds the Regional Water Planning Group Assessments of Gulf Coast aquifer availability. The District has used the more conservative Regional Water plan values from Exhibit B, Data Table 4 of the 2001 Approved Regional Water Plans of Regions G and H to insure that the Gulf Coast aquifer is managed on a sustainable basis.

The estimates of individual aquifer annual recharge used in this plan were based on a reasonable methodology and available data that could be considered applicable. The District presents the estimates of annual aquifer recharge as a preliminary basis on which to comply with statutory requirements and to begin the management of groundwater in the District. As improved information on groundwater conditions in the District becomes available, the District may use this information to refine the specific methodology by which the District will seek to sustainably manage the groundwater in the District. The details on the calculations used in developing the estimates of annual recharge to the aquifers of the District are presented in Appendix G.

How the Natural or Artificial Recharge in the District May be Increased

The natural or artificial recharge in the District might be increased by the construction of storm-water runoff infiltration galleries near ephemeral streams.

Estimate of the Projected Total Water Demand within the District

Estimates of projected water demand are based on anticipated patterns of population growth and migration applied to standardized estimated water use rates for the recognized categories of water use. Estimates of projected annual total water demand represent a need for water that may ultimately be met by a supply of surface water or groundwater. The estimation of projected total water demand is the first step in determining the adequacy of a regional system of water supply. The estimate of projected total water demand within the District in the year 2010 is 52,796 acre-feet. The source of this estimate is from Exhibit B, Data Table 2 in the TWDB Approved 2001 Region G and Region H, Regional Water Plans. Details of the estimate of the projected water demand are presented in Appendix E.

County	2000	2010	2020	2030	2040	2050
Austin	18,050	18,259	18,552	18,927	19,354	19,986
Grimes	15,389	22,271	22,433	22,626	22,555	22,915
Walker	11,674	12,266	12,757	13,832	14,506	14,815
Total Projected Demand =	**45,113**	**52,796**	**53,742**	**55,385**	**56,415**	**57,716**

Table 3, Regions G and H Estimates of Projected Water Demands in Austin, Grimes, and Walker counties in acre-feet per year (one acre-foot = 325,851 gallons or approximately 0.326 Mgd)

At the time that the estimates of projected total water demand for Austin, Grimes, and Walker counties were developed by the Region G and Region H Planning Groups, the District was not yet in operation and able to participate in the estimate development process.

Estimate of Projected Surface Water and Groundwater Supplies

Estimates of projected water supplies represent the estimated capacity of water supply systems to deliver water to meet user needs on an annual basis. Estimates of projected water supplies are compared with estimates of projected demand to determine if the existing infrastructure is capable of meeting the expected needs of a water user group. The annual water delivery capacity of different water systems in different areas may not be estimated by the same methods. The estimate of projected ground and surface water supplies in the District for the year 2010 is 76,305 acre-feet. This estimate is from Exhibit B, Data Table 5 in the TWDB Approved 2001 Region G and Region H, Regional Water Plans. Details of the estimate of the projected surface water and groundwater are presented in Appendix F.

Estimates of projected groundwater supplies typically represent the pumping capacity of the wells or well fields that supply a water user group. The estimation methodology for projected groundwater supplies may or may not reduce projections based on expected water-level drawdown or other conditions. The projected groundwater supplies of a water user group may significantly exceed the amount of water actually used by the user because the well fields supplying the user groups have additional or redundant capacity. This is particularly true of municipal water user groups where redundant capacity is built in to the system to insure a constant supply of water.

County	2000	2010	2020	2030	2040	2050
Austin	19,393	19,432	19,506	19,599	19,730	19,987
Grimes	31,253	37,974	37,974	37,974	37,974	37,974
Walker	19,131	18,899	18,916	7,731*	7,747*	7,765*
Total Projected Supplies =	**69,777**	**76,305**	**76,396**	**57,573**	**57,704**	**57,961**

Table 4, Region G and Region H Estimates of Projected Ground and Surface Water Supplies in Austin, Grimes, and Walker counties in acre-feet per year (one acre-foot equals 325,851 gallons or approximately 0.326 Mgd)

Note: The projected ground and surface water supplies given in Table 4 for Walker County in the decades of 2030 through 2050 appear significantly reduced from prior decades. This apparent reduction in projected supplies is due to the conclusion of the current term of existing surface water supply contracts. The 2001 Region H, Regional Water Plan that has been approved by TWDB includes recommended Water Management Strategies to renew these existing contracts. This recommendation by the Region H, Regional Water Plan is shown in this plan document on page 13 in the "Water Management Strategies to Meet Needs of Water User Groups" section.

At the time that the estimates of projected water supplies for Austin, Grimes, and Walker counties were developed by the Region G and Region H Planning Groups, the District was not yet in operation and able to participate in the estimate development process.

Water Management Strategies to Meet Needs of Water User Groups

The projected water supplies and demand estimates for Austin, Grimes, and Walker Counties taken from the Region G and Region H Water Plans indicate that projected demands do not exceed projected supplies through 2050. No strategies were identified for Grimes and Austin Counties. Walker County strategies were to extend existing surface water supply contracts in the year 2030. Only one groundwater related strategy was recommended by Region H to supply the City of Willis in Montgomery County from a Walker County well field.

Water User Group	County	Water Management Strategy	Source	2000	2010	2020	2030	2040	2050
Steam Electric Power	Grimes	No strategy identified	Not identified	0	0	0	0	0	0
Huntsville	Walker	In 2030 extend existing contract through 2050, split between basins (Total = 9,209 acft/yr)*	Lake Livingston	0	0	0	7,828	7,828	7,828
Huntsville	Walker	In 2030 extend existing contract through 2050, split between basins (Total = 9,209 acft/yr)*	Lake Livingston	0	0	0	1,381	1,381	1,381
City of Willis**	Montgomery	New well fields	Gulf Coast aquifer	0	0	0	133	303	500
County-other	Walker	Extend existing contract through 2050	Lake Livingston	0	0	0	1,210	1,203	1,215
County-other	Walker	Extend existing contract through 2050	Lake Livingston	0	0	0	783	790	778

Table 5, Water Management Strategies Recommended for Austin, Grimes, and Walker counties in the Regions G and H Regional Water Plans in acre-feet per year (one acre-foot equals 325,851 gallons or approximately 0.326 Mgd)

* **Note**: The City of Huntsville in Walker County is supplied by surface water furnished under a contract due to expire by the year 2030. The expiration date of this contract is reflected in the reduction of projected water supplies for Walker County shown for 2030 through 2050 in Table 4 on page 12 in the "Estimate of Projected Surface Water and Groundwater Supplies"section. The water management strategies recommended in the 2001 TWDB approved Region H, Regional Water Plan for the City of Huntsville in Walker County are to extend the current existing water supply contract through the year 2050. The extension of the existing contract restores the water supply (9,209 acre-ft per year) in the years 2030 through 2050 that is shown to be reduced for those years in Table 4 on page 12. For regional planning purposes, the total amount of the contract is shown as split between the area of Walker County in the San Jacinto River Basin (1,381 acre-feet per year) and the Trinity River Basins (7,828 acre-feet per year).

** **Note**: The water management strategy recommended in the 2001 TWDB approved Region H; Regional Water Plan for the City of Willis in Montgomery County is for the construction of a well field(s) in an area of Walker County adjacent to the City of Willis beginning in the year 2030. This strategy was developed because the Region H groundwater availability value for the Gulf Coast aquifer (55,000 acre-feet per year) had been previously allocated and it was not feasible to provide surface water supplies for the City of Willis.

The City of Willis is located in the Lone Star Groundwater Conservation District (LSGCD). As of the date of adoption of this plan the LSGCD has developed a groundwater availability estimate for the Gulf Coast aquifer (64,000 acre-feet per year) that is greater than the estimate used by Region H to develop the 2001 Regional Water Plan. The LSGCD is currently (as of the date of adoption of this plan) defining aquifer management zones within the district and the groundwater availability within each zone. It is possible that the City of Willis may be able to develop adequate groundwater supplies within Montgomery County to meet the projected demands of the City. Any well field(s) for the City of Willis developed in Walker County will be subject to the permitting process requirements and fees for the production of groundwater and the transportation of groundwater outside of the District as specified in the District Rules at the time of development.

How the Groundwater Management Plan Addresses Water Supply Needs in a Manner Not in Conflict with the Region G and Region H Water Plans

In order to address water supply needs in a manner not in conflict with the TWDB Approved 2001 Regional Water Plans from the Region G and Region H Regional Water Planning Groups, the District has adopted the groundwater availability values totaling 77,206 ac-ft per year from Exhibit B, Data Table 4 of the 2001 Regions G and H Regional Water Plans. The District has added the District estimates of annual recharge for the Yegua-Jackson and San Bernard alluvium aquifers to the Exhibit B, Data Table 4 values to arrive at the estimate of the total amount of useable groundwater of 107, 289 acre-feet per year. The Yegua-Jackson aquifer and San Bernard Alluvium aquifer were not included in the assessments of groundwater availability developed by the regions.

Details on How the District Will Manage Groundwater in the District

The District will provide for the conservation, preservation, protection, recharging and prevention of waste of groundwater within the District by developing and implementing an efficient, economical and environmentally sound conservation program with full consideration and respect for the individual citizens of the District. The District seeks to manage the groundwater resources of the District as practicably as possible in a sustainable manner. The Texas Legislature established that groundwater conservation districts are the preferred method of groundwater management in Section 36.0015 of the Texas Water Code. In consideration of the economic and cultural activities occurring within the District, the District will identify and engage in such activities and practices, that if implemented may result in the conservation of groundwater in the District. The District will manage groundwater resources through rules developed and implemented in accordance with Chapter 36 of the Texas Water Code and the provisions of the District Enabling Act recorded in Chapter 1361 of the Acts of the 77th Texas Legislature (HB 3655). (Appendices A and C) The District will require that any well constructed as an exempt well under activities regulated by the Texas Railroad Commission (TRC) and later converted to another use not regulated by the TRC will be required to seek a permit for the use of groundwater in the District.

An observation well network may be established and maintained in order to monitor changing storage conditions of groundwater supplies within the District. When a monitoring well network has been established the District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions to the District Board of Directors and to the public. The District may undertake, as necessary, investigations of the groundwater resources within the District and will make the results of investigations available to the public upon adoption by the District Board of Directors. The District will co-operate with investigations of the groundwater resources of the District undertaken by other local political subdivisions or agencies of the State of Texas.

In order to better manage groundwater resources the District may establish management zones for all sources of groundwater within the District. In each management zone the District may:

a) Establish groundwater availability and authorize the production of groundwater
b) Determine and implement the proportional reductions of the use of groundwater for all classes of groundwater use that are established by the District

c) Allow for the transfer of the permitted right to use groundwater if a process is established in the District rules

Section 36.116 of the Texas Water Code provides that the District may use the management zones to adopt different rules for each:

a) Aquifer
b) Aquifer subdivision
c) Geologic formation
d) Geographic area in which any part of a through c above may occur within the District

For the purpose of managing the use of groundwater within the District, the District may define sustainable use as the use of an amount of groundwater in the District as a whole or any management zone established by the District that does not exceed:

a) The amount of annual recharge of the aquifer or aquifer subdivision in which the use occurs as recognized by the District or
b) Any other criteria established by the District as being a threshold of use beyond which further use of the aquifer or aquifer subdivision may result in a specified undesirable or injurious condition

The District will use the currently available estimates of groundwater recharge, movement and availability within the District in exercising the statutory responsibility of managing the groundwater in the District. As improved information on groundwater conditions in the District becomes available, the District may use that information to refine the specific methodology by which the District will seek to sustainably manage the groundwater in the District.
The annual amount of water used from an aquifer or aquifer subdivision in the District or in a management zone established by the District may be averaged over a period of years specified in the District rules to determine if the sustainable use has been exceeded. If the sustainable use of an aquifer or aquifer subdivision in the District or a management zone is found to have been exceeded the District may implement proportional reductions in the permitted use of groundwater in the District or management zone to reduce the levels of use to the sustainable amount. The District may implement proportional reductions in the permitted use of groundwater only to the extent that is required to maintain sustainable use in an aquifer, aquifer subdivision or a management zone when averaged over time.

The District rules may specify the methodology by which the District will track the usage of groundwater from an aquifer or aquifer subdivision in the District or a management zone to determine whether the sustainable use has been exceeded. The District rules may specify the methodology by which the District will implement any proportional reductions in the permitted use of groundwater in the District. All District actions with regard to proportional reductions of the permitted use of groundwater will be taken in noticed public meetings and in accord with the District rules.

The District may implement rules establishing a process in which the District may allow an existing user of groundwater prior to the effective date of the District Rules to obtain a permit for the use of groundwater, unless the use of groundwater is specifically exempted from permitting under the District Rules. This process is intended to recognize the existing use of groundwater in the District. To obtain a groundwater use permit, a user must indicate the maximum annual amount of groundwater put towards each beneficial use of the groundwater; provide any

additional information required by the District as specified in the District Rules and make payment of any outstanding use fees as specified in the District Rules. The opportunity extended to existing users of groundwater to obtain a groundwater use permit does not exempt the permit holder from any more restrictive permit conditions that may be imposed by the District in the future, provided that the restrictions imposed:

a) Apply to all subsequent new applications for the permitted use of groundwater and applications for the increased use of groundwater by holders of groundwater use permits regardless of the type or location of use
b) Bear a reasonable relationship to the District's management plan
c) Are reasonably necessary to protect the groundwater resources of the District

The District may adopt rules to regulate groundwater withdrawals by means of spacing and/or production limits. The District may deny a well construction permit or limit groundwater withdrawals in accordance with the guidelines stated in the rules of the District. In making a determination to deny a permit or reduce the amount of groundwater withdrawals authorized in an existing permit, the District may weigh the public benefit in managing the aquifer to be derived from the denial of a groundwater withdrawal permit or the reduction of the amount of authorized groundwater withdrawals against the individual hardship imposed by the permit denial or authorization reduction.

The relevant factors to be considered in making a determination to deny a permit or limit groundwater withdrawals may include:

a) The rules of the District
b) The distribution of groundwater resources in the District or any management zones established by the District
c) The economic hardship resulting from grant or denial of a permit or the terms prescribed by the permit

In pursuit of the District's mission of protecting the resource, the District may require reduction of groundwater withdrawals. To achieve this purpose, the District may, at the Boards discretion amend or revoke any permits after notice and hearing. The determination to seek the amendment, reduction or revocation of a permit by the District will be based on aquifer conditions observed by the District. The District may, when necessary, enforce the terms and conditions of permits and the rules of the District by enjoining the permit holder in a court of competent jurisdiction as provided for in Texas Water Code Chapter 36.102.

The District may employ technical resources at its disposal, as needed, to evaluate the resources available within the District and to determine the effectiveness of regulatory or conservation measures. In consideration of particular individual, localized or District-wide conditions the District may allow the production in a management zone to exceed the sustainable amount for a period of time considered necessary by the District. The exercise of this discretion by the District shall not be construed as limiting the authority of the District in any other matter. A public or private user may appeal to the Board for discretion in enforcement of the provisions of a reduction in the permitted use of groundwater on grounds of adverse economic hardship or unique local conditions. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

Actions, Procedures, Performance and Avoidance Necessary to Effectuate the Plan

The District will implement the provisions of this management plan and will utilize the objectives of the plan as a guide for District actions, operations and decision-making. The District will ensure that planning efforts, activities and operations are consistent with the provisions of this plan.

The District will adopt rules in accordance with Chapter 36 of the Texas Water Code and all rules will be followed and enforced. The development of rules will be based on the scientific information and technical evidence available to the District.

The District will encourage cooperation and coordination in the implementation of this plan. All operations and activities will be performed in a manner that encourages the cooperation of the citizens of the District and with the appropriate water management entities at the state, regional and local level.

Methodology for Tracking the District's Progress in Achieving Management Goals

The General Manager of the District will prepare and submit an annual report (Annual Report) to the District Board of Directors. The Annual Report will include an update on the District's performance in achieving the management goals contained in this plan. The general manager will present the Annual Report to the Board of Directors within one hundred eighty (180) days following the completion of the District's Fiscal Year, beginning in the fiscal year starting on October 1, 2004*. A copy of the annual audit of District financial records will be included in the Annual Report. The District will maintain a copy of the Annual Report, after approval by the Board of Directors, on file for public inspection at the District offices.

* **Note**: The regular meetings of the BGCD Board of Directors are scheduled on a quarterly basis. The time period of 180 days from the completion of the BGCD fiscal year for the General Manager to present the Annual Report to the Board of Directors requires that the Annual Report be presented to the Board of Directors by the second regular (quarterly) Board meeting following the completion of the BGCD fiscal year.

Management Goals

1. Providing for the Most Efficient Use of Groundwater in the District

1.1 Objective **–** Each year, the District will require all new exempt or non-exempt wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District rules.

1.1 Performance Standard **–** Each Year the number of exempt and non-exempt wells registered by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District.

2. Controlling and Preventing the Waste of Groundwater in the District

2.1 Objective **–** Each year, the District will make an evaluation of the District Rules to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.

2.1 Performance Standard **–** The District will include a discussion of the annual evaluation of the District Rules and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.

2.2 Objective **–** Each year, the District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater by an article on groundwater waste reduction on the District's website.

2.2 Performance Standard **–** Each year, a copy of the information provided in the groundwater waste reduction article on the District's website will be included in the District's Annual Report to be given to the District Board of Directors.

3. Controlling and Preventing Subsidence - This Management Goal is not Applicable to the District.

4. Natural Resource Issues Affecting the Use and Availability of Groundwater or affected by the Use of Groundwater - This Management Goal is not Applicable to the District.

5. Conjunctive Surface Water Management Issues

5.1 Objective **–** Each year, the District will participate in the regional planning process by being represented at the Region G and Region H Regional Water Planning Group meetings.

5.1 Performance Standard **–** The attendance of a District representative to at least 50 percent of the Region G and Region H Regional Water Planning Group meetings will be noted in the Annual Report presented to the District Board of Directors.

6. Addressing Conservation

6.1 Objective – The District will post an article annually, regarding water conservation on the District website www.bluebonnetgroundwater.org .

6.1 Performance Standard **–** A copy of the article posted on the District website regarding water conservation will be included in the Annual Report to the Board of Directors.

7. Addressing Drought Conditions

7.1 Objective **–** Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and check for the periodic updates to the Drought Preparedness Council Situation Report (Situation Report) posted on the Texas Water Information Network website www.txwin.net .

7.1 Performance Standard **–** Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and Situation Reports will be included with copies of the quarterly briefing, in the District Annual Report to the Board of Directors.

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Appendix A

District Enabling Act
HB 3655 of 77th Texas Legislature
Creating the
Bluebonnet Groundwater Conservation District

AN ACT

relating to the creation, administration, powers, duties, operation, and financing of the Bluebonnet Groundwater Conservation District.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. CREATION. (a) A groundwater conservation district, to be known as the Bluebonnet Groundwater Conservation District, is created in Grimes, Washington, Waller, Austin, and Walker counties, subject to approval at a confirmation election under Section 15 of this Act. The district is a governmental agency and a body politic and corporate.

(b) The district is created under and is essential to accomplish the purposes of Section 59, Article XVI, Texas Constitution.

(c) The purpose of this Act is to create a locally controlled groundwater district in order to protect and recharge groundwater, to prevent pollution or waste of groundwater, to control subsidence caused by withdrawal of water from the groundwater reservoirs in the area, and to regulate the transport of water out of the boundaries of the district.

SECTION 2. DEFINITION. In this Act, "district" means the Bluebonnet Groundwater Conservation District.

SECTION 3. BOUNDARIES. The boundaries of the district are coextensive with the boundaries of Grimes, Washington, Waller, Austin, and Walker counties.

SECTION 4. FINDING OF BENEFIT. All of the land and other property included within the boundaries of the district will be benefited by the works and projects that are to be accomplished by the district under powers conferred by Section 59, Article XVI, Texas Constitution. The district is created to serve a public use and benefit.

SECTION 5. GENERAL POWERS. (a) Except as otherwise provided by this Act, the district has all the rights, powers, privileges, authority, functions, and duties provided by the general law of this state, including Chapter 36, Water Code, applicable to groundwater conservation districts created under Section 59, Article XVI, Texas Constitution. This Act prevails over any provision of general law, including Chapter 36, Water Code, that is in conflict or is inconsistent with this Act.

(b) The district does not have the authority granted by the following provisions of Chapter 36, Water Code:

(1) Section 36.105, relating to eminent domain; and

(2) Sections 36.020 and 36.201–36.204, relating to taxes.

SECTION 6. FEES. (a) The board of directors of the district by rule may impose reasonable fees on each well for which a permit is issued by the district and which is not exempt from regulation by the district. A fee may be based on the size of column pipe used by the well or on the actual, authorized, or anticipated amount of water to be withdrawn from the well.

(b) Fees may not exceed:

(1) $1 per acre-foot payable annually for water used for agricultural use; or

(2) 17 cents per thousand gallons for water used for any other purpose.

(c) In addition to the fee authorized under Subsection (a) of this section, the district may impose a reasonable fee or surcharge for an export fee using one of the following methods:

(1) a fee negotiated between the district and the transporter; or

(2) a combined production and export fee not to exceed 17 cents per thousand gallons for water used.

(d) Fees authorized by this section may be assessed annually and may be used to fund the cost of district operations.

SECTION 7. EXEMPTIONS. (a) The district may exempt wells under Section 36.117, Water Code, from the requirements to obtain a drilling permit, an operating permit, or any other permit required by Chapter 36, Water Code, or the district's rules.

(b) The district may not require a permit for:

(1) a well used solely for domestic use or for providing water for livestock or poultry on a tract of land larger than 10 acres that is either drilled, completed, or equipped so that it is incapable of producing more than 25,000 gallons of groundwater a day;

(2) the drilling of a water well used solely to supply water for a rig that is actively engaged in drilling or exploration operations for an oil or gas well permitted by the Railroad Commission of Texas, provided that the person holding the permit is responsible for drilling and operating the water well and the well is located on the same lease or field associated with the drilling rig; or

(3) the drilling of a water well authorized under a permit issued by the Railroad Commission of Texas under Chapter 134, Natural Resources Code, or for production from any such well to the extent the withdrawals are required for mining activities regardless of any subsequent use of the water.

(c) The district may not deny the owner of a tract of land, or the owner's lessee, who does not have a well equipped to produce more than 25,000 gallons a day on the tract, either a permit to drill a well on the owner's land or the privilege to produce groundwater from the owner's land, subject to the rules of the district.

(d) The district may not restrict the production of any well that is exempt from permitting under Subsection (b)(1) of this section.

(e) Notwithstanding Subsection (b) of this section, the district may require a well to be permitted by the district and to comply with all district rules if:

(1) the purpose of a well exempted under Subsection (b)(2) of this section is no longer solely to supply water for a rig that is actively engaged in drilling or exploration operations for an oil or gas well permitted by the Railroad Commission of Texas; or

(2) the withdrawals from a well exempted under Subsection (b)(3) of this section are no longer necessary for mining activities or are greater than the amount necessary for mining activities specified in the permit issued by the Railroad Commission of Texas under Chapter 134, Natural Resources Code.

(f) An entity holding a permit issued by the Railroad Commission of Texas under Chapter 134, Natural Resources Code, that authorizes the drilling of a water well shall report monthly to the district:

(1) the total amount of water withdrawn during the month;

(2) the quantity of water necessary for mining activities; and

(3) the quantity of water withdrawn for other purposes.

(g) Notwithstanding Subsection (e) of this section, the district may not require a well exempted under Subsection (b)(3) of this section to comply with the spacing requirements of the district.

(h) The district may not deny an application for a permit to drill and produce water for hydrocarbon production activities if the application meets the spacing, density, and production rules applicable to all permitted water wells in the district.

(i) A water well exempted under Subsection (a) or (b) of this section may:

(1) be registered in accordance with rules adopted by the district; and

(2) be equipped and maintained so as to conform to the district's rules requiring installation of casing, pipe, and fittings to prevent the escape of groundwater from a groundwater reservoir to any reservoir not containing groundwater and to prevent the pollution or harmful alteration of the character of the water in any groundwater reservoir.

(j) The district may require the driller of a well exempted under Subsection (a) or (b) of this section to file the drilling log with the district.

(k) A well to supply water for a subdivision of land for which a plat approval is required by Chapter 232, Local Government Code, is not exempted under Subsection (b) of this section.

(l) Groundwater withdrawn from a well exempt from permitting or regulation under this section and subsequently transported outside the boundaries of the district is subject to any applicable production and export fees under Section 6 of this Act.

(m) This section applies to water wells, including water wells used to supply water for activities related to the exploration or production of hydrocarbons or minerals. This section does not apply to production or injection wells drilled for oil, gas, sulphur, uranium, or brine, for core tests, or for injection of gas, saltwater, or other fluids, under permits issued by the Railroad Commission of Texas.

SECTION 8. MITIGATION ASSISTANCE. In addition to the authority granted under Chapter 36, Water Code, the district may assist in the mediation between landowners regarding the mitigation of the loss of existing groundwater supply of exempt domestic and livestock users due to the groundwater pumping of others.

SECTION 9. MANAGEMENT PLAN. The district shall develop or contract to develop its own management plan under Section 36.1071, Water Code.

SECTION 10. PERMITTING. The district shall issue permits for wells based on the consideration of whether:

(1) the application conforms to the requirements prescribed by Chapter 36, Water Code, and is accompanied by the prescribed fees;

(2) the proposed use of water unreasonably affects existing groundwater and surface water resources or existing permit holders;

(3) the proposed use of water is dedicated to any beneficial use;

(4) the proposed use of water is consistent with the district's certified water management plan;

(5) the applicant has agreed to avoid waste and

achieve water conservation; and

(6) the applicant has agreed that reasonable diligence will be used to protect groundwater quality and that the applicant will follow well plugging guidelines at the time of well closure.

SECTION 11. COORDINATION OF ACTIVITIES WITH OTHER ENTITIES. (a) The district may coordinate activities with the Central Carrizo-Wilcox Coordinating Council and may appoint a nonvoting representative to the Central Carrizo-Wilcox Coordinating Council.

(b) The district may coordinate activities with the Harris-Galveston Coastal Subsidence District or with other groundwater conservation districts to manage portions of the Gulf Coast Aquifer.

SECTION 12. BOARD OF DIRECTORS. (a) The district is governed by a board of directors of not fewer than 8 or more than 20 directors, appointed as provided by Section 13 of this Act.

(b) Initial directors serve until permanent directors are appointed under Section 13 of this Act and qualified as required by Subsection (d) of this section.

(c) Permanent directors serve four-year staggered terms.

(d) Each director must qualify to serve as a director in the manner provided by Section 36.055, Water Code.

(e) A director serves until the director's successor has qualified.

(f) A director may serve consecutive terms.

(g) If there is a vacancy on the board, the governing body of the entity that appointed the director who vacated the office shall appoint a director to serve the remainder of the term. In making this appointment, the governing body shall appoint a director to represent the interest of the director who has vacated the office.

(h) Directors are not entitled to receive compensation for serving as a director but may be reimbursed for actual, reasonable expenses incurred in the discharge of official duties.

(i) A majority vote of a quorum is required for board action. If there is a tie vote, the proposed action fails.

SECTION 13. APPOINTMENT OF DIRECTORS. (a) The commissioners courts of the counties within the district, if the district has two to five counties, shall each appoint four directors, of whom:

(1) one must represent municipal interests;

(2) one must represent agricultural interests;

(3) one must represent industrial interests; and

(4) one must represent rural water suppliers' interests.

(b) If the district consists of one county, the commissioners court of that county shall appoint eight directors, of whom:

(1) two must represent municipal interests;

(2) two must represent agricultural interests;

(3) two must represent industrial interests; and

(4) two must represent rural water suppliers' interests.

(c) The commissioners courts of the counties within the district shall each appoint the appropriate number of initial directors as soon as practicable following the effective date of this Act, but not later than the 90th day after the effective date of this Act.

(d) The initial directors shall draw lots to determine their terms. Half of the initial directors serve terms that expire on

the second anniversary of the date on which all initial directors have qualified as required by Section 12 of this Act, and half of the initial directors serve terms that expire on the fourth anniversary of the date on which all initial directors have qualified as required by Section 12 of this Act. On the second anniversary of the date on which all initial directors have qualified as required by Section 12 of this Act and every two years after that date, the appropriate commissioners courts shall appoint the appropriate number of permanent directors.

SECTION 14. ORGANIZATIONAL MEETING. As soon as practicable after all the initial directors have been appointed and have qualified as provided in this Act, a majority of the directors shall convene the organizational meeting of the district at a location within the district agreeable to a majority of the directors. If no location can be agreed on, the organizational meeting of the directors shall be at the Washington County Courthouse.

SECTION 15. CONFIRMATION ELECTION. (a) The initial board of directors shall call and hold, on the same date in each county to be included in the district, an election to confirm the creation of the district.

(b) Except as provided by this section, a confirmation election must be conducted as provided by Sections 36.017, 36.018, and 36.019, Water Code, and Section 41.001, Election Code.

(c) If the majority of qualified voters in a county who vote in the election vote to confirm the creation of the district, that county is included in the district. If the majority of qualified voters in a county who vote in the election vote not to confirm the creation of the district, that county is excluded from the district.

(d) If the creation of the district is not confirmed by an election held under this section before the second anniversary of the effective date of this Act, the district is dissolved and this Act expires on that date.

SECTION 16. FINDINGS RELATED TO PROCEDURAL REQUIREMENTS. (a) The proper and legal notice of the intention to introduce this Act, setting forth the general substance of this Act, has been published as provided by law, and the notice and a copy of this Act have been furnished to all persons, agencies, officials, or entities to which they are required to be furnished by the constitution and other laws of this state, including the governor, who has submitted the notice and Act to the Texas Natural Resource Conservation Commission.

(b) The Texas Natural Resource Conservation Commission has filed its recommendations relating to this Act with the governor, the lieutenant governor, and the speaker of the house of representatives within the required time.

(c) All requirements of the constitution and laws of this state and the rules and procedures of the legislature with respect to the notice, introduction, and passage of this Act are fulfilled and accomplished.

SECTION 17. EFFECTIVE DATE. This Act takes effect September 1, 2001.

_____ _____

President of the Senate Speaker of the House

I certify that H.B. No. 3655 was passed by the House on April 27, 2001, by a non-record vote; and that the House concurred in Senate amendments to H.B. No. 3655 on May 25, 2001, by a

non-record vote.

_____
Chief Clerk of the House

I certify that H.B. No. 3655 was passed by the Senate, with amendments, on May 22, 2001, by a viva-voce vote.

_____
Secretary of the Senate

APPROVED: _____
Date

_____
Governor

Appendix B

Evidence of the Administrative Processes Required For the Certification of the Groundwater Management Plan as Administratively Complete

BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Meeting

Wednesday, July 21, 2004
6:00 PM

Navasota City Hall, City Council Chambers
107 Farquhar
Navasota, Texas

AGENDA

1. Call to order

2. Public Hearing – Proposed District Management Plan that establishes: the District Mission; the purpose and time period of the Plan; reviews the composition of the District and the authority of the District; established the groundwater resource of the District; reviews the regional geologic structure and aquifer relationships in the District; sets forth aquifer descriptions; describes the physiography of the District; defines units of measure for the water planning estimates in the Plan; estimates the Total usable amount of groundwater in the District, the amount of groundwater used annually in the District and the amount of natural or artificial annual recharge of the groundwater resources within the District; describes how recharge may be increased; states estimates of projected total water demand within the District and of projected surface and groundwater supplies; discusses water management strategies to meet the needs of water user groups; how the District Plan addresses water supply needs in a manner not in conflict with the Region G and H water plans; details of District plans to manage groundwater in the District; actions, procedures performance and avoidance necessary to effectuate the Plan; methodology for tracking the District's progress in achieving management goals; and management Goals for the District.

3. Public Comment
   (Public comment is limited to a maximum of 5 minutes per speaker and/or 30 minutes total time for all speakers)

4. Discussion and possible action to approve minutes of April 21, 2004 and June 23, 2004 Board meetings

5. Discussion and possible action to approve Resolution 2004-06 adopting the District Management Plan.

6. Discussion and possible action to approve appointment of a Board Member as a financial review official to improve segregation of accounting duties as recommended by Ingram, Wallis & Company as part of their presentation of the FY 2003 Audit.

7. Discussion and possible action to approve quarterly Financial Report.

8. Discussion and possible action to approve quarterly Investment Report.

9. Discussion and possible action to accept resignation of Director Tommy Oates from Walker County.

10. General Manager Report

    a. Report on meetings, conferences and seminars attended.

b. Report on efforts to expand number of participating non-exempt water producers.
c. Report on office being closed for 7 days in August.
d. Report on District related and initiated water issue publicity.

11. Date for next Board meeting – September 22, 2004 (FY 2004 Budget Amendment & FY 2005 Budget).

12. Adjourn

Executive Session

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices) and 551.086 (Economic Development). No final action will be taken in Executive Session.

A copy of this agenda was posted at the District offices located at 303 East Washington, Navasota, Texas at 2:30 PM on July 9, 2004 by the undersigned.

(s) Lloyd A Behm
Lloyd A. Behm, General Manager

BLUEBONNET GROUNDWATER CONSERVATION DISTRICT
Resolution No. 2004-06

A RESOLUTION OF THE BLUEBONNET GROUNDWATER CONSERVATION DISTRICT ADOPTING THE DISTRICT MANAGEMENT PLAN.

WHEREAS, the Bluebonnet Groundwater Conservation District ("District") was created by H.B. 3655, an Act of the 77th Texas Legislature, effective September 1, 2001, and by subsequent confirmation by the voters in Austin, Grimes and Walker Counties of the District, and has operated under the rights, powers, privileges, authority, functions, duties, and requirements of this Act, Chapter 36 of the Texas Water Code, other provisions of the Texas Water Code, provisions of the general law of Texas and the Texas Constitution and under sections of the Texas Administrative Code since its creation; and

WHEREAS, under the direction of the Board of Directors, and in accordance with Section 9 of H.B. 3655, Section 36.1071, Texas Water Code, and Chapter 356, Title 31, Texas Administrative Code, the District developed a Management Plan; and

WHEREAS, the District engaged Turner, Collie & Braden Inc. of Austin, Texas to provide technical assistance on ascertaining the technical information, estimates, and other information that are required by the Texas Water Development Board, the Texas Administrative Code, and Chapter 36, Texas Water Code, to be included in the Management Plan; and

WHEREAS, the District held a public hearing on July 21, 2004, which was properly noticed as required by law, to receive comments on the Management Plan for the District; and

WHEREAS, the Board of Directors finds that the Management Plan meets all of the requirements of H.B. 3655, Chapter 36, Texas Water Code, and Chapter 356, Title 31, Texas Administrative Code.

NOW, THEREFORE, BE IT RESOLVED, that:

(1) The Bluebonnet Groundwater Conservation District Management Plan is hereby adopted and approved as the management plan for the District.
(2) The General Manager of the District is hereby directed to take any and all necessary action to file the adopted plan with the Texas Water Development Board for certification.
(3) The General Manager of the District is authorized to coordinate with the Texas Water Development Board as may be required in furtherance of certification pursuant to the provisions of Section 36.1072 of the Texas Water Code.
(4) The General Manager of the District is authorized and directed to take all necessary action during the certification process and after certification of the Management Plan is received to effect coordination of the Plan, as required by statute, code and regulation, with regional water planning groups, other groundwater conservation districts, river authorities, and other entities and political subdivisions.

AND IT IS SO ORDERED, PASSED AND ADOPTED ON THIS THE 21ST DAY OF JULY, 2004.

BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

J. Jared Patout, President

ATTEST:

Joe B Sandel, Secretary

Appendix C

TWDB Groundwater Availability Estimates for Austin, Grimes, and Walker Counties

Austin, Grimes, and Walker Counties Groundwater Availability
(Acre-feet per Year)
Exhibit B, Data Table 4, 2001 Regions G and H, TWDB Approved Regional Water Plans

Note: These data are taken from the Exhibit B, Data Table 4 of the 2001 Regional Water Plans from Regions G and H that were approved by Texas Water Development Board. The values in the tables presented below are the basis of the District estimate of the Total Amount of Useable Groundwater given on page 10 of this plan. The estimate of the Total Amount of Useable Groundwater that is given on page 10, however also includes data on other aquifers which were not considered in the development of the Regions G and H Regional Water Plans. The groundwater availability values from the Exhibit B, Data Table 4 of the 2001 approved Regional Water plans for Regions G and H are presented below to show the source data that served as the basis of the estimate of the Total Amount of Useable Groundwater in the District.

Estimates of the annual availability of the Yegua-Jackson aquifer and San Bernard River Alluvium aquifer were included with the Exhibit B, Table 4 values from the 2001 approved Regional Water Plans. The annual availability estimates for the Yegua-Jackson aquifer and the San Bernard River Alluvium aquifer are based on the estimates of annual recharge developed by the District. These estimates are summarized in Table 2 on page 11 of the plan document with details of the calculations used to develop the estimates presented in Appendix G. The Yegua-Jackson aquifer and the San Bernard River Alluvium aquifer are the only aquifers for which the District used site-specific data on the annual groundwater availability, the groundwater availability values for all other aquifers presented in this plan were taken from the Exhibit B, Table 4 values given the 2001 approved Regional Water plans from Regions G and H.

Austin County

Source Name	River Basin	2000	S2010	2020	2030	2040	2050
Brazos River Alluvium Aquifer	Brazos	8,607	8,607	8,607	8,607	8,607	8,607
Gulf Coast Aquifer	Brazos	8,776	8,776	8,776	8,776	8,776	8,776
Gulf Coast Aquifer	Brazos-Colorado	12,121	12,121	12,121	12,121	12,121	12,121
Gulf Coast Aquifer	Colorado	17	17	17	17	17	17
Total Annual Groundwater Availability =		**29,521**	**29,521**	**29,521**	**29,521**	**29,521**	**29,521**

Grimes County

Source Name	River Basin	2000	S2010	2020	2030	2040	2050
Brazos River Alluvium Aquifer	Brazos	1,700	1,700	1,700	1,700	1,700	1,700
Carrizo-Wilcox Aquifer	Brazos	1,804	1,804	1,804	1,804	1,804	1,804
Carrizo-Wilcox Aquifer	San Jacinto	4,776	4,776	4,776	4,776	4,776	4,776
Carrizo-Wilcox Aquifer	Trinity	209	209	209	209	209	209
Gulf Coast Aquifer	Brazos	9,895	9,895	9,895	9,895	9,895	9,895
Gulf Coast Aquifer	San Jacinto	1,765	1,765	1,765	1,765	1,765	1,765
Gulf Coast Aquifer	Trinity	2,423	2,423	2,423	2,423	2,423	2,423
Queen City Aquifer	Brazos	231	231	231	231	231	231
Queen City Aquifer	Trinity	231	231	231	231	231	231
Sparta Aquifer	Brazos	2,044	2,044	2,044	2,044	2,044	2,044
Total Annual Groundwater Availability =		**25,078**	**25,078**	**25,078**	**25,078**	**25,078**	**25,078**

Walker County

Source Name	River Basin	2000	S2010	2020	2030	2040	2050
Carrizo-Wilcox Aquifer	Trinity	2,293	2,293	2,293	2,293	2,293	2,293
Gulf Coast Aquifer	San Jacinto	12,434	12,434	12,434	12,434	12,434	12,434
Gulf Coast Aquifer	Trinity	5,845	5,845	5,845	5,845	5,845	5,845
Queen City Aquifer	Trinity	75	75	75	75	75	75
Other Aquifer	Trinity	200	200	200	200	200	200
Sparta Aquifer	Trinity	1,760	1,760	1,760	1,760	1,760	1,760
Total Annual Groundwater Availability =		**22,607**	**22,607**	**22,607**	**22,607**	**22,607**	**22,607**

Appendix D

TWDB Groundwater Use Estimates for Austin, Grimes, and Walker Counties

Austin County Estimated Groundwater Use
Acre-Feet per Year
Texas Water Development Board Water Use Survey Data

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1980	2694	2	0	0	9998	254	**12,948**
	1984	3256	33	0	24	8754	192	**12,259**
	1985	3308	29	0	24	7291	210	**10,862**
	1986	3078	23	0	25	7900	180	**11,206**
	1987	3114	44	0	20	6717	170	**10,065**
	1988	3190	27	0	21	8783	164	**12,185**
	1989	3009	33	0	20	9172	162	**12,396**
	1990	3181	46	0	20	9642	163	**13,052**
	1991	2921	41	0	58	9042	168	**12,230**
	1992	2939	75	0	58	10851	199	**14,122**
	1993	3101	77	0	58	7252	212	**10,700**
	1994	3182	66	0	58	8492	186	**11,984**
	1995	3446	62	0	58	7877	207	**11,650**
	1996	3562	61	0	58	9627	192	**13,500**
	1997	3219	65	0	58	7877	190	**11,409**
	1998	3469	127	0	58	9504	160	**13,318**
	1999	3619	43	0	58	9504	162	**13,386**

Grimes County Estimated Groundwater Use
Acre-Feet per Year
Texas Water Development Board Water Use Survey Data

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1980	0	0	0	0	140	0	140
Gulf Coast		1167	2	0	0	110	398	1,677
Other Un-Differentiated		393	111	0	0	0	341	845
Sparta		2	0	0	0	0	0	2
		1,562	113	0	0	250	739	**2,664**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1984	0	0	0	0	268	0	268
Gulf Coast		1723	9	0	0	211	431	2,374
Other Un-Differentiated		324	66	0	26	0	369	785
Sparta		2	0	0	0	0	0	2
		2,049	75	0	26	479	800	**3,429**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1985	0	0	0	0	112	0	112
Gulf Coast		2851	9	0	0	88	366	3,314
Other Un-Differentiated		378	83	0	24	0	314	799
Sparta		2	0	0	0	0	0	2
		3,231	92	0	24	200	680	**4,227**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1986	0	0	0	0	112	0	112
Gulf Coast		2040	5	0	0	88	369	2,502
Other Un-Differentiated		349	95	0	27	0	317	788
Sparta		2	0	0	0	0	0	2
		2,391	100	0	27	200	686	**3,404**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1987	0	0	0	0	112	0	112
Gulf Coast		1916	6	0	0	88	380	2,390
Other Un-Differentiated		382	206	0	22	0	324	934
Sparta		2	0	0	0	0	0	2
		2,300	212	0	22	200	704	**3,438**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1988	0	0	0	0	84	0	84
Gulf Coast		1745	5	0	0	66	371	2,187
Other Un-Differentiated		374	219	0	23	0	319	935
Sparta		3	0	0	0	0	0	3
		2,122	224	0	23	150	690	**3,209**

Grimes County Groundwater Use, Continued

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1989	0	0	0	0	22	0	22
Gulf Coast		1663	5	0	0	18	329	2,015
Other Un-Differentiated		330	173	0	0	0	281	784
Sparta		5	0	0	0	0	0	5
		1,998	178	0	0	40	610	**2,826**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1990	0	0	0	0	19	0	19
Gulf Coast		2208	9	0	0	16	373	2,606
Other Un-Differentiated		458	174	0	0	0	320	952
Sparta		4	0	0	0	0	0	4
		2,670	183	0	0	35	693	**3,581**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1991	0	0	0	0	19	0	19
Gulf Coast		1945	11	0	29	16	375	2,376
Other Un-Differentiated		430	82	0	2	0	322	836
Sparta		4	0	0	0	0	0	4
		2,379	93	0	31	35	697	**3,235**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1992	0	0	0	0	19	0	19
Gulf Coast		2033	4	0	29	16	416	2,498
Other Un-Differentiated		587	70	0	2	0	358	1,017
Sparta		6	0	0	0	0	0	6
		2,626	74	0	31	35	774	**3,540**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1993	0	0	0	0	99	0	99
Gulf Coast		2271	13	0	29	139	397	2,849
Other Un-Differentiated		649	85	0	2	0	342	1,078
Sparta		6	0	0	0	0	0	6
		2,926	98	0	31	238	739	**4,032**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1994	0	0	0	0	0	0	0
Gulf Coast		2659	13	0	29	244	357	3,302
Other Un-Differentiated		641	132	0	2	0	307	1,082
Sparta		6	0	0	0	0	0	6
		3,306	145	0	31	244	664	**4,390**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1995	0	0	0	0	0	0	0
Gulf Coast		2345	3	0	29	271	435	3,083
Other Un-Differentiated		448	122	0	2	0	374	946
Sparta		6	0	0	0	0	0	6
		2,799	125	0	31	271	809	**4,035**

Grimes County Groundwater Use, Continued

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1996	0	0	0	0	0	0	0
Gulf Coast		2931	137	0	29	261	395	3,753
Other Un-Differentiated		788	0	0	2	0	339	1,129
Sparta		6	0	0	0	0	0	6
		3,725	137	0	31	261	734	**4,888**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1997	0	0	0	0	0	0	0
Gulf Coast		2722	168	0	29	261	353	3,533
Other Un-Differentiated		770	0	0	2	0	301	1,073
Sparta		6	0	0	0	0	0	6
		3,498	168	0	31	261	654	**4,612**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1998	0	0	0	0	0	0	0
Gulf Coast		2840	117	0	29	373	382	3,741
Other Un-Differentiated		772	0	0	2	0	327	1,101
Sparta		6	0	0	0	0	0	6
		3,618	117	0	31	373	709	**4,848**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	1999	0	0	0	0	0	0	0
Gulf Coast		2854	83	0	29	373	331	3,670
Other Un-Differentiated		730	0	0	2	0	285	1,017
Sparta		6	0	0	0	0	0	6
		3,590	83	0	31	373	616	**4,693**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Brazos River Alluvium	2000	0	0	0	0	0	0	0
Gulf Coast		3071	126	0	29	185	335	3,746
Other Un-Differentiated		370	0	0	2	0	287	659
Sparta		6	0	0	0	0	0	6
		3,447	126	0	31	185	622	**4,411**

Walker County Estimated Groundwater Use
Acre-Feet per Year
Texas Water Development Board Water Use Survey Data

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1980	9769	182	0	0	0	231	10,182
Other Un-Differentiated		142	0	0	0	0	79	221
		9,911	182	0	0	0	310	**10,403**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1984	3542	220	0	6	75	261	4,104
Other Un-Differentiated		299	0	0	0	0	91	390
		3,841	220	0	6	75	352	**4,494**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1985	3302	230	0	6	54	233	3,825
Other Un-Differentiated		546	0	0	0	0	81	627
		3,848	230	0	6	54	314	**4,452**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1986	3383	224	0	6	36	268	3,917
Other Un-Differentiated		595	0	0	0	0	93	688
		3,978	224	0	6	36	361	**4,605**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1987	4127	184	0	5	36	228	4,580
Other Un-Differentiated		1098	7	0	0	0	79	1,184
		5,225	191	0	5	36	307	**5,764**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1988	3829	184	0	6	36	248	4,303
Other Un-Differentiated		1124	6	0	0	0	86	1,216
		4,953	190	0	6	36	334	**5,519**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1989	4025	183	0	5	326	220	4,759
Other Un-Differentiated		1113	7	0	0	0	76	1,196
		5,138	190	0	5	326	296	**5,955**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1990	4066	185	0	5	324	217	4,797
Other Un-Differentiated		1153	5	0	0	0	75	1,233
		5,219	190	0	5	324	292	**6,030**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1991	3684	124	0	12	324	222	4,366
Other Un-Differentiated		1114	5	0	0	0	77	1,196
		4,798	129	0	12	324	299	**5,562**

Walker County Groundwater Use, Continued

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1992	3565	182	0	12	324	168	4,251
Other Un-Differentiated		1212	6	0	0	0	58	1,276
		4,777	188	0	12	324	226	**5,527**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1993	4208	184	0	12	11	148	4,563
Other Un-Differentiated		1316	8	0	0	0	51	1,375
		5,524	192	0	12	11	199	**5,938**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1994	3752	184	0	12	11	175	4,134
Other Un-Differentiated		1240	0	0	0	0	61	1,301
		4,992	184	0	12	11	236	**5,435**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1995	4919	210	0	12	11	188	5,340
Other Un-Differentiated		1327	0	0	0	0	65	1,392
		6,246	210	0	12	11	253	**6,732**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1996	5386	212	0	12	11	185	5,806
Other Un-Differentiated		1305	0	0	0	0	64	1,369
		6,691	212	0	12	11	249	**7,175**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1997	5492	183	0	12	11	220	5,918
Other Un-Differentiated		670	0	0	0	0	76	746
		6,162	183	0	12	11	296	**6,664**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1998	5320	470	0	12	11	185	5,998
Other Un-Differentiated		630	0	0	0	0	64	694
		5,950	470	0	12	11	249	**6,692**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	1999	5547	586	0	12	11	211	6,367
Other Un-Differentiated		668	0	0	0	0	73	741
		6,215	586	0	12	11	284	**7,108**

Aquifer	Year	Municipal	Mfg	Power	Mining	Irrigation	Livestock	Annual Total
Gulf Coast	2000	4212	455	0	12	0	188	4,867
Other Un-Differentiated		411	0	0	0	0	65	476
		4,623	455	0	12	0	253	**5,343**

Appendix E

TWDB Projected Water Demands for Austin, Grimes, and Walker Counties

Projected Water Demands for Austin, Grimes, and Walker Counties
(Acre-Feet per Year)
Exhibit B, Data Table 2, 2001 Regions G and H, TWDB Approved Regional Water Plans

Austin County

WUG	River Basin	Category	2000	2010	2020	2030	2040	2050
Bellville	Brazos	Municipal	923	983	1,064	1,166	1,279	1,423
San Felipe	Brazos	Municipal	99	102	119	141	164	171
Sealy	Brazos	Municipal	971	1,068	1,177	1,319	1,462	1,661
Wallis	Brazos-Colorado	Municipal	171	181	193	209	226	252
County-Other	Brazos	Municipal	1,141	1,168	1,220	1,283	1,360	1,533
County-Other	Brazos-Colorado	Municipal	240	247	261	278	297	333
County-Other	Colorado	Municipal	4	5	5	5	5	6
Irrigation	Brazos	Irrigation	860	860	860	860	860	860
Irrigation	Brazos-Colorado	Irrigation	11,431	11,431	11,431	11,431	11,431	11,431
Livestock	Brazos	Livestock	1,494	1,494	1,494	1,494	1,494	1,494
Livestock	Brazos-Colorado	Livestock	419	419	419	419	419	419
Livestock	Colorado	Livestock	80	80	80	80	80	80
Manufacturing	Brazos	Manufacturing	112	138	165	194	234	278
Manufacturing	Brazos-Colorado	Manufacturing	8	9	11	13	15	18
Mining	Brazos	Mining	78	62	47	33	28	27
Mining	Brazos-Colorado	Mining	6	3	1	0	0	0
Mining	Colorado	Mining	13	9	5	2	0	0
			18,050	**18,259**	**18,552**	**18,927**	**19,354**	**19,986**

Grimes County

WUG	River Basin	Category	2000	2010	2020	2030	2040	2050
Anderson	Brazos	Municipal	78	81	82	85	80	76
Navasota	Brazos	Municipal	901	925	935	955	941	997
County-Other	Brazos	Municipal	997	1,063	1,142	1,224	1,178	1,316
County-Other	San Jacinto	Municipal	540	575	611	655	625	708
County-Other	Trinity	Municipal	262	279	297	318	304	344
Irrigation	Brazos	Irrigation	125	125	125	125	125	125
Livestock	Brazos	Livestock	1,117	1,117	1,117	1,117	1,117	1,117
Livestock	San Jacinto	Livestock	472	472	472	472	472	472
Livestock	Trinity	Livestock	344	344	344	344	344	344
Manufacturing	Brazos	Manufacturing	280	314	351	391	435	483
Mining	Brazos	Mining	210	210	210	210	210	210
Mining	San Jacinto	Mining	61	44	25	9	3	2
Mining	Trinity	Mining	2	1	1	0	0	0
Steam Electric	Brazos	Power	10,000	16,721	16,721	16,721	16,721	16,721
			15,389	**22,271**	**22,433**	**22,626**	**22,555**	**22,915**

Walker County

WUG	River Basin	Category	2000	2010	2020	2030	2040	2050
Huntsville	San Jacinto	Municipal	749	810	859	960	1,024	1,104
Huntsville	Trinity	Municipal	4,244	4,591	4,870	5,438	5,803	6,256
New Waverly	San Jacinto	Municipal	219	218	212	217	223	239
County-Other	San Jacinto	Municipal	2,016	2,099	2,177	2,364	2,471	2,336
County-Other	Trinity	Municipal	3,293	3,377	3,451	3,648	3,764	3,641
Irrigation	San Jacinto	Irrigation	324	324	324	324	324	324
Irrigation	Trinity	Irrigation	21	21	21	21	21	21
Livestock	San Jacinto	Livestock	275	275	275	275	275	275
Livestock	Trinity	Livestock	290	290	290	290	290	290
Manufacturing	San Jacinto	Manufacturing	217	234	248	263	277	292
Manufacturing	Trinity	Manufacturing	11	11	12	13	13	14
Mining	San Jacinto	Mining	8	9	10	10	11	12
Mining	Trinity	Mining	7	7	8	9	10	11
			11,674	**12,266**	**12,757**	**13,832**	**14,506**	**14,815**

Appendix F

TWDB Projected Water Supply for Austin, Grimes, and Walker Counties

Projected Water Supplies for Austin, Grimes, and Walker Counties
(Acre-Feet per Year)
Exhibit B, Data Table 5, 2001 Regions G and H, TWDB Approved Regional Water Plans

Austin County

WUG	River Basin	Type	Source Name	2000	2010	2020	2030	2040	2050
Bellville	Brazos	GW	Gulf Coast Aquifer	1,423	1,423	1,423	1,423	1,423	1,423
San Felipe	Brazos	GW	Gulf Coast Aquifer	171	171	171	171	171	171
Sealy	Brazos	GW	Gulf Coast Aquifer	1,661	1,661	1,661	1,661	1,661	1,661
Wallis	Brazos-Colorado	GW	Gulf Coast Aquifer	252	252	252	252	252	252
County-Other	Brazos	GW	Gulf Coast Aquifer	1,141	1,168	1,220	1,283	1,360	1,533
County-Other	Brazos-Colorado	GW	Gulf Coast Aquifer	240	247	261	278	297	334
County-Other	Colorado	GW	Gulf Coast Aquifer	4	5	5	5	5	6
Irrigation	Brazos	GW	Gulf Coast Aquifer	860	860	860	860	860	860
Irrigation	Brazos-Colorado	GW	Gulf Coast Aquifer	11,431	11,431	11,431	11,431	11,431	11,431
Livestock	Brazos	SW	Livestock Local Supply	1,181	1,181	1,181	1,181	1,181	1,181
Livestock	Brazos	GW	Gulf Coast Aquifer	313	313	313	313	313	313
Livestock	Brazos-Colorado	SW	Livestock Local Supply	333	333	333	333	333	333
Livestock	Brazos-Colorado	GW	Gulf Coast Aquifer	86	86	86	86	86	86
Livestock	Colorado	SW	Livestock Local Supply	80	80	80	80	80	80
Manufacturing	Brazos	GW	Gulf Coast Aquifer	112	138	165	194	234	278
Manufacturing	Brazos-Colorado	GW	Gulf Coast Aquifer	8	9	11	13	15	18
Mining	Brazos	GW	Gulf Coast Aquifer	78	62	47	33	28	27
Mining	Brazos-Colorado	GW	Gulf Coast Aquifer	6	3	1	0	0	0
Mining	Colorado	GW	Gulf Coast Aquifer	13	9	5	2	0	0
				19,393	**19,432**	**19,506**	**19,599**	**19,730**	**19,987**

Grimes County

WUG	River Basin	Type	Source Name	2000	2010	2020	2030	2040	2050
Anderson	Brazos	GW	Gulf Coast Aquifer	123	123	123	123	123	123
Navasota	Brazos	GW	Gulf Coast Aquifer	1,540	1,540	1,540	1,540	1,540	1,540
Mining	Brazos	GW	Brazos Ri. Alluvium Aq.	67	67	67	67	67	67
Steam Electric	Brazos	SW	Brazos Ri. Authority Sys.	6,125	6,125	6,125	6,125	6,125	6,125
Mining	Brazos	GW	Carrizo-Wilcox Aquifer	63	63	63	63	63	63
County-Other	Brazos	GW	Brazos Ri. Alluvium Aq.	1,633	1,633	1,633	1,633	1,633	1,633
County-Other	Brazos	GW	Gulf Coast Aquifer	5,131	5,131	5,131	5,131	5,131	5,131
County-Other	San Jacinto	GW	Carrizo-Wilcox Aquifer	2,786	2,786	2,786	2,786	2,786	2,786
County-Other	San Jacinto	GW	Gulf Coast Aquifer	877	877	877	877	877	877
County-Other	Trinity	GW	Gulf Coast Aquifer	1,781	1,781	1,781	1,781	1,781	1,781
Irrigation	Brazos	SW	Irrigation Local Supply	1,471	1,471	1,471	1,471	1,471	1,471
Irrigation	Brazos	GW	Gulf Coast Aquifer	689	689	689	689	689	689
Livestock	Brazos	GW	Gulf Coast Aquifer	2,083	2,083	2,083	2,083	2,083	2,083
Livestock	San Jacinto	GW	Gulf Coast Aquifer	881	881	881	881	881	881
Livestock	Trinity	GW	Gulf Coast Aquifer	642	642	642	642	642	642
Manufacturing	Brazos	GW	Carrizo-Wilcox Aquifer	1,011	1,011	1,011	1,011	1,011	1,011
Manufacturing	Brazos	GW	Gulf Coast Aquifer	329	329	329	329	329	329
Mining	Brazos	GW	Sparta Aquifer	80	80	80	80	80	80
Mining	San Jacinto	GW	Carrizo-Wilcox Aquifer	57	57	57	57	57	57
Mining	San Jacinto	GW	Gulf Coast Aquifer	7	7	7	7	7	7
Mining	Trinity	GW	Carrizo-Wilcox Aquifer	2	2	2	2	2	2
Steam Electric	Brazos	SW	Brazos Ri. Authority Sys.	3,600	3,600	3,600	3,600	3,600	3,600
Steam Electric	Brazos	SW	Livingston Lake/Res.	0	6,721	6,721	6,721	6,721	6,721
Steam Electric	Brazos	SW	Navasota Ri. Run-of-Ri.	275	275	275	275	275	275
				31,253	**37,974**	**37,974**	**37,974**	**37,974**	**37,974**

Walker County

WUG	River Basin	Type	Source Name	2000	2010	2020	2030	2040	2050
Huntsville	San Jacinto	SW	Livingston Lake/Reservoir	1,430	1,403	1,381	0	0	0
Huntsville	San Jacinto	GW	Gulf Coast Aquifer	298	298	298	298	298	298
Huntsville	Trinity	SW	Livingston Lake/Reservoir	8,098	7,958	7,828	0	0	0
Huntsville	Trinity	GW	Gulf Coast Aquifer	1,689	1,689	1,689	1,689	1,689	1,689
New Waverly	San Jacinto	GW	Gulf Coast Aquifer	239	239	239	239	239	239
County-Other	San Jacinto	SW	Livingston Lake/Reservoir	635	706	771	0	0	0
County-Other	San Jacinto	GW	Gulf Coast Aquifer	1,632	1,647	1,663	1,690	1,704	1,681
County-Other	Trinity	GW	Gulf Coast Aquifer	2,468	2,453	2,437	2,410	2,396	2,419
County-Other	Trinity	SW	Livingston Lake/Reservoir	1,039	1,135	1,222	0	0	0
County-Other	Trinity	GW	Other Aquifer	200	200	200	200	200	200
Irrigation	San Jacinto	SW	Livingston Lake/Reservoir	301	51	51	51	51	51
Irrigation	San Jacinto	GW	Gulf Coast Aquifer	273	273	273	273	273	273
Irrigation	Trinity	SW	Livingston Lake/Reservoir	21	21	21	21	21	21
Mining	San Jacinto	GW	Gulf Coast Aquifer	8	9	10	10	11	12
Mining	Trinity	GW	Gulf Coast Aquifer	7	7	8	9	10	11
Livestock	San Jacinto	SW	Livestock Local Supply	94	94	94	94	94	94
Livestock	San Jacinto	GW	Gulf Coast Aquifer	181	181	181	181	181	181
Livestock	Trinity	SW	Livestock Local Supply	109	109	109	109	109	109
Livestock	Trinity	GW	Gulf Coast Aquifer	181	181	181	181	181	181
Manufacturing	San Jacinto	GW	Gulf Coast Aquifer	217	234	248	263	277	292
Manufacturing	Trinity	GW	Gulf Coast Aquifer	11	11	12	13	13	14
				19,131	**18,899**	**18,916**	**7,731**	**7,747**	**7,765**

Appendix G

Details on the Development of the Estimates of Annual Recharge

At the time of the development of the management plan document, the Northern Gulf Coast aquifer Groundwater Availability Model (GAM) has not been released and is not available for use to develop an estimate of recharge to the Gulf coast aquifer in the District. To develop an estimate of the annual recharge to the Gulf coast aquifer in the District, the preliminary estimate of the annual recharge rate used in the calibration of the Northern Gulf Coast aquifer GAM (1.09 inches per acre) was used. This value was presented by USGS during the Stakeholder Advisory Forum meeting for the Northern Gulf Coast aquifer GAM of January 29th, 2003. The preliminary recharge rate was applied to an estimate of the area (in acres) of the extent of the Gulf Coast aquifer in the counties of the District. The estimated area of the Gulf Coast aquifer is based on the TWDB GIS coverage of the Gulf Coast aquifer.

The District was not able to identify a published estimate of the annual recharge or the rate or an estimated rate of annual recharge to the Brazos River Alluvium aquifer, the San Bernard River Alluvium aquifer, or the Yegua-Jackson aquifer. In order to comply with the statutory requirement of including an estimate of the annual amount of recharge to the groundwater resources of the District, the District applied the preliminary rate of annual recharge to the Gulf Coast aquifer to estimates of the area (in acres) of these aquifers within the District. The estimated area of the San Bernard River Alluvium aquifer were based on GIS coverage of the outcrop of alluvial sediments within the river basin developed from a scanned image of the Geologic Atlas of Texas. The area of the Brazos River Alluvium aquifer in the District was estimated from the TWDB GIS coverage of the aquifer. The estimate of the area of the Yegua-Jackson aquifer in the District was based on the TWDB GIS coverage for the aquifer and reduced in area by the area of the Navasota and Trinity River Alluvium estimated from scanned images of the Geologic Atlas of Texas. A recharge rate of approximately 1.1 inches per year represents approximately 2.75 percent of an annual rainfall of 40 inches. The District used this rate to fulfill statutory requirements for the management plan document that would result in a reasonable estimate of annual recharge that is based on a reasonable methodology.

Austin County

Recharge Rate = 1.09 inches per year

1.09 inches per year / 12 inches (1 foot) = 0.0908333… feet per year

0.0908333… feet per year rounded to 0.0908 feet per year
(To avoid implication of undue accuracy)

Area of the **Brazos River Alluvium** aquifer outcrop in Austin County = 40,998 acres
(GIS calculation from TWDB minor aquifer map)

0.0908 feet per year x 40,998 acres = 3,722.6184 (**3,723**) acre-feet per year

Area of the **San Bernard Alluvium** aquifer outcrop in Austin County = 1,948 acres
(GIS calculation from Geologic Atlas of Texas; Seguin Sheet, 1974; Bureau of Economic Geology)

0.0908 feet per year x 1,948 acres = 176.8784 (**177**) acre-feet per year

Area of the **Gulf Coast** aquifer outcrop in Austin County = 377,693 acres
(GIS calculation from TWDB major aquifer map)

0.0908 feet per year x 377,693 acres = 34,294.5244 (**34,295**) acre-feet per year

Grimes County
Recharge Rate = 1.09 inches per year

1.09 inches per year / 12 inches (1 foot) = 0.0908333… feet per year

0.0908333… feet per year rounded to 0.0908 feet per year
(To avoid implication of undue accuracy)

Area of the **Brazos River Alluvium** aquifer outcrop in Grimes County = 26,941 acres
(GIS calculation from TWDB minor aquifer map)

0.0908 feet per year x 26,941 acres = 2,446.2428 (**2,446**) acre-feet per year

Area of the **Yegua-Jackson** aquifer outcrop in Grimes County = 206,572 acres
(GIS calculation from Geologic Atlas of Texas; Beaumont Sheet, 1968 revised 1992 and Austin Sheet, 1974; Bureau of Economic Geology)

0.0908 feet per year x 206,572 acres = 18,756.7376 (**18,757**) acre-feet per year

Area of the **Gulf Coast** aquifer outcrop in Grimes County = 258,010 acres
(GIS calculation from TWDB major aquifer map)

0.0908 feet per year x 258,010 acres = 23,427.308 (**23,427**) acre-feet per year

Walker County
Recharge Rate = 1.09 inches per year

1.09 inches per year / 12 inches (1 foot) = 0.0908333… feet per year

0.0908333… feet per year rounded to 0.0908 feet per year
(To avoid implication of undue accuracy)

Area of the **Yegua-Jackson** aquifer outcrop in Walker County = 122,978 acres
(GIS calculation from Geologic Atlas of Texas; Beaumont Sheet, 1968 revised 1992 and Palestine Sheet, 1968; Bureau of Economic Geology)

0.0908 feet per year x 122,978 acres = 11,166.4024 (**11,166**) acre-feet per year

Area of the **Gulf Coast** aquifer outcrop in Walker County = 344,380 acres
(GIS calculation from TWDB major aquifer map)

0.0908 feet per year x 344,380 acres = 31,269.704 (**31,270**) acre-feet per year