CHART 3.3

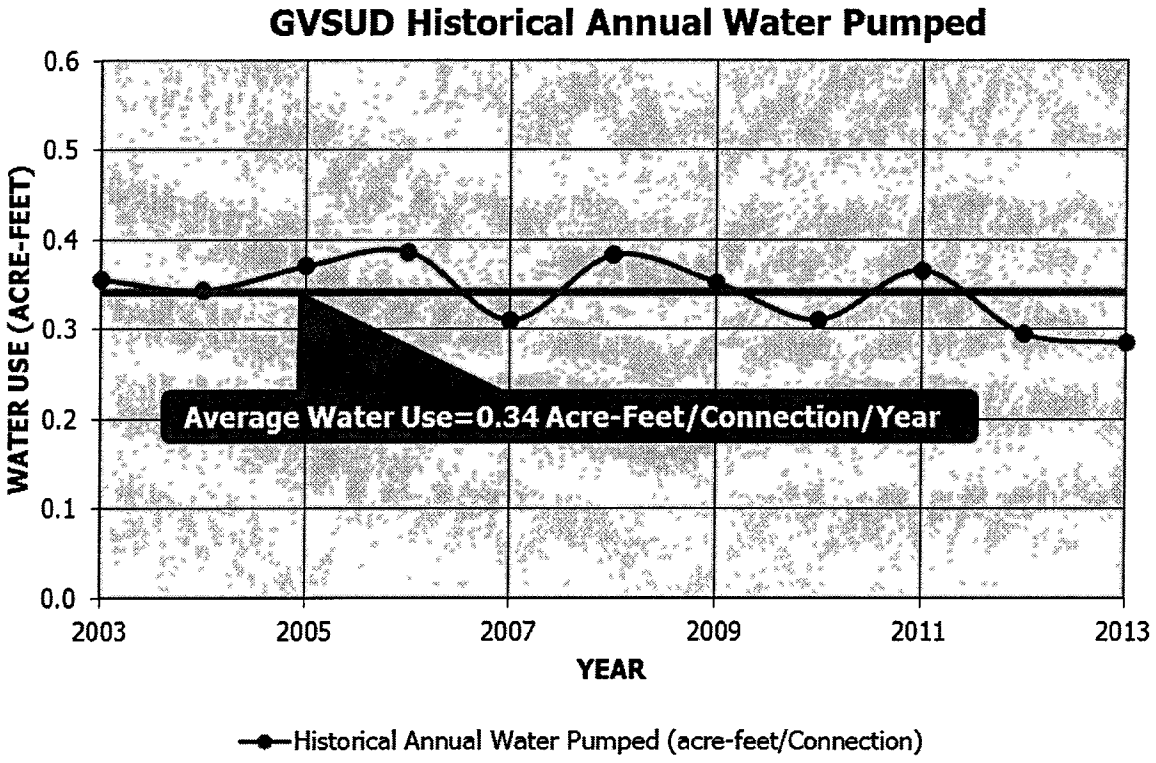


Chart 3.3 above displays the historical water usage for the years 2003 to 2013. The average water use rate for GVSUD was 0.34 acre-feet/connection/year.

4.0 PROJECTED WATER CONNECTIONS AND WATER USE

The 5% average annual growth rate was used to determine quantity of future connections. An 8% and 10% average annual growth rate is also shown in the table to represent a hurried growth of the GVSUD service area. The future connection count along with 0.34 acre-feet/year average water use was used to determine the future estimated water demand.

Table 4.1, shows the projected connection growth based on a 5%, 8% and 10% growth trend and a 0.34 acre-feet/connection/year water use.

TABLE 4.1

Green Valley Special Utility District Projected Growth						
Year	Projected Water Connections			Projected Water Demand (acre-feet/year)		
	5%	8%	10%	5%	8%	10%
2013	9,621	9,621	9,621	3,271	3,271	3,271
2014	10,102	10,391	10,583	3,435	3,533	3,598
2015	10,607	11,222	11,641	3,606	3,815	3,958
2016	11,138	12,120	12,806	3,787	4,121	4,354
2017	11,694	13,089	14,086	3,976	4,450	4,789
2018	12,279	14,136	15,495	4,175	4,806	5,268
2019	12,893	15,267	17,044	4,384	5,191	5,795
2020	13,538	16,489	18,749	4,603	5,606	6,375
2021	14,215	17,808	20,623	4,833	6,055	7,012
2022	14,925	19,232	22,686	5,075	6,539	7,713
2023	15,672	20,771	24,954	5,328	7,062	8,484
2024	16,455	22,433	27,450	5,595	7,627	9,333
2025	17,278	24,227	30,195	5,874	8,237	10,266
2026	18,142	26,165	33,214	6,168	8,896	11,293
2027	19,049	28,259	36,536	6,477	9,608	12,422
2028	20,001	30,519	40,189	6,800	10,377	13,664
2029	21,001	32,961	44,208	7,140	11,207	15,031
2030	22,052	35,598	48,629	7,498	12,103	16,534
2031	23,154	38,446	53,492	7,872	13,072	18,187
2032	24,312	41,521	58,841	8,266	14,117	20,006
2033	25,527	44,843	64,725	8,679	15,247	22,007
2034	26,804	48,431	71,198	9,113	16,466	24,207

Note: Water Usage assumption of 0.34 acre-feet per Connection/Year.

This data indicates a projected water demand for the year 2034 of 9,113 acre-feet, 16,466 acre-feet and 24,207 acre-feet for the associated growth rates of 5%, 8% and 10%, respectively.

5.0 SUMMARY OF EXISTING WATER SYSTEM

GVSUD was divided into individual pressure planes based on Hydraulic Grade Lines in order to quantify the existing and projected number of connections in the study area. These areas are shown on Attachment 'A', Existing Pressure Planes Map. Shown below, in Table 5.0, is a summary of the existing connections per individual pressure planes.

TABLE 5.0

Existing Connections Per Pressure Plane			
1	2	3	4
Service Level No.	**Pressure Plane**	**Existing Connections**	**Percentage of Connections Per Pressure Plane**
1	Plant 1	1,877	19.51%
2	Plant 2	-	0.00%
3	Plant 3	318	3.31%
4	Plant 4	2,688	27.94%
5	Plant 5	476	4.95%
6	Wells	2,030	21.10%
7	Plant 10	-	0.00%
8	Leissner	927	9.64%
9	Haeckerville	528	5.49%
10	Wagner	489	5.08%
11	East Central	234	2.43%
12	1518 EST	54	0.56%
TOTAL		**9,621**	**100%**

As shown in the above table, there are 9,621 existing connections in the system, as of January 2013.

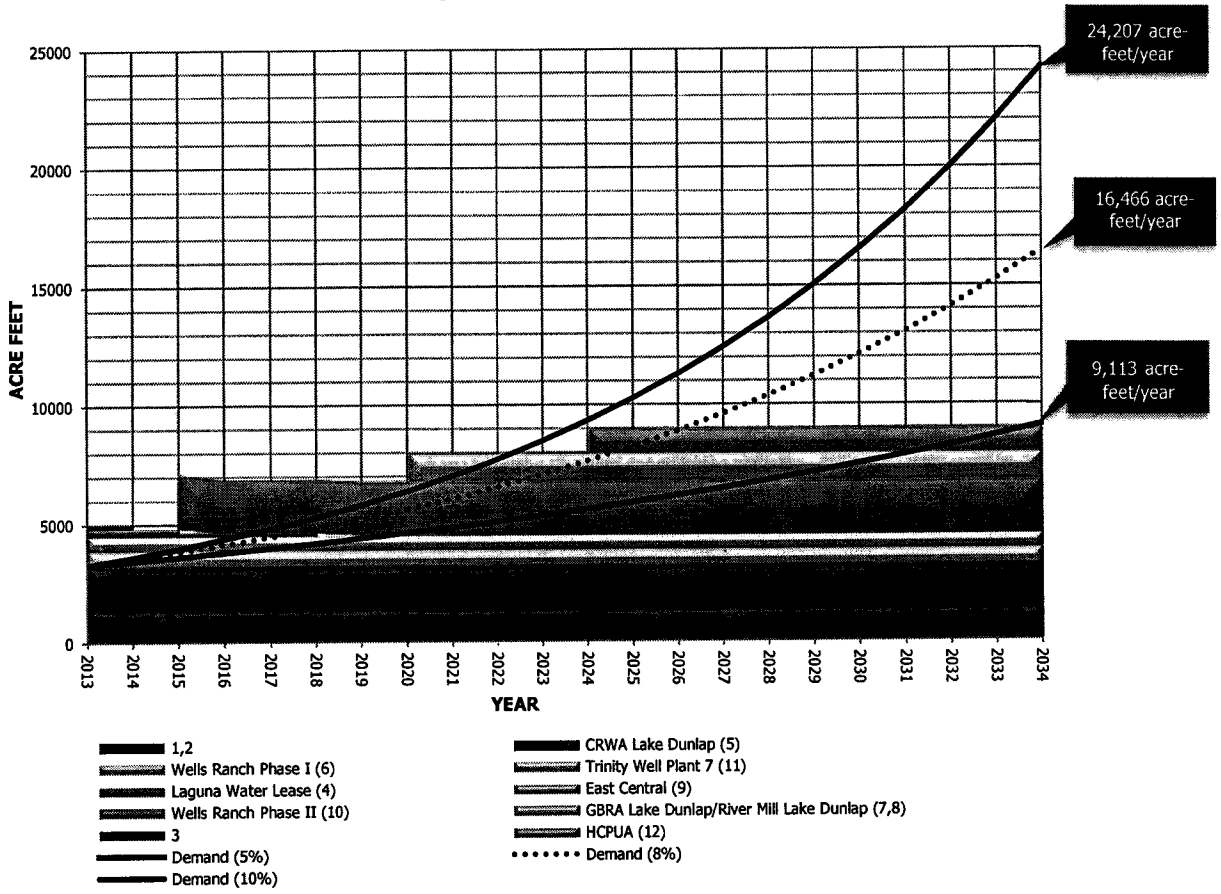
5.1 EXISTING WATER SUPPLY CAPACITY AND WATER RIGHTS

GVSUD currently has contracted water rights with several sources. These water rights include Edwards Wells, a Trinity Well, Canyon Regional Water Authority, East Central Special Utility District and Hays Caldwell Public Utility Agency. GVSUD currently has 5,004 acre-feet/year in water rights with some of these water rights in the form of short-term leases due to expire soon. These leases are not guaranteed to renew. This puts GVSUD at risk of losing these water rights.

Chart 5.1 below gives a summary of the current water rights in relation to the projected demand. The water rights' numbers correspond to Table 5.1 on the following page.

CHART 5.1

GVSUD Existing Water Inventory vs Future Demand



GVSUD currently has approximately 1,704 acre-feet of Edwards Aquifer well water and 600 acre-feet of Trinity Aquifer well water. By 2015, the amount of Edwards well water will decrease by nearly 172 acre-feet and by 2018 another 132 acre-feet due to leases expiring. The remaining 1,400.8 acre-feet of Edwards Aquifer water rights are owned. In 2012, GVSUD signed a lease with East Central to buy 200 acre-feet of water. This lease is a 3-year lease and is due to expire in 2015. There is no guarantee that this lease will be renewed at that time. These short-term leases pose a serious risk for GVSUD as it impairs GVSUD from being able to use these water sources for future planning. As of 2014, there is approximately 5,004 acre-feet of water available to GVSUD.

TABLE 5.1

GVSUD AVAILABLE WATER INVENTORY						
No.	**PERMIT #**	**OLD #**	**COUNTY**	**ACRE FT.**	**SOURCE**	**EXPIRES**
1	P100-199	BE00081AD	COMAL	309	Edwards	Owned
2	P100-776	CO00146	COMAL	1091.812	Edwards	Owned
3	P103-289		COMAL	171.56	Edwards	Leased
		TOTAL ACRE FT.		**1572.372**		
4	LAGUNA WATER LEASE		COMAL	132	Edwards	2018
		TOTAL ACRE FT.		**1704.372**		
5	CRWA LAKE DUNLAP			1800	CRWA	Owned
6	WELLS RANCH PH 1			700	CRWA	Owned
7	GBRA LAKE DUNLAP			1000	CRWA	40 Year term/not available
8	RIVER MILL LAKE DUNLAP			190	CRWA	Owned but not available
		TOTAL ACRE FT.		**3690**		
9	EAST CENTRAL			200	East Central	12/31/2015
10	WELLS RANCH PH 2			2300	CRWA	Negotiation Pending
11	TRINITY WELL PLANT 7			600	Trinity	Owned
12	HCPUA			1000	HCPUA	Owned (Assumed 2024)
		GRAND TOTAL ACRE FT.		**9494.372**		

5.2 EXISTING PRESSURE PLANES

The boundary of each existing pressure plane was determined from USGS topography. The topography was used to establish the different water pressure planes based on desired minimum and maximum water pressures. These pressure plane boundaries were delineated with help from GVSUD staff. The boundaries of these twelve (12) Pressure Planes are shown on Attachment 'A, GVSUD Existing Pressure Planes. A summary and outline of the equipment for each Pressure Plane is located below in Table 5.3:

5.3 DESCRIPTION OF EXISTING PLANT 1 PRESSURE PLANE

Plant 1 Pressure Plane serves the area in the northwestern part of GVSUD, this pressure plane is shown on Attachment 'A'. This service area also includes the CRWA Damerau elevated storage tank. This Pressure Plane has a hydraulic grade line of 1008 feet mean sea level (MSL). A pneumatic pressure tank and pump combination is used in order to provide this pressure plane with pressure. The water supply for this pressure plane is currently provided by Edwards Aquifer and Trinity Aquifer water. In 2015 the

Weil Road Booster Pump Station will be completed and will deliver CRWA water to this service area. This will bring an additional source of water, more storage, and less restricted water. As shown on Table 5.0, Plant 1 Pressure Plane currently serves 1,877 connections. A summary of existing Plant 1 infrastructure is listed below and shown in Table 5.3:

- 200,000-gallon Ground Storage
- 1,000,000-gallon Elevated Storage
- 5,000-gallon Pneumatic Pressure Tank
- 3 Booster Pumps @ 450 gpm = 1,350 gpm
- Weil Road Booster Pump Station (Construction Completion in 2015)
  - 500,000-gallon Ground Storage
  - 2 Booster Pumps @ 1,440 gpm = 2,800 gpm

5.4 DESCRIPTION OF EXISTING PLANT 2 PRESSURE PLANE

Plant 2 Pressure Plane serves the area in the northeastern part of GVSUD and northeastern of Plant 3 Pressure Plane, this pressure plane is shown on Attachment 'A'. This Pressure Plane has a hydraulic grade line of 897 feet MSL. Plant 1 is currently serving the water supply for this pressure plane. As shown on Table 5.0, Plant 2 Pressure Plane is currently within the Plant 1 Pressure Plane. A summary of Plant 2 is listed below and shown in Table 5.3:

- 127,000-gallon Ground Storage
- 80,000-gallon Ground Storage
- 100,000-gallon Elevated Storage
- 4 Booster Pumps @ 450 gpm = 1,800 gpm

5.5 DESCRIPTION OF EXISTING PLANT 3 PRESSURE PLANE

Plant 3 Pressure Plane serves the area west of Wagner and north of East Central Special Utility District service area, this pressure plane is shown on Attachment 'A'. The Water supply for this pressure plane is provided by Edwards Aquifer water and water from Canyon Regional Water Authority. This Pressure Plane has a hydraulic grade line of 830 feet MSL. As shown on Table 5.0, Plant 3 Pressure Plane currently serves 318 connections. A summary of Plant 3 is listed below and shown in Table 5.3:

- 127,000-gallon Ground Storage
- 80,000-gallon Ground Storage
- 100,000-gallon Elevated Storage
- 4 Booster Pumps @ 450 gpm = 1,800 gpm

5.6 DESCRIPTION OF EXISTING PLANT 4 PRESSURE PLANE

Plant 4 Pressure Plane serves the northeast corner of the GVSUD area and is east of Plant 1 Pressure Plane, this pressure plane is shown on Attachment 'A'. This Pressure Plane has a hydraulic grade line of 830 feet MSL. The water supply for this pressure plane is provided by Canyon Regional Water Authority's Lake Dunlap plant. This pressure plane is using existing CRWA-Lake Dunlap storage tanks and high service pumps to feed the meters in this pressure plane and to fill the Plant 4 elevated tower near Zipp Road. Table 5.0 shows a summary of the existing pressure plane. The total number of existing connections served by Plane 4 Pressure Plane is 2,688 connections. A summary of Plant 4 is listed below and shown in Table 5.3:

- 100,000-gallon Elevated Storage – currently not in service
- 500,000-gallon Elevated Storage
- CRWA-Lake Dunlap existing equipment (tanks & high service pumps)

5.7 DESCRIPTION OF EXISTING PLANT 5 PRESSURE PLANE

Plant 5 Pressure Plane serves the area southwest of GVSUD service area and east of East Central SUD service area, this pressure plane is shown on Attachment 'A'. The water for this pressure plane is provided by the Edwards Aquifer. This Edwards water is piped from the Plant 7, 8 & 9 Pressure Plane (Wells Pressure Plane), across IH-35 and sent through the system to Plant 5. As shown on Table 5.0, Plant 5 Pressure Plane currently serves 476 connections. A summary of Plant 5 is listed below and shown in Table 5.3:

- 60,000-gallon Ground Storage
- 3,000-gallon Pneumatic Pressure Tank
- 2 Booster Pumps @ 225 gpm = 450 gpm

5.8 DESCRIPTION OF EXISTING WELLS PRESSURE PLANE (PLANT 7, 8 & 9)

The Wells Pressure Plane serves the area in the northwestern portion of GVSUD service area, this pressure plane is shown on Attachment 'A'. The water supply for this pressure plane is provided by two Edwards Aquifer wells and one Trinity well that are owned by GVSUD. This Pressure Plane has a hydraulic grade line of 1008 feet mean sea level (MSL). As shown on Table 5.0, the Wells Pressure Plane currently serves 2,030 connections. A summary of Plants 7, 8 & 9 are listed below and shown in Table 5.3:

- Plant 7
  - 200,000-gallon Ground Storage
  - 5,000-gallon Pneumatic Pressure Tank
  - 2 Booster Pumps @ 800 gpm = 1,600 gpm
  - 2 Booster Pumps @ 450 gpm = 900 gpm

  - Well #2
    - 1 Well pump @ 800 gpm
  - Well #3
    - 1 Well pump @ 1,600 gpm
  - Well #4
    - 1 Well pump @ 600 gpm
- Plant 8
  - 200,000-gallon Ground Storage
  - 5,000-gallon Pneumatic Pressure Tank
  - Well #1
  - 1 Well pump @ 1,200 gpm
  - 1 Booster Pump @ 800 gpm
  - 1 Booster Pump @ 450 gpm

- Plant 9
  - 200,000-gallon Ground Storage
  - 80,000-gallon Ground Storage
  - 300,000-gallon Elevated Storage
  - 2 Booster Pumps @ 500 gpm = 1,000 gpm
  - 2 Booster Pumps @ 1,000 gpm = 2,000 gpm

5.10 DESCRIPTION OF EXISTING PLANT 10 PRESSURE PLANE

Plant 10 Pressure Plane serves the area in the southeastern most portion of GVSUD, this pressure plane is shown on Attachment 'A'. Canyon Regional Water Authority provides the water supply for this pressure plane through a take point at Leissner Booster Pump Station. As shown on Table 5.0, Plant 10 is being bypassed and is not currently serving any connections, but is being maintained for future use if needed. A summary of Plant 10 is listed below and shown in Table 5.3:

- 2 ea. @ 250,000-gallon Ground Storage
- 13,000-gallon Pneumatic Pressure Tank
- 3 Booster Pumps @ 500 gpm = 1,500 gpm

5.11 DESCRIPTION OF EXISTING 1518 PRESSURE PLANE

1518 Pressure Plane serves the area in the southwestern most portion of GVSUD, this pressure plane is shown on Attachment 'A'. This Pressure Plane has a hydraulic grade line of 880 feet mean sea level (MSL). The water supply for this pressure plane is provided by Canyon Regional Water Authority FM 1518 elevated storage tank. As shown on Table 5.3, 1518 Pressure Plane currently serves 54 connections.

5.12 DESCRIPTION OF EXISTING LEISSNER PRESSURE PLANE

Leissner Pressure Plane serves the area southeast of GVSUD service area and west of East Central SUD and Plant 3 service areas, this pressure plane is shown on Attachment 'A'. The water for this pressure plane is provided by CRWA Leissner Booster Pump Station, which transports Wells Ranch water. As shown on Table 5.3, Leissner Pressure Plane currently serves 927 connections.

5.13 DESCRIPTION OF EXISTING HAECKERVILLE PRESSURE PLANE

Haeckerville Pressure Plane serves the area southwest of the Wagner service area as shown on Attachment 'A'. The water supply for this pressure plane is currently served by CRWA. As shown on Table 5.3, the Haeckerville Pressure Plane currently serves 528 connections.

5.14 DESCRIPTION OF EXISTING WAGNER PRESSURE PLANE

Wagner Pressure Plane serves the area southwest of the City of Marion located in the center of GVSUD, this pressure plane is shown on Attachment 'A'. This pressure plane has a hydraulic grade line of 880 feet mean sea level. This area is currently using the CRWA Wagner Booster Pump Station to serve this pressure plane. As shown on Table 5.3, Wagner Pressure Plane currently serves 489 connections.

5.15 DESCRIPTION OF EXISTING EAST CENTRAL PRESSURE PLANE

East Central Pressure Plane serves the area of the south central most portion of GVSUD, this pressure plane is shown on Attachment 'A'. The water supply for this pressure plane is East Central Special Utility District. This area currently experiences a pressure of approximately 90 psi from ECSUD pressure tank and is provided by a nearby ECSUD booster pump station. This contract may not be renewed with East Central SUD when it expires in 2015. As shown on Table 5.3, East Central Pressure Plane currently serves 234 connections.

Table 5.3 on the following page gives an overall summary of the current plants in the GVSUD system.

TABLE 5.3 SUMMARY OF EXISTING PRESSURE PLANES

GREEN VALLEY SPECIAL UTILITY DISTRICT EXISTING EQUIPMENT							
Plane Name		**Connections**	**GST Capacity (gallons)**	**EST Capacity (gallons)**	**Pneumatic Tank (gallons)**	**Booster Pumps**	**Well Pumps**
Plant 1 Pressure Plane		1877	200,000	1,000,000	5,000	3 @ 450 gpm	
Plant 2 Pressure Plane		-	127,000 80,000	100,000		4 @ 450 gpm	
Plant 3 Pressure Plane		318	127,000 80,000	100,000		4 @ 450 gpm	
Plant 4 Pressure Plane		2,688		500,000			
Plant 5 Pressure Plane		476	60,000		3,000	2 @ 225 gpm	
Wells Pressure Plane	Plant 7	2,030	200,000		5,000	2 @ 800 gpm 2 @ 50 gpm 1 @ 800 gpm 1 @ 600 gpm	
	Plant 7, Well #2						1 @ 800 gpm
	Plant 7, Well #3						1 @ 1,600 gpm
	Plant 7, Well #4						1 @ 600 gpm
	Plant 8		200,000		5,000	1 @ 800 gpm 2 @ 450 gpm	
	Plant 8, Well #1						1 @ 1,200 gpm
	Plant 9		200,000 80,000	300,000		2 @ 500 gpm 2 @ 1,000 gpm	
Plant 10 Pressure Plane		-	250,000 250,000		13,000	3 @ 500 gpm	
1518 Pressure Plane		54					
Leissner Pressure Plane		927					
Haeckerville Pressure Plane		528					
Wagner Pressure Plane		489					
East Central Pressure Plane		234					
TOTAL		9,621	1,854,000	2,000,000	31,000	14,700 gpm	4,200
Capacity per Connection			**394.38**	**289.31**		**3.13**	**2.07**

GVSUD is currently able to supply water to all connections using their current infrastructure. However, as they grow they will need to implement additional infrastructure in order to be able to supply water to the existing and additional connections.

The GVSUD water system as a whole has enough capacity to meet current demands. A summary of their capacity per connection is listed below:

- Ground Storage - 394 gallons/connection
- Elevated Storage – 289 gallons/connection
- Booster Pumps – 3.13 gpm/connection
- Well Pumps – 2.07 gpm/connection

6.0 TCEQ DESIGN STANDARDS

The Texas Commission on Environmental Quality (30 TAC §290.45) has set minimum design standards that ensure a water system is capable of meeting the demands of its customers, these standards are in Attachment 5. TCEQ does not included consideration for additional fire flows that maybe necessary for future development in their minimum requirements. These standards must be met in order to be compliant with the state.

Water Treatment Plant:

- Treatment Capacity: 0.6 gpm/connection (must be greater than the anticipated maximum daily demand)

Storage:

- Total Storage: 200 gallons/connection
- Elevated Storage: 100 gallons/connection
- Pressure Tank: 20 gallons/connection (in lieu of elevated storage up to 2,500 connections)

Pumping:

- If less than 200 gallons per connection of elevated storage is provided, two or more pumps with a total capacity of 2.0 gpm/connection, or that have a total capacity of at least 1,000 gpm and the ability to meet peak hourly demands with the largest pump out of service, whichever is less.

- If at least 200 gallons/connection of elevated storage is provided: two or more pumps with a minimum capacity of 0.6 gpm/connection.

7.0 GVSUD DESIGN REQUIREMENTS

RCE used historical water usage records to establish design requirements in order to ensure that minimum service equals or exceeds the minimum requirements expected by the TCEQ and meets or exceeds GVSUD future water demands.

As a whole, GVSUD design requirements exceed the minimum criteria established by TCEQ. GVSUD current water system is in full compliance with TCEQ and is able to meet current demands in the system. In Table 7.1, are GVSUD's historical water usage records.

TABLE 7.1

Green Valley Special Utility District Historic Water Use					
1	2	3	4	5	6
Year	**Historical Water Connections**	**Daily Avg. Pumped (gpd)**	**Daily Avg. Pumped per Conn. (gpd/Conn.)**	**Average Daily Water Usage per Conn. (gpm/Conn.)**	**Peak Hour Water Usage per Conn. (gpm/Conn.)***
2003	6,500	2,062,238	317.3	0.22	0.9
2004	6,800	2,083,664	306.4	0.21	0.9
2005	7,500	2,478,256	330.4	0.23	0.9
2006	8,000	2,759,471	344.9	0.24	1.0
2007	8,302	2,300,600	277.1	0.19	0.8
2008	8,453	2,888,026	341.7	0.24	0.9
2009	8,650	2,715,726	314.0	0.22	0.9
2010	8,829	2,447,903	277.3	0.19	0.8
2011	8,995	2,936,234	326.4	0.23	0.9
2012	9,274	2,443,439	263.5	0.18	0.7
2013	9,621	2,445,225	254.2	0.18	0.7
		Average	**304.8**	**0.21**	**0.8**

*Based on a Peak Factor of 4

The preceding table shows the average daily and peak hour water usage. The average number of connections used for each year was provided by GVSUD staff. We used the last 11 years of data to represent modern operating conditions. The average water usage for the past 11 years is 0.21 gpm/connection. This average use value is less than the 0.31 gpm/connection as suggested by the Texas Water Development Board and Edwards Aquifer Authority. The table above shows that the Average Daily Demand is 304.8 gpd/connection, and the Peak Hour Demand, is 0.8 gpm/connection. These values were used in determining GVSUD's design requirements. The color of the text corresponds to the location of the value in Table 7.1 above.

However, when the system is broken down into pressure planes, some individual pressure planes fail to meet the TCEQ minimums using only GVSUD infrastructure, however the Districts wholesale connections provide additional storage, pump capacity and pressure. Water production capacity is designed to meet historical peak daily demand. System storage is designed and based on average daily demand. Annual evaluations of the average daily demand and peak daily demand of water flows should be conducted based on daily records of pumping for the calendar year. This will enable the design requirements to be revised and adjusted accordingly. GVSUD design requirements for average and peak flows are as follows:

- Average Daily Demand: 351 gpd/connection
- Peak Daily Demand: 702 gpd/connection
- Peak Hour Demand: 0.8 gpm/connection + Fire Flow

TCEQ minimum requirements do not consider fire flow. Additional size for water main projects may be required to not only meet the minimum requirements of the TCEQ, but to confidently provide fire flow protection. This additional fire flow consideration will be on a project-by-project basis.

The average daily demand of 351 gpd/connection is based on the 10-year historic average of 304.8 gpd/connection with an added 15-percent safety factor. Below is an explanation of how this value was calculated.

$$304.8 \times .15 = 45.72 + 305 = 351 \text{ gpd/connection}$$

The peak daily demand is based on the average maximum with a peak factor of 2 (two). We used a peak factor of 2 because we were not able to obtain peak usage data from GVSUD, therefore used an industry standard of 2. A peak factor of 2 represents an average water system. The maximum peak daily demand is 702 gpd/connection. The calculation is shown below.

$$351 \times 2 = 702 \text{ gpd/connection}$$

GVSUD historical water use is at 0.21 gpm/connection. This value is the average daily demand and is used to calculate storage volumes. This calculation is based on the 0.34 acre-feet/year historical average annual water usage per connection. Below is the calculation that shows how this number was achieved.

$$\frac{.34\text{acre - ft}}{\text{year}} \text{x} \frac{1\text{year}}{365\text{days}} \text{x} \frac{1\text{day}}{24\text{hrs}} \text{x} \frac{1\text{hr}}{60\text{min}} \text{x} \frac{43{,}560\text{ft}^2}{1\text{acre}} \text{x} \frac{7.48\text{gal}}{1\text{ft}^3} = 0.21\text{gpm/connection}$$

GVSUD is currently in compliance with TCEQ minimums, however TCEQ does not account for future growth in these requirements. Due to rapid growth in this area, GVSUD will need to perform several water system improvements in order to meet this ever-growing demand and to remain compliant with TCEQ. The following is a summary of GVSUD's design requirements for water treatment, storage, and pumping based on these average and peak flow design requirements:

Historical Water Supply Capacity:
0.25 gpm/connection (Peak Day Demand)
(.21x15%) = 0.242 = 0.25 gpm/Connection~0.40 acre-feet/connection

Water Plant:

$$\frac{1{,}704 \text{ ac} - \text{ft (Edwards Rights)} + 600 \text{ ac - ft(Trinity Rights)}}{0.4 \text{ acre} - \text{feet/connection}} = 5{,}760 \text{ connections}$$

5,760 connections*0.6 gpm/connection (TCEQ min) = 3,456 gpm

Well 1 – 800 gpm
Well 2 – 1,600 gpm
Well 3 – 1,200 gpm
Well 4 – 600 gpm
TOTAL – 4,200 gpm*

**Does not include CRWA Wells Ranch or Lake Dunlap*

Existing capacity = 4,200 gpm > TCEQ minimum Capacity =3,456 gpm

Storage:

- Total Storage: 176 gallons/connection (Average Daily Demand)
- Ground Storage: 88 gallons/connection
- Elevated Storage: 88 gallons/connection

Pumping:

- High Service Pumps: 0.8 gpm/connection (Peak Hour Demand) (Firm)

The water supply capacity was determined by taking the highest peak daily demand and adding 15% giving us a value of 0.25 gpm/connection after rounding up to the nearest hundredth.

The values above were calculated by taking the daily average pumped for each year and averaging these values equals 351 gpd/connection. This value was then halved in order to allow for 12 hours of storage capacity. The 351 gpd/connection represents a full 24 hours of storage capacity. The ground and elevated storage requirements were calculated by taking the total amount of storage and dividing by 2 (two) to distribute evenly between elevated and ground storage. The same ratio that TCEQ established in their design criteria was applied to GVSUD's design criteria. The elevated requirement from TCEQ was half as much as the total storage amount, therefore, we are establishing a total storage criteria of 176 gallons/connection and 88 gallons/connection for elevated storage. This calculation is shown below.

- 24 hours = 176 gallons/connection

$$\frac{\frac{176\ \text{gallon}}{\text{day}}}{\text{connection}} \text{x.5 day} = 88\ \text{gallons/connection}$$

- 12 hours = 88 gallons/connection

The high service pump usage was determined to be 0.8 gpm/connection and per TCEQ requirements, 2.0 gpm/connection was used.
Below is a summary of TCEQ requirements vs. GVSUD demand. The more stringent value will be used for future capacity design criteria.

TCEQ vs. GVSUD			
1	2	3	4
Description	**TCEQ (minimum)**	**Green Valley SUD (existing)**	**Green Valley SUD (demand)**
Water Rights (acre-feet/connection/year)	0.50	0.52	0.34
Water Plant Supply (gpm/connection)	0.60	2.07	0.25
Total Storage (gallons/connection)	200	400.6	176
Ground Storage (gallons/connection)	-	192.7	88
Elevated Storage (gallons/connection)	100	207.88	88
Pumping (gpm/connection)	2.0	3.13	0.8

Note: Bold value indicates GVSUD design criteria used for future development

Clarification: The 0.44 gpm/connection Water Plant Supply calculation includes the infrastructure owned by GVSUD and does not include any CRWA infrastructure that provides pressure, storage, treatment and pumping capacity to the system. If the calculation is completed using the number of connections for the service area being serviced (Wells, Plant 1 and Plant 5 Pressure Planes) the results are as follows:

Water Plant Supply =
4200 gpm Well Capacity / 4383 connections = 0.96 gpm/connection > TCEQ minimum

Similarly, we could add the CRWA infrastructure (Treatment, pumping and storage) to provide a more accurate picture of the robust system in place to serve the District. At this time all calculations will only include infrastructure and capacity owned and operated by GVSUD directly.

8.0 PROPOSED WATER SYSTEM

The GVSUD water system is currently very complex and requires extensive maintenance in order to maintain the 12 existing pressure planes. It is proposed that GVSUD move to a simpler, more efficient, self-maintained, water system that will meet the rapidly growing demands of its customers. The system is currently complicated due to 12 pressure planes and containing many mechanical devices such as pneumatic tanks and PRVs that require extensive maintenance, limit redundancy, and are prone to failure. This proposed water system will allow for the movement of water to all parts of the system and give the system redundant water sources.

RCE has identified capital improvement projects (CIPs) in order to meet future storage, pump and water demands through the year 2034 and replace aging infrastructure. The strategy of these CIP's will be to combine the existing 12 pressure planes into four pressure planes in an effort to allow the GVSUD water system the opportunity to run effectively and efficiently in the future as demands for water increases. The proposed CIPs will provide redundancy in each pressure plane. These areas are shown on Attachment 'B', Proposed Pressure Planes Map.

8.1 PROPOSED WATER SUPPLY

The water supply for GVSUD is obtained from many different sources and is composed of several leases. A list of the current and expired water leases was compiled in order to analyze the amount of water that will be needed in the future. This list is shown in Table 5.2.

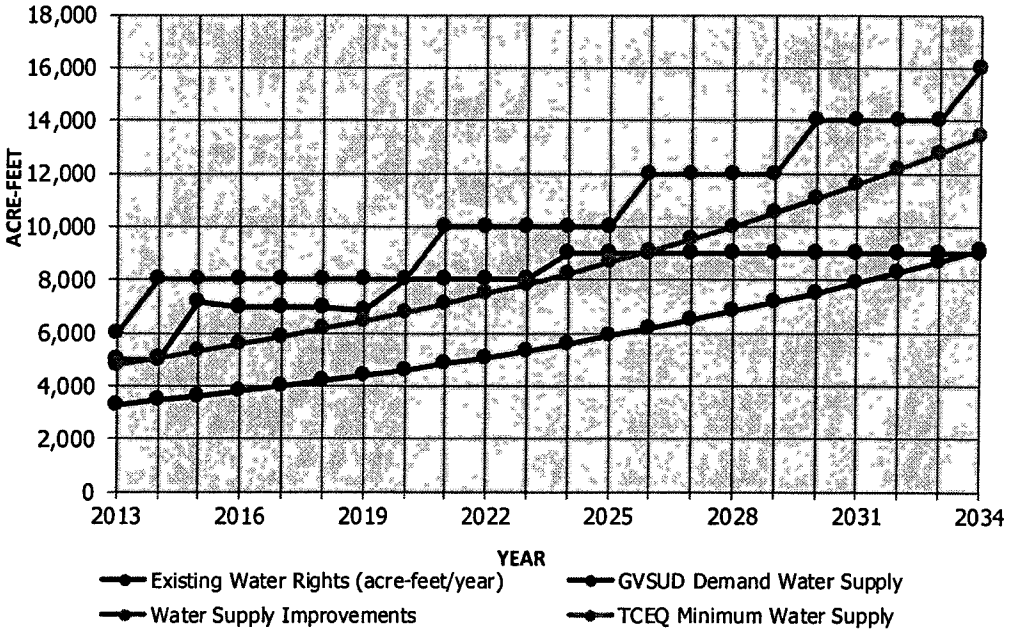
It is recommended that GVSUD continue to pursue supplemental sources of water supply. GVSUD's current water rights with East Central are due to expire in 2015 and the Laguna Water Lease is set to expire in 2018. According to Chart 5.1, by 2020 GVSUD will have exhausted its 4,500 acre-feet of owned water inventory assuming a 5% projected water demand growth. Therefore, the water opportunities CRWA Wells Ranch Phase 2 and GBRA Lake Dunlap/River Mill Lake Dunlap projects shown in Chart 5.1 will need to be negotiated and ready for distribution. GVSUD projected water demand is 9,113 acre-feet/year by 2034. A couple of providers to further explore for water opportunities in Edwards Wells, East Central Special Utility District, Schertz Sequin, Trinity wells, Carrizo-Wilcox wells, GBRA, HCPUA, CRWA water swap with SAWS and Springs Hill Water Supply Company. Another option is to explore more opportunities with brackish water. In addition to finding addition sources of water, GVSUD should implement a water conservation plan that would reduce the amount of water required throughout the system each year.

Water Supply

Year	Projected Connections	Existing Water Rights (acre-feet/year)	GVSUD Demand Water Supply (acre-feet/year)	TCEQ Minimum Water Supply (acre-feet/year)	Water Supply Improvements (acre-feet/year)
2013	9,621	5,004	3,271	4,811	6,000
2014	10,102	5,004	3,435	5,051	8,000
2015	10,607	7,133	3,606	5,304	8,000
2016	11,138	6,933	3,787	5,569	8,000
2017	11,694	6,933	3,976	5,847	8,000
2018	12,279	6,933	4,175	6,140	8,000
2019	12,893	6,801	4,384	6,447	8,000
2020	13,538	7,991	4,603	6,769	8,000
2021	14,215	7,991	4,833	7,107	10,000
2022	14,925	7,991	5,075	7,463	10,000
2023	15,672	7,991	5,328	7,836	10,000
2024	16,455	8,991	5,595	8,228	10,000
2025	17,278	8,991	5,874	8,639	10,000
2026	18,142	8,991	6,168	9,071	12,000
2027	19,049	8,991	6,477	9,524	12,000
2028	20,001	8,991	6,800	10,001	12,000
2029	21,001	8,991	7,140	10,501	12,000
2030	22,052	8,991	7,498	11,026	14,000
2031	23,154	8,991	7,872	11,577	14,000
2032	24,312	8,991	8,266	12,156	14,000
2033	25,527	8,991	8,679	12,764	14,000
2034	26,804	8,991	9,113	13,402	16,000

* Note: See Table 5.1 for summary of GVSUD Existing Water Rights.

Minimum Water Rights Supply Criteria =	0.31 gpm/Connection	**0.50**	Acre-Feet/Connection
GVSUD Historical Annual Water Usage =	0.21 gpm/Connection	**0.34**	Acre-Feet/Connection



GVSUD water supply will not require additional water rights until 2034 according to the future demand projection shown on the previous page. The dark blue line in the figure above shows that GVSUD's current water rights. In order to meet the TCEQ minimum water supply the District will need to find additional water rights by 2025.

8.2 PROPOSED 750-FT PRESSURE PLANE

The proposed 750' pressure plane includes the current 1518, Plant 5, Leissner, and East Central service levels. The boundary of this pressure plane serves 1,460 connections. It is projected that by 2024 this plane will have approximately 2,497 connections. In analyzing this proposed pressure plane it is determined that this plane will need additional infrastructure in order to meet TCEQ minimum requirements. A summary of the current infrastructure is listed below:

- 1,950 gpm pumping capacity (1,450 gpm capacity with largest out of commission)
- 560,000 gallons Ground Storage
- 16,000 gallons Pneumatic Pressure Tanks.

This does not account for the existing infrastructure at Plant 15 or East Central pressure plane. CRWA has the Lake Dunlap Water Treatment Plant that also feeds water into this pressure plane. This water treatment plant has storage tanks as well as high service pumps that contribute to this service area.

The table and chart below shows the future required pumping capacity as well as the current pumping capacity. It shows that the current capacity is below the required pumping capacity. This plane will need approximately 7,000 gallons per minute of pumping capacity in order to meet its demand in the future. This chart also gives us an outlook on the additional capacity that will be required in order to meet the demands of this pressure plane.

This proposed pressure plane does not currently have any elevated storage. Fortunately, this pressure plane can temporarily comply with TCEQ minimum design standards and feed off the 830 pressure plane elevated tanks until an elevated storage is added. When this plane is ready for this infrastructure, it will need an additional 500,000 gallon of elevated storage.

This plane has sufficient storage but TCEQ requires that each pressure plane have at least 100 gallons/connection of elevated storage. Therefore, the construction of the 500,000 gallon of elevated storage will meet this requirement and ensure that enough pressure is provided to all the water connections in this plane. This plane will continue to use pumping capacity from adjacent pressure planes until their plant improvements are completed. This pressure plane has excess water and can temporary share water with other pressure planes that are deficient in water capacity while the transition to

the four proposed pressure planes is completed. GVSUD currently obtains water from several CRWA metering stations. These metering stations gives GVSUD the capability to utilize CRWA surface and future groundwater.

The following pages give an overview of the current situation and future infrastructure that will be needed by the year 2034 for the 750' pressure plane. Below is a summary of the deficiencies for this pressure plane.

750 Pressure Plane			
	Elevated Storage (gallons)	Total Storage (gallons)	Pumping (gpm)
Existing	0	560,000	1,950
Required	500,000	1,060,000	8,950
Deficit	**500,000**	**500,000**	**7,000**

RCE has proposed two elevated storage tanks with booster pumps onsite that will ensure that this proposed pressure plane is able to meet future water demands. The projects will include two pipeline improvements and an elevated tank in the McQueeney area in order to eliminated PRVs. The other elevated tank will be constructed to the south of IH-10 off Gin Road. Together, these two elevated tanks floating together will be able to service the 750-pressure plane. A summary of the projects needed for this pressure plane is shown in the table below.

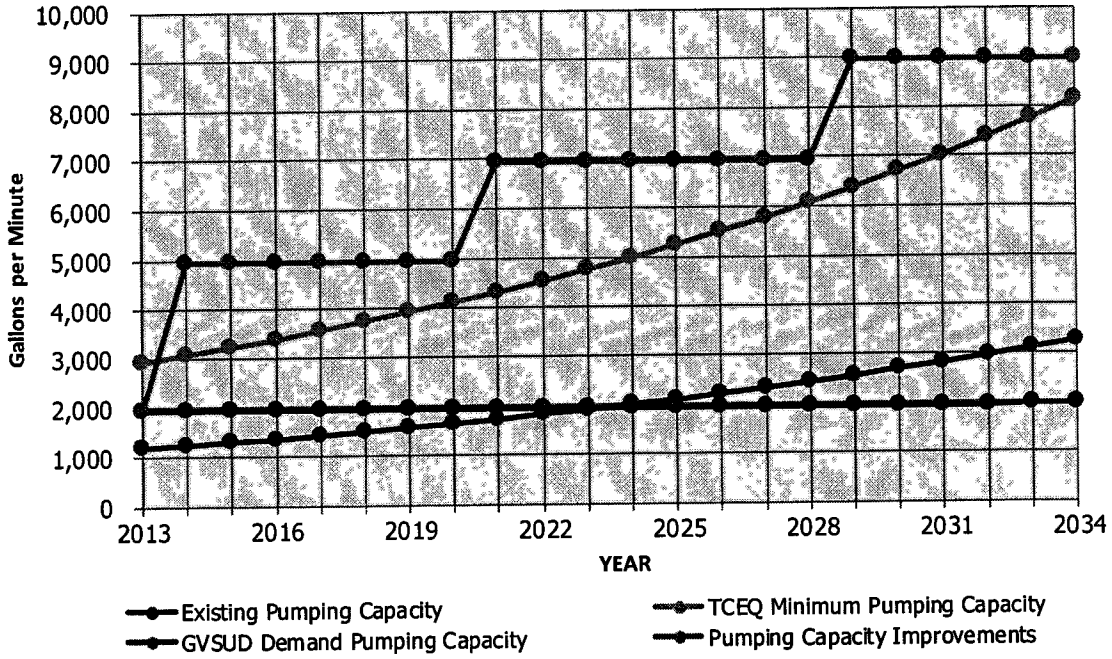
750 Pressure Plane Proposed Improvements	
Project	Year
Pipeline from FM 725 to CRWA Lake Dunlap WTP	2016
16" Pipeline along FM 725 – Union Wine to Altwein	2017
750 Elevated Storage Tank	2018
750' Elevated Storage Tank at Gin Road	2020

750 Pressure Plane

PUMPING CAPACITY

Year	Projected Connections	Existing Pumping Capacity	TCEQ Minimum Pumping Capacity	GVSUD Demand Pumping Capacity	Pumping Capacity Improvements
2013	1,460	1,950	2,920	1,168	1,950
2014	1,533	1,950	3,066	1,226	4,950
2015	1,610	1,950	3,219	1,288	4,950
2016	1,690	1,950	3,380	1,352	4,950
2017	1,775	1,950	3,549	1,420	4,950
2018	1,863	1,950	3,727	1,491	4,950
2019	1,957	1,950	3,913	1,565	4,950
2020	2,054	1,950	4,109	1,643	4,950
2021	2,157	1,950	4,314	1,726	6,950
2022	2,265	1,950	4,530	1,812	6,950
2023	2,378	1,950	4,756	1,903	6,950
2024	2,497	1,950	4,994	1,998	6,950
2025	2,622	1,950	5,244	2,098	6,950
2026	2,753	1,950	5,506	2,202	6,950
2027	2,891	1,950	5,781	2,313	6,950
2028	3,035	1,950	6,070	2,428	6,950
2029	3,187	1,951	6,374	2,550	8,950
2030	3,346	1,952	6,693	2,677	8,950
2031	3,514	1,953	7,027	2,811	8,950
2032	3,689	1,954	7,379	2,951	8,950
2033	3,874	1,955	7,748	3,099	8,950
2034	4,068	1,956	8,135	3,254	8,950

TCEQ minimum Pumping Capacity Criteria = **2.0** gpm/Connection
GVSUD Pumping Capacity Design Criteria = **0.8** gpm/Connection

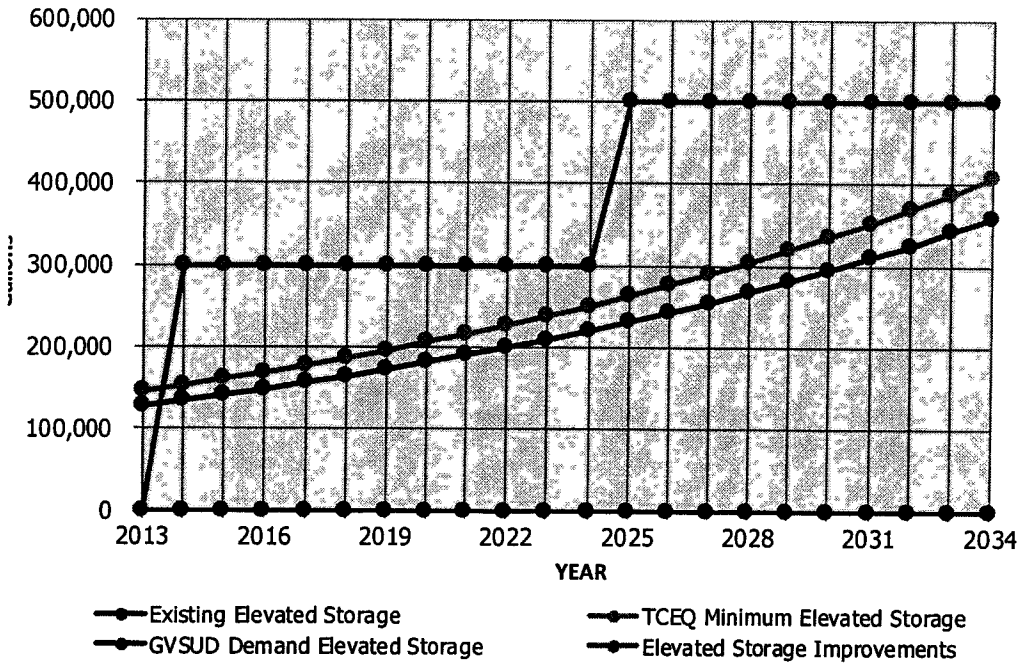


750 Pressure Plane

ELEVATED STORAGE

Year	Projected Connections	Existing Elevated Storage	TCEQ Minimum Elevated Storage	GVSUD Demand Elevated Storage	Elevated Storage Improvements
2013	1,460	0	146,000	128,480	0
2014	1,533	0	153,300	134,904	300,000
2015	1,610	0	160,965	141,649	300,000
2016	1,690	0	169,013	148,732	300,000
2017	1,775	0	177,464	156,168	300,000
2018	1,863	0	186,337	163,977	300,000
2019	1,957	0	195,654	172,175	300,000
2020	2,054	0	205,437	180,784	300,000
2021	2,157	0	215,708	189,823	300,000
2022	2,265	0	226,494	199,315	300,000
2023	2,378	0	237,819	209,280	300,000
2024	2,497	0	249,710	219,744	300,000
2025	2,622	0	262,195	230,732	500,000
2026	2,753	0	275,305	242,268	500,000
2027	2,891	0	289,070	254,382	500,000
2028	3,035	0	303,524	267,101	500,000
2029	3,187	0	318,700	280,456	500,000
2030	3,346	0	334,635	294,479	500,000
2031	3,514	0	351,366	309,202	500,000
2032	3,689	0	368,935	324,663	500,000
2033	3,874	0	387,381	340,896	500,000
2034	4,068	0	406,751	357,940	500,000

TCEQ minimum Elevated Storage Criteria = **100** Gallons/Connection
GVSUD Elevated Storage Design Criteria = **88** Gallons/Connection

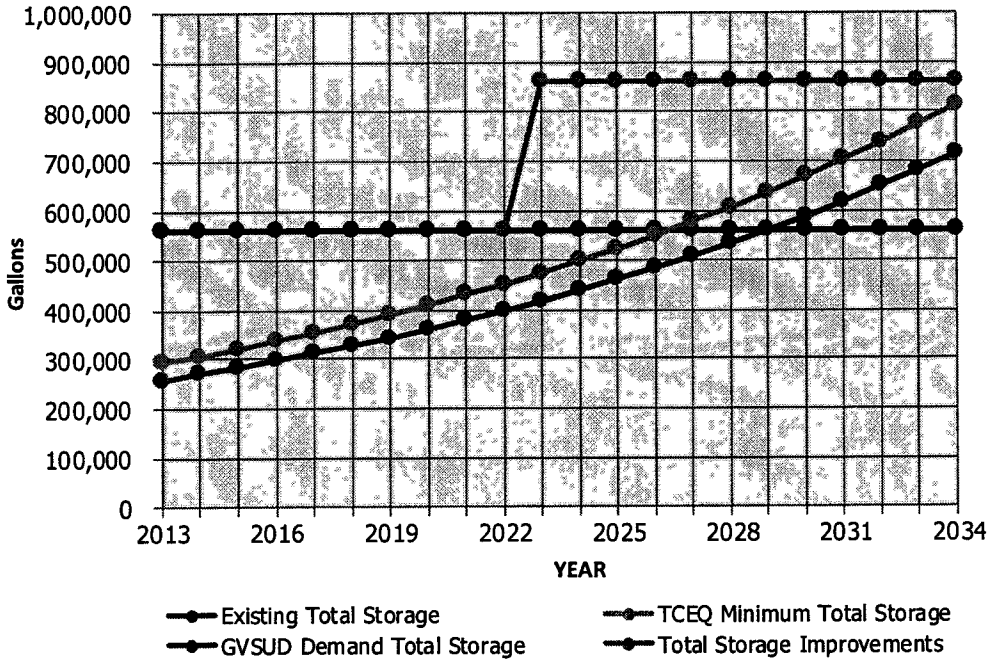


750 Pressure Plane

TOTAL STORAGE

Year	Projected Connections	Existing Total Storage	TCEQ Minimum Total Storage	GVSUD Demand Total Storage	Total Storage Improvements
2013	1,460	560,000	292,000	256,960	
2014	1,533	560,000	306,600	269,808	
2015	1,610	560,000	321,930	283,298	
2016	1,690	560,000	338,027	297,463	
2017	1,775	560,000	354,928	312,336	
2018	1,863	560,000	372,674	327,953	
2019	1,957	560,000	391,308	344,351	
2020	2,054	560,000	410,873	361,569	
2021	2,157	560,000	431,417	379,647	
2022	2,265	560,000	452,988	398,629	560,000
2023	2,378	560,000	475,637	418,561	860,000
2024	2,497	560,000	499,419	439,489	860,000
2025	2,622	560,000	524,390	461,463	860,000
2026	2,753	560,000	550,610	484,536	860,000
2027	2,891	560,000	578,140	508,763	860,000
2028	3,035	560,000	607,047	534,201	860,000
2029	3,187	560,000	637,399	560,911	860,000
2030	3,346	560,000	669,269	588,957	860,000
2031	3,514	560,000	702,733	618,405	860,000
2032	3,689	560,000	737,869	649,325	860,000
2033	3,874	560,000	774,763	681,791	860,000
2034	4,068	560,000	813,501	715,881	860,000

TCEQ minimum Total Storage Criteria = **200** Gallons/Connection
GVSUD Total Storage Design Criteria = **176** Gallons/Connection



8.3 PROPOSED 1008-FT PRESSURE PLANE

The proposed 1008 pressure plane includes the existing Plant 1 and Plant 9 pressure planes. The boundary for this pressure plane will serve 3,030 connections and is projected to have 5,182 connections by the year 2024. This plane currently has 4,350 gallons per minute of pumping capacity (3,350 gpm with the largest 1,000-gpm pump out of commission), 480,000 gallons of ground capacity, 1,300,000 gallons of elevated storage capacity, and 5,000 gallons of pneumatic pressure tanks.

This plane currently has extensive storage capacity both elevated and ground. The Weil Road Booster Pump Station and ground storage tank currently in progress will add 3,600 gpm to the pumping capacity and 0.5 MG to the storage capacity. GVSUD plans to eliminate pressure tanks due to maintenance issues and high electricity costs associated with their use.

The following pages give an overview of the current situation and future infrastructure that will be needed by the year 2034 for the 1008' pressure plane. Below is a summary of this pressure planes deficiency.

1008 Pressure Plane			
	Elevated Storage (gallons)	Total Storage (gallons)	Pumping (gpm)
Existing	1,300,000	1,780,000	4,350
Required	0	0	7,150
Deficit	**0**	**0**	**2,800***

*Deficit will be obtained once Weil Road Booster Station is constructed

The proposed 1008 pressure plane will consist of three separate projects that will ensure that future water demands are met. Currently in progress, is a booster pump station on Weil Road that that will move CRWA water into this pressure plane. Another project currently in progress is a large segment of a 24" pipeline to eventually connect Plant 1 and Plant 9 allowing the two elevated storage tanks to float and operate on the same redundant pressures. The first project will be to upgrade Plant 9 with elevated storage and pumping capacity. The second project is to construct a direct fill pipeline from the existing wells north of IH 35 to Plant 1. The final project will be to upgrade the Plant 1 ground storage and pumping facilities. All these projects will ensure that GVSUD will be able to provide fire flow to future developments in this pressure plane. A summary of the projects needed for this pressure plane is shown in the table on the following page.

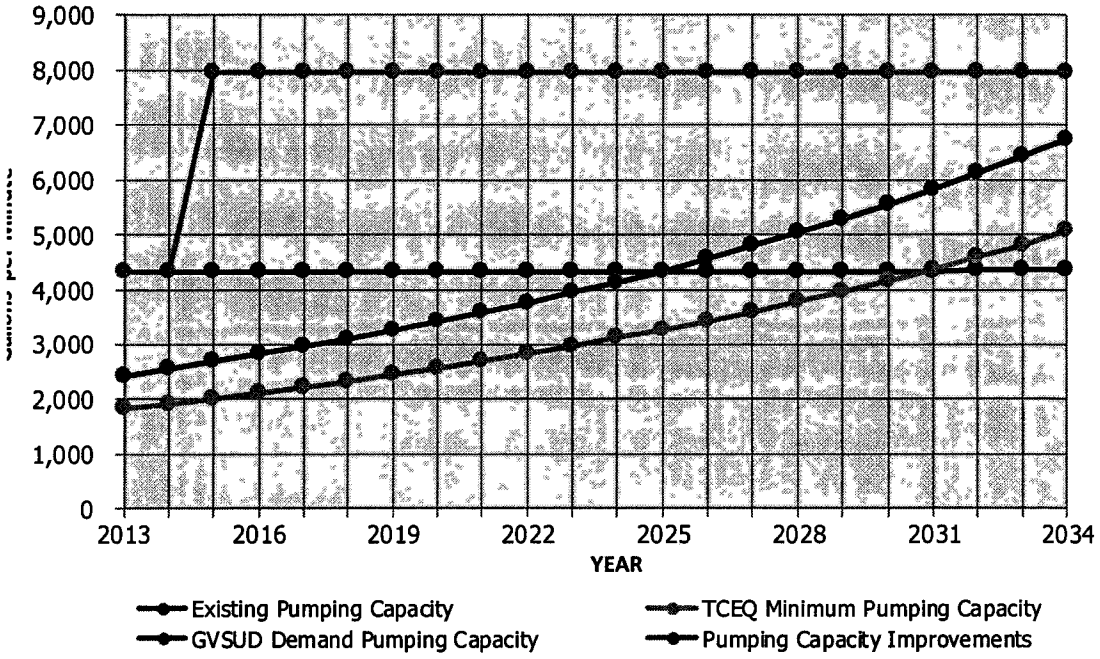
1008 Pressure Plane Proposed Improvements	
Project	Year
Plant 9 Improvements	2017
20" Pipe Line from Wells to Plant 1 Improvements	2019
Plant 1 – Storage & Pump Improvements	2020

1008 Pressure Plane

PUMPING CAPACITY

Year	Projected Connections	Existing Pumping Capacity	TCEQ Minimum Pumping Capacity	GVSUD Demand Pumping Capacity	Pumping Capacity Improvements
2013	3,030	4,350	1,818	2,424	4,350
2014	3,182	4,350	1,909	2,545	4,350
2015	3,341	4,350	2,004	2,672	7,950
2016	3,508	4,350	2,105	2,806	7,950
2017	3,683	4,350	2,210	2,946	7,950
2018	3,867	4,350	2,320	3,094	7,950
2019	4,060	4,350	2,436	3,248	7,950
2020	4,264	4,350	2,558	3,411	7,950
2021	4,477	4,350	2,686	3,581	7,950
2022	4,701	4,350	2,820	3,760	7,950
2023	4,936	4,350	2,961	3,948	7,950
2024	5,182	4,350	3,109	4,146	7,950
2025	5,441	4,350	3,265	4,353	7,950
2026	5,714	4,350	3,428	4,571	7,950
2027	5,999	4,350	3,600	4,799	7,950
2028	6,299	4,350	3,779	5,039	7,950
2029	6,614	4,351	3,968	5,291	7,950
2030	6,945	4,352	4,167	5,556	7,950
2031	7,292	4,353	4,375	5,834	7,950
2032	7,657	4,354	4,594	6,125	7,950
2033	8,039	4,355	4,824	6,432	7,950
2034	8,441	4,356	5,065	6,753	7,950

TCEQ minimum Pumping Capacity Criteria = **0.6** gpm/Connection
GVSUD Pumping Capacity Design Criteria = **0.8** gpm/Connection

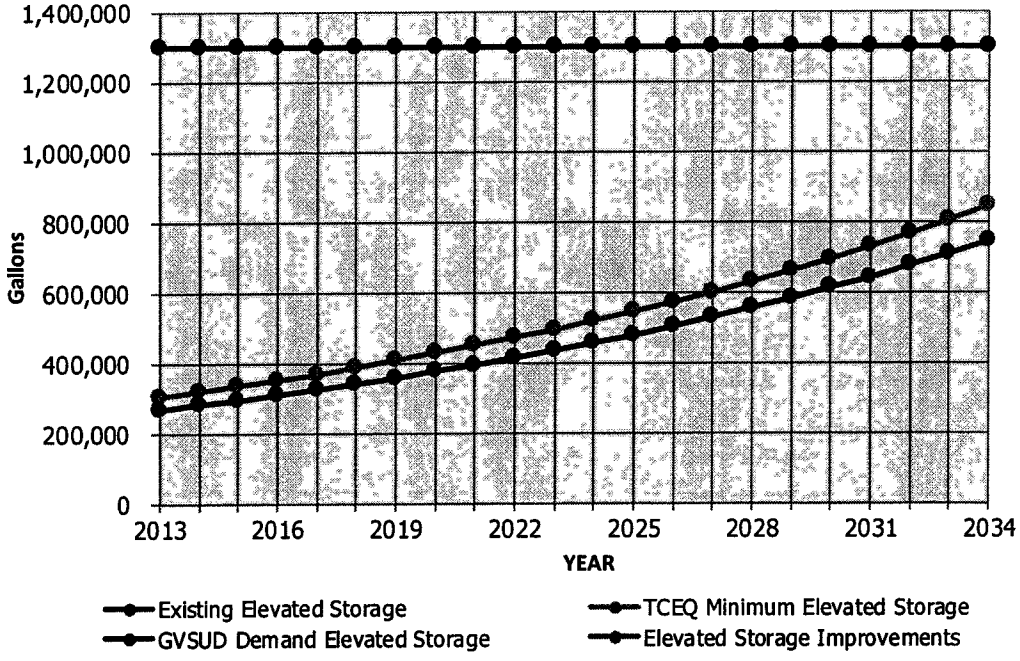


1008 Pressure Plane

ELEVATED STORAGE

Year	Projected Connections	Existing Elevated Storage	TCEQ Minimum Elevated Storage	GVSUD Demand Elevated Storage	Elevated Storage Improvements
2013	3,030	1,300,000	303,000	266,640	
2014	3,182	1,300,000	318,150	279,972	
2015	3,341	1,300,000	334,058	293,971	
2016	3,508	1,300,000	350,760	308,669	
2017	3,683	1,300,000	368,298	324,103	
2018	3,867	1,300,000	386,713	340,308	
2019	4,060	1,300,000	406,049	357,323	
2020	4,264	1,300,000	426,351	375,189	
2021	4,477	1,300,000	447,669	393,949	
2022	4,701	1,300,000	470,052	413,646	
2023	4,936	1,300,000	493,555	434,328	
2024	5,182	1,300,000	518,233	456,045	
2025	5,441	1,300,000	544,144	478,847	
2026	5,714	1,300,000	571,352	502,789	
2027	5,999	1,300,000	599,919	527,929	
2028	6,299	1,300,000	629,915	554,325	
2029	6,614	1,300,000	661,411	582,042	
2030	6,945	1,300,000	694,482	611,144	
2031	7,292	1,300,000	729,206	641,701	
2032	7,657	1,300,000	765,666	673,786	
2033	8,039	1,300,000	803,949	707,475	
2034	8,441	1,300,000	844,147	742,849	

TCEQ minimum Elevated Storage Criteria = **100** Gallons/Connection
GVSUD Elevated Storage Design Criteria = **88** Gallons/Connection

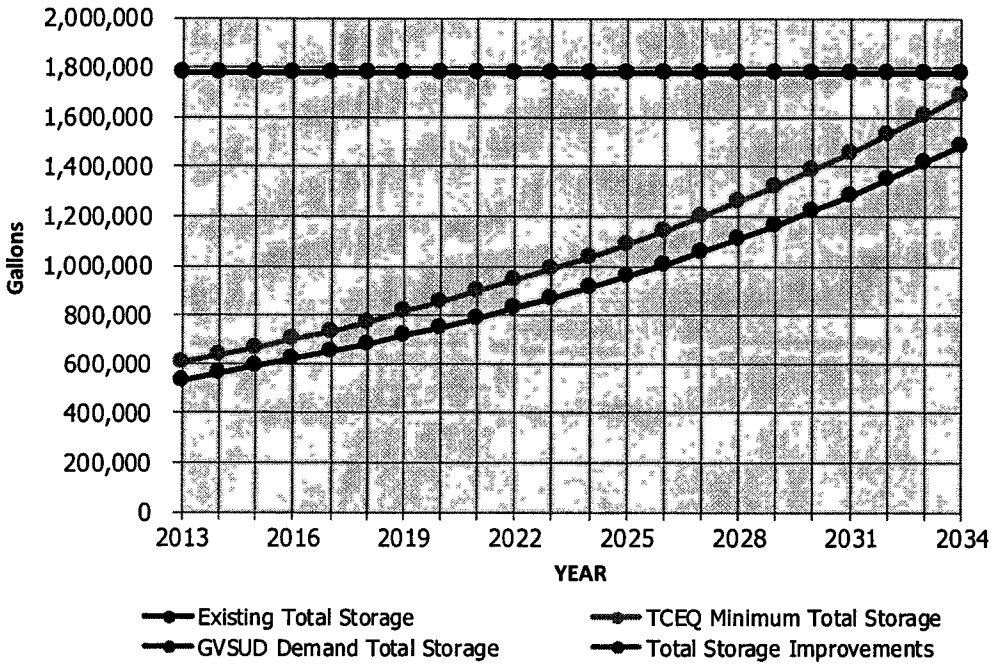


1008 Pressure Plane

TOTAL STORAGE

Year	Projected Connections	Existing Total Storage	TCEQ Minimum Total Storage	GVSUD Demand Total Storage	Total Storage Improvements
2013	3,030	1,780,000	606,000	533,280	
2014	3,182	1,780,000	636,300	559,944	
2015	3,341	1,780,000	668,115	587,941	
2016	3,508	1,780,000	701,521	617,338	
2017	3,683	1,780,000	736,597	648,205	
2018	3,867	1,780,000	773,427	680,615	
2019	4,060	1,780,000	812,098	714,646	
2020	4,264	1,780,000	852,703	750,379	
2021	4,477	1,780,000	895,338	787,897	
2022	4,701	1,780,000	940,105	827,292	
2023	4,936	1,780,000	987,110	868,657	
2024	5,182	1,780,000	1,036,466	912,090	
2025	5,441	1,780,000	1,088,289	957,694	
2026	5,714	1,780,000	1,142,703	1,005,579	
2027	5,999	1,780,000	1,199,839	1,055,858	
2028	6,299	1,780,000	1,259,830	1,108,651	
2029	6,614	1,780,000	1,322,822	1,164,083	
2030	6,945	1,780,000	1,388,963	1,222,288	
2031	7,292	1,780,000	1,458,411	1,283,402	
2032	7,657	1,780,000	1,531,332	1,347,572	
2033	8,039	1,780,000	1,607,898	1,414,951	
2034	8,441	1,780,000	1,688,293	1,485,698	

TCEQ minimum Total Storage Criteria = **200** Gallons/Connection
GVSUD Total Storage Design Criteria = **176** Gallons/Connection



8.4 PROPOSED 897-FT PRESSURE PLANE

The proposed 897' pressure plane includes the current Plant 2, Plant 7, Plant 8 and the Damerau pressure planes. The boundary for this pressure plane currently serves 881 connections and is projected to grow to 1,507 connections by 2024. This plane currently has 6,600 gallons per minute of pumping capacity (a 5,800 gpm pumping capacity with the largest 800 gpm pump out of commission), 607,000 gallons of storage capacity and 100,000 gallons of elevated storage and 10,000 gallons of pneumatic pressure tanks. This pressure plane will need 150,000 gallons of additional elevated storage in order to meet GVSUD demand by 2034.

The following pages give an overview of the current situation and future infrastructure that will be needed by the year 2034 for the 897' pressure plane. Below is a summary of the deficiencies for this pressure plane.

897 Pressure Plane			
	Elevated Storage (gallons)	Total Storage (gallons)	Pumping (gpm)
Existing	100,000	707,000	6,600
Required	250,000	0	0
Deficit	**150,000**	**0**	**0**

The proposed 897-pressure plane primary consists of preparing the three Edwards Aquifer wells and one Trinity Aquifer well so that they can boost water into the 1008 pressure plane. The proposed projects include adding a ground storage tank that will allow well water from all 4 wells to be pumped to a common storage tank. This common storage tank will then pump water into the GVSUD system. The Weil Road Booster Pump Station and ground storage tank will also be able to pump to this pressure plane until the common ground storage tank described above is constructed. The fill pipeline from Youngsford to the Weil Road BPS will provide water from an additional source to the service area. The construction of a second Trinity Aquifer well will provide additional water to fill the proposed ground storage tank to supplement the GVSUD system. The modification to the existing pipelines is to connect the wells to Plant 1 & Plant 9 and secure confident easements. This will also ensure that Plant 1 & Plant 9 float together. These projects will ensure that future developments in this area are able to have sufficient domestic drinking water as well as fire flows. A summary of the projects needed for this pressure plane is shown below.

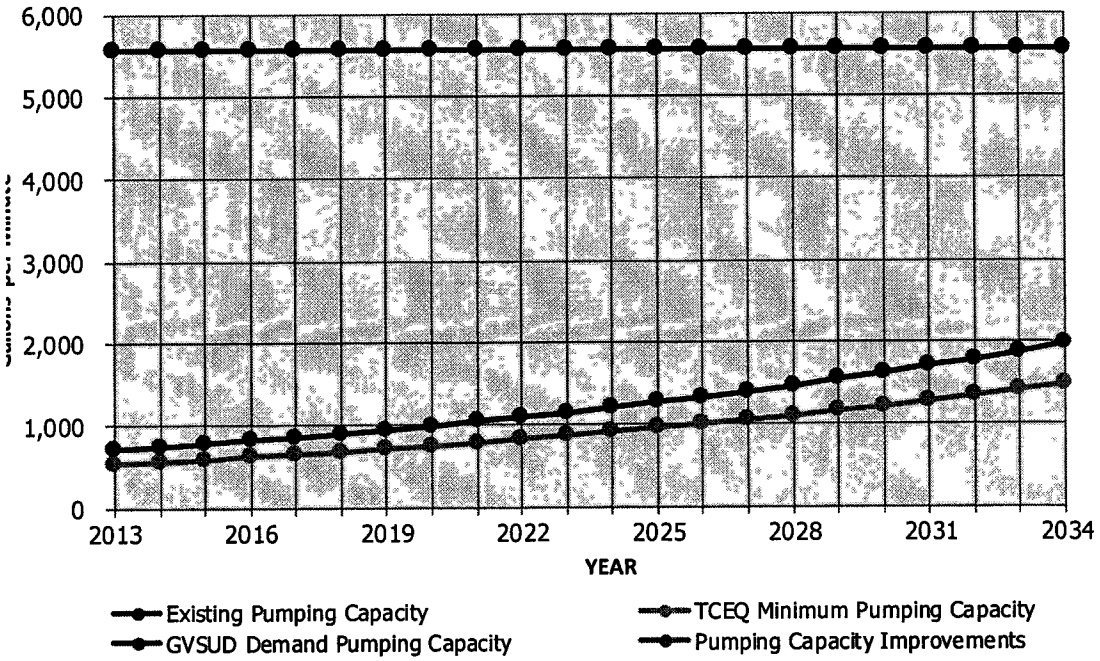
897 Pressure Plane Proposed Improvements	
Project	Year
897' Ground Storage Tank and Booster Pump Station	2017
16" Weil Road BPS Fill Pipeline – Youngsford to Weil Rd BPS	2018
Trinity Well Development	2019
24" Pipe Line that connects existing wells to 897' GST	2021
20" Pipe Line from Wells to Plant 9 Improvements	2022
20" Pipe Line from Wells to Plant 1 Improvements	2023

897 Pressure Plane

PUMPING CAPACITY

Year	Projected Connections	Existing Pumping Capacity	TCEQ Minimum Pumping Capacity	GVSUD Demand Pumping Capacity	Pumping Capacity Improvements
2013	881	5,550	529	705	
2014	925	5,550	555	740	
2015	971	5,550	583	777	
2016	1,020	5,550	612	816	
2017	1,071	5,550	643	857	
2018	1,124	5,550	675	900	
2019	1,181	5,550	708	944	
2020	1,240	5,550	744	992	
2021	1,302	5,550	781	1,041	
2022	1,367	5,550	820	1,093	
2023	1,435	5,550	861	1,148	
2024	1,507	5,550	904	1,205	
2025	1,582	5,550	949	1,266	
2026	1,661	5,550	997	1,329	
2027	1,744	5,550	1,047	1,395	
2028	1,832	5,550	1,099	1,465	
2029	1,923	5,550	1,154	1,538	
2030	2,019	5,550	1,212	1,615	
2031	2,120	5,550	1,272	1,696	
2032	2,226	5,550	1,336	1,781	
2033	2,338	5,550	1,403	1,870	
2034	2,454	5,550	1,473	1,964	

TCEQ minimum Pumping Capacity Criteria = **0.6** gpm/Connection
GVSUD Pumping Capacity Design Criteria = **0.8** gpm/Connection

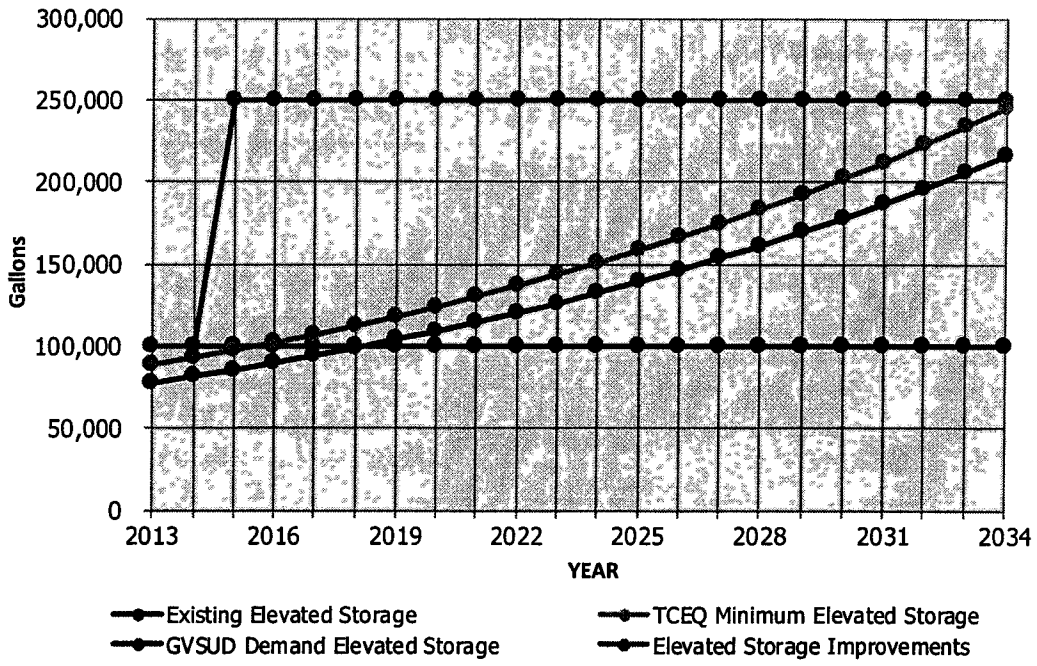


897 Pressure Plane

ELEVATED STORAGE

Year	Projected Connections	Existing Elevated Storage	TCEQ Minimum Elevated Storage	GVSUD Demand Elevated Storage	Elevated Storage Improvements
2013	881	100,000	88,100	77,528	100,000
2014	925	100,000	92,505	81,404	100,000
2015	971	100,000	97,130	85,475	250,000
2016	1,020	100,000	101,987	89,748	250,000
2017	1,071	100,000	107,086	94,236	250,000
2018	1,124	100,000	112,440	98,948	250,000
2019	1,181	100,000	118,062	103,895	250,000
2020	1,240	100,000	123,966	109,090	250,000
2021	1,302	100,000	130,164	114,544	250,000
2022	1,367	100,000	136,672	120,271	250,000
2023	1,435	100,000	143,506	126,285	250,000
2024	1,507	100,000	150,681	132,599	250,000
2025	1,582	100,000	158,215	139,229	250,000
2026	1,661	100,000	166,126	146,191	250,000
2027	1,744	100,000	174,432	153,500	250,000
2028	1,832	100,000	183,154	161,175	250,000
2029	1,923	100,000	192,311	169,234	250,000
2030	2,019	100,000	201,927	177,696	250,000
2031	2,120	100,000	212,023	186,580	250,000
2032	2,226	100,000	222,624	195,909	250,000
2033	2,338	100,000	233,756	205,705	250,000
2034	2,454	100,000	245,443	215,990	250,000

TCEQ minimum Elevated Storage Criteria = **100** Gallons/Connection
GVSUD Elevated Storage Design Criteria = **88** Gallons/Connection

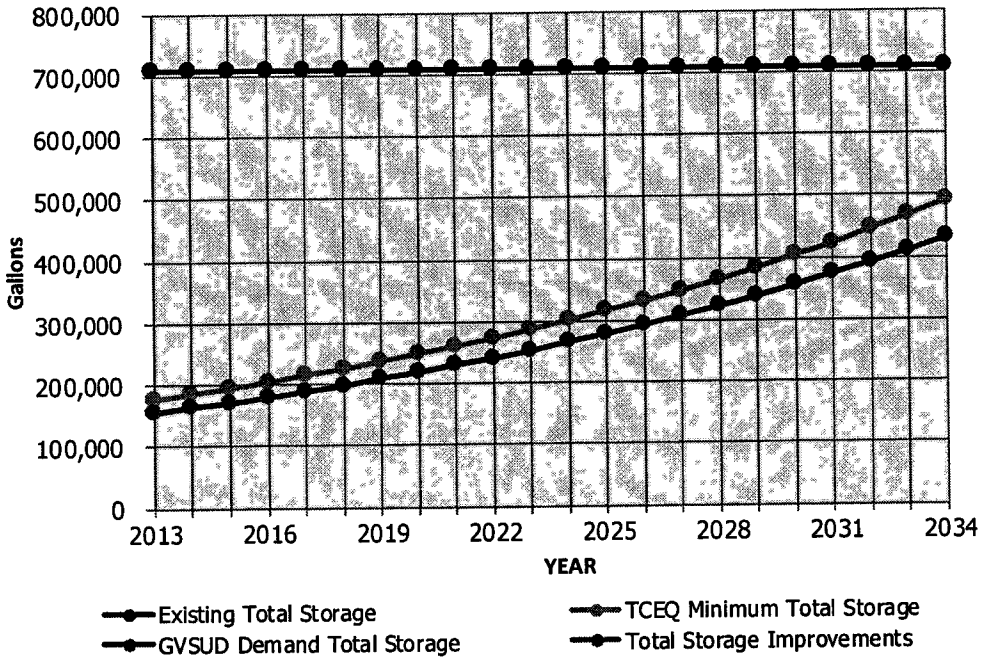


897 Pressure Plane

TOTAL STORAGE

Year	Projected Connections	Existing Total Storage	TCEQ Minimum Total Storage	GVSUD Demand Total Storage	Total Storage Improvements
2013	881	707,000	176,200	155,056	
2014	925	707,000	185,010	162,809	
2015	971	707,000	194,261	170,949	
2016	1,020	707,000	203,974	179,497	
2017	1,071	707,000	214,172	188,472	
2018	1,124	707,000	224,881	197,895	
2019	1,181	707,000	236,125	207,790	
2020	1,240	707,000	247,931	218,179	
2021	1,302	707,000	260,328	229,088	
2022	1,367	707,000	273,344	240,543	
2023	1,435	707,000	287,011	252,570	
2024	1,507	707,000	301,362	265,198	
2025	1,582	707,000	316,430	278,458	
2026	1,661	707,000	332,251	292,381	
2027	1,744	707,000	348,864	307,000	
2028	1,832	707,000	366,307	322,350	
2029	1,923	707,001	384,623	338,468	
2030	2,019	707,002	403,854	355,391	
2031	2,120	707,003	424,046	373,161	
2032	2,226	707,004	445,249	391,819	
2033	2,338	707,005	467,511	411,410	
2034	2,454	707,006	490,887	431,980	

TCEQ minimum Total Storage Criteria = **200** Gallons/Connection
GVSUD Total Storage Design Criteria = **176** Gallons/Connection



8.5 PROPOSED 830-FT PRESSURE PLANE

The proposed 830' pressure plane includes Plant 3, Plant 4, Haeckerville, and the Wagner pressure planes. This pressure plane currently has 1,800 gallons per minute of pumping capacity (1,350 gpm with one of the four 450 gpm pumps out of commission), 207,000 gallons of ground storage capacity and 700,000 gallons of elevated storage.

This plane will need to add approximately 23,000 gallons per minute of additional pumping capacity by 2034. This plane will use water from the 897-pressure plane since that plane has excess capacities. This pressure plane will be able to meet demands with some assistance from the 897 plane and CRWA existing infrastructure until it can get additional infrastructure built.

This pressure plane will need to add approximately 700,000 gallons of elevated storage by the year 2034. This pressure plane can continue to use water from the 897-pressure plane until infrastructure is in place.

In addition to the 700,000 gallons of elevated storage requirements, this plane will need an additional 750,000 gallons of storage in order to meet the total storage requirement.

The following pages give an overview of the current situation and future infrastructure that will be needed by the year 2034 for the 830' pressure plane. Below is a summary of the deficiencies for this pressure plane.

830 Pressure Plane			
	Elevated Storage (Gallons)	Total Storage (Gallons)	Pumping (GPM)
Existing	700,000	907,000	1,800
Required	1,400,000	2,457,000	24,800
Deficit	**700,000**	**1,550,000**	**23,000**

The proposed 830-pressure plane will consists of constructing an elevated storage tank and several pipeline upgrades. This elevated storage tank will also float with the existing Zipp Rd tank and Plant 3 tank. This elevated storage tank site will also need to contain at least 23,000 gallons per minute of additional pumping capacity in order to meet demands in the year 2034. A summary of the projects needed for this pressure plane is shown in the table below.

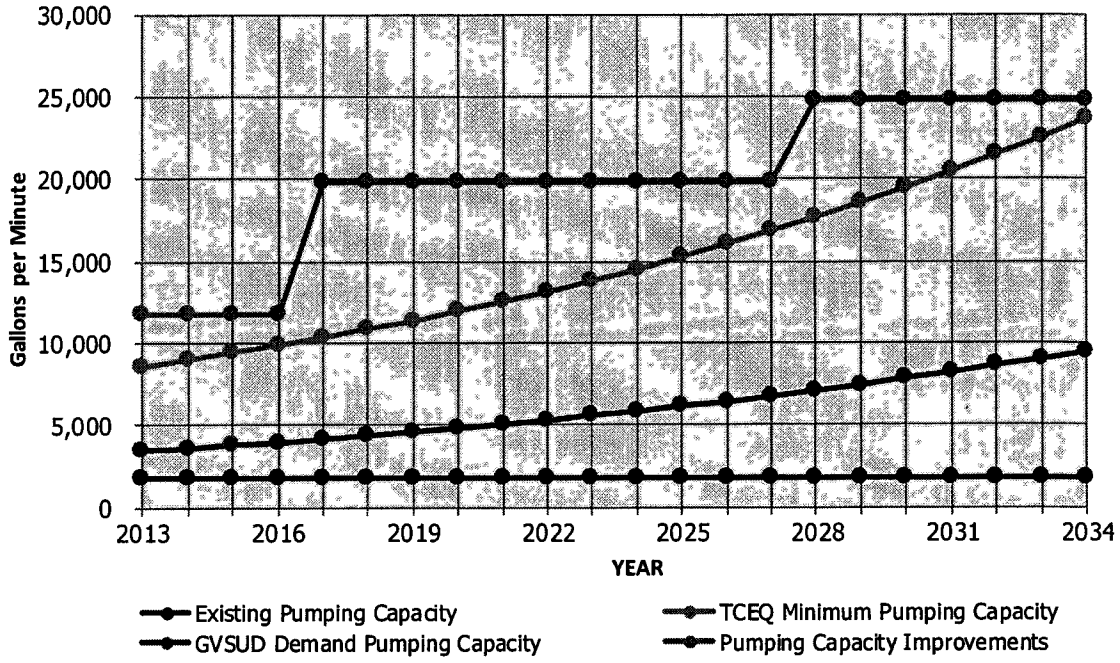
830 Pressure Plane Proposed Improvements	
Project	Year
Pipeline Along Klein Road – FM 1044 to FM 725	2016
8" Pipeline along Bolton Road (connect)	2017
GVSUD Take Point Meter Station at Santa Clara and IH 10	2018
16" Pipe Line Along Hardy Road	2019
830' EST @ Hardy Road and Union Wine	2020

830 Pressure Plane

PUMPING CAPACITY

Year	Projected Connections	Existing Pumping Capacity	TCEQ Minimum Pumping Capacity	GVSUD Demand Pumping Capacity	Pumping Capacity Improvements
2013	4,250	1,800	8,500	3,400	11,800
2014	4,463	1,800	8,925	3,570	11,800
2015	4,686	1,800	9,371	3,749	11,800
2016	4,920	1,800	9,840	3,936	11,800
2017	5,166	1,800	10,332	4,133	19,800
2018	5,424	1,800	10,848	4,339	19,800
2019	5,695	1,800	11,391	4,556	19,800
2020	5,980	1,800	11,960	4,784	19,800
2021	6,279	1,800	12,558	5,023	19,800
2022	6,593	1,800	13,186	5,275	19,800
2023	6,923	1,800	13,846	5,538	19,800
2024	7,269	1,800	14,538	5,815	19,800
2025	7,632	1,800	15,265	6,106	19,800
2026	8,014	1,800	16,028	6,411	19,800
2027	8,415	1,800	16,829	6,732	19,800
2028	8,835	1,800	17,671	7,068	24,800
2029	9,277	1,800	18,554	7,422	24,800
2030	9,741	1,800	19,482	7,793	24,800
2031	10,228	1,800	20,456	8,183	24,800
2032	10,740	1,800	21,479	8,592	24,800
2033	11,277	1,800	22,553	9,021	24,800
2034	11,840	1,800	23,681	9,472	24,800

TCEQ minimum Pumping Capacity Criteria = **2.0** gpm/Connection
GVSUD Pumping Capacity Design Criteria = **0.8** gpm/Connection

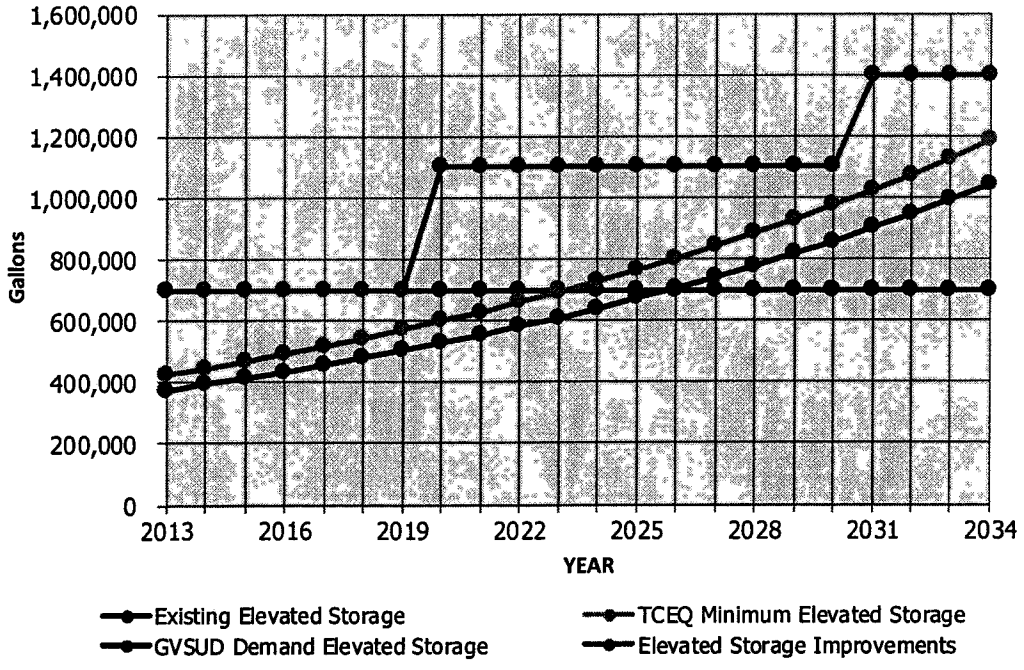


830 Pressure Plane

ELEVATED STORAGE

Year	Projected Connections	Existing Elevated Storage	TCEQ Minimum Elevated Storage	GVSUD Demand Elevated Storage	Elevated Storage Improvements
2013	4,250	700,000	425,000	374,000	
2014	4,463	700,000	446,250	392,700	700,000
2015	4,686	700,000	468,563	412,335	700,000
2016	4,920	700,000	491,991	432,952	700,000
2017	5,166	700,000	516,590	454,599	700,000
2018	5,424	700,000	542,420	477,329	700,000
2019	5,695	700,000	569,541	501,196	700,000
2020	5,980	700,000	598,018	526,256	1,100,000
2021	6,279	700,000	627,919	552,568	1,100,000
2022	6,593	700,000	659,314	580,197	1,100,000
2023	6,923	700,000	692,280	609,207	1,100,000
2024	7,269	700,000	726,894	639,667	1,100,000
2025	7,632	700,000	763,239	671,650	1,100,000
2026	8,014	700,000	801,401	705,233	1,100,000
2027	8,415	700,000	841,471	740,494	1,100,000
2028	8,835	700,000	883,544	777,519	1,100,000
2029	9,277	700,000	927,722	816,395	1,100,000
2030	9,741	700,000	974,108	857,215	1,100,000
2031	10,228	700,000	1,022,813	900,076	1,400,000
2032	10,740	700,000	1,073,954	945,079	1,400,000
2033	11,277	700,000	1,127,652	992,333	1,400,000
2034	11,840	700,000	1,184,034	1,041,950	1,400,000

TCEQ minimum Elevated Storage Criteria = **100** Gallons/Connection
GVSUD Elevated Storage Design Criteria = **88** Gallons/Connection

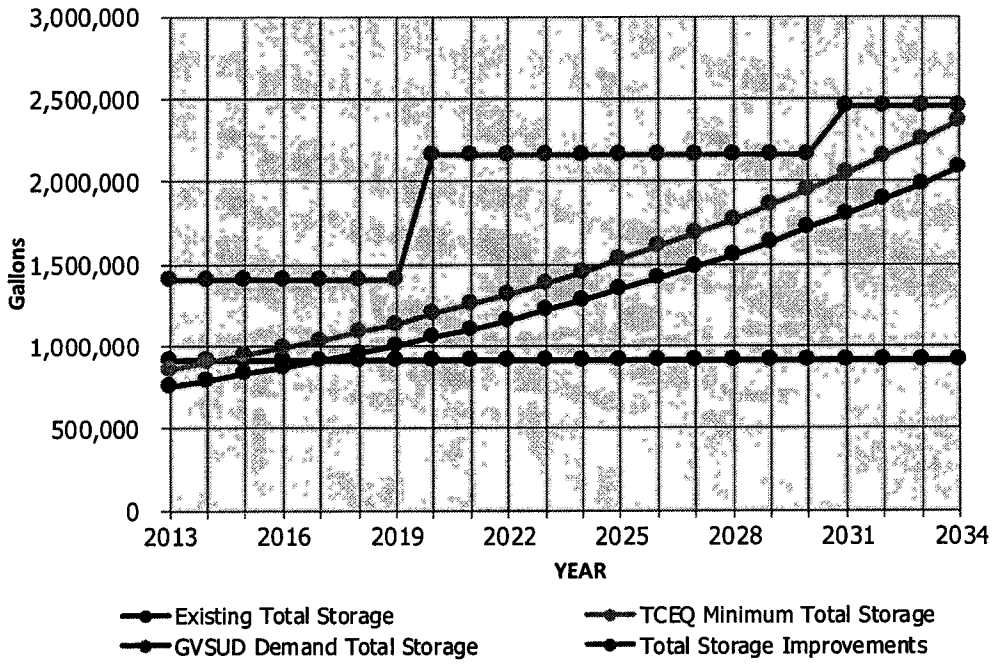


830 Pressure Plane

TOTAL STORAGE

Year	Projected Connections	Existing Total Storage	TCEQ Minimum Total Storage	GVSUD Demand Total Storage	Total Storage Improvements
2013	4,250	907,000	850,000	748,000	1,407,000
2014	4,463	907,000	892,500	785,400	1,407,000
2015	4,686	907,000	937,125	824,670	1,407,000
2016	4,920	907,000	983,981	865,904	1,407,000
2017	5,166	907,000	1,033,180	909,199	1,407,000
2018	5,424	907,000	1,084,839	954,659	1,407,000
2019	5,695	907,000	1,139,081	1,002,392	1,407,000
2020	5,980	907,000	1,196,035	1,052,511	2,157,000
2021	6,279	907,000	1,255,837	1,105,137	2,157,000
2022	6,593	907,000	1,318,629	1,160,394	2,157,000
2023	6,923	907,000	1,384,560	1,218,413	2,157,000
2024	7,269	907,000	1,453,788	1,279,334	2,157,000
2025	7,632	907,000	1,526,478	1,343,301	2,157,000
2026	8,014	907,000	1,602,802	1,410,466	2,157,000
2027	8,415	907,000	1,682,942	1,480,989	2,157,000
2028	8,835	907,000	1,767,089	1,555,038	2,157,000
2029	9,277	907,000	1,855,443	1,632,790	2,157,000
2030	9,741	907,000	1,948,216	1,714,430	2,157,000
2031	10,228	907,000	2,045,626	1,800,151	2,457,000
2032	10,740	907,000	2,147,908	1,890,159	2,457,000
2033	11,277	907,000	2,255,303	1,984,667	2,457,000
2034	11,840	907,000	2,368,068	2,083,900	2,457,000

TCEQ minimum Total Storage Criteria = **200** Gallons/Connection
GVSUD Total Storage Design Criteria = **176** Gallons/Connection



9.0 PROJECT LIST

For GVSUD to eventually operate with four (4) pressure planes the following projects are recommended. GVSUD should first focus on capital improvement projects that will improve the water system so that all water demands will be met. Attachment 'C', Proposed Capital Improvements gives an approximate location of the proposed projects as well as a proposed descriptive list of the projects. There are also several projects that GVSUD can pursue in order to make their water system work more efficiently and effectively, which will eliminate the need for constant system monitoring and hands on attention. These projects allow for a self-sustaining water system.

River City Engineering has a summary of project costs and is shown on the following page in Table 9.1. Also in Attachment 1, is a detailed cost estimate for the capital improvement projects.

TABLE 9.1

Green Valley Special Utility District
Statement of Probable Cost
Proposed Capital Improvement Projects

Project	Description	Total Cost
1	16" Pipe Line along Terminal Loop	$ 436,391
2	24" Pipe Line that Connects Plant 1 to Plant 9	$ 943,930
3	12" Pipe along Youngsford Road from Country Lane to Santa Clara	$ 681,482
4	GVSUD Take-Point Meter Station at Zuehl Road & IH10	$ 170,678
5	16" Pipe Line Along Green Valley Road, Plant 1 to Plant 2	$ 7,447,496
6	12" Pipe from Wells to Plant 1	$ 886,032
7	12" Pipe along FM 1518 from Abbott to Kusmierz	$ 416,671
8	GVSUD Take-Point Meter Station at Linne Road & IH10	$ 224,428
9	24" Pipe Line from Wells to Plant 9 Improvements	$ 4,579,792
10	12" Pipe Line Along FM 482	$ 2,573,630
11	24" Pipe Line IH-35 Crossing	$ 939,676
12	Well Side Booster Pump Station	$ 2,179,970
13	Plant 9 Improvements	$ 2,621,296
14	830' Elevated Storage Tank at Most Western FM 78	$ 2,347,485
15	12" Pipe Line along Marion Road from CRWA Pipe to GV Road	$ 1,054,146
16	12" Pipe Line along Tolle Road & Country Lane	$ 1,170,762
17	750' Elevated Water Storage Tank at McQueeney	$ 3,965,167
18	12" Pipe along Schwab & Wosnig	$ 1,490,904
19	Common Ground Storage Tank and Booster Pump Station	$ 2,524,067
20	24" Pipe Line connects Existing Wells	$ 1,576,310
21	750' Elevated Storage Tank at South of Plant 10	$ 3,960,167
22	12" Pipeline along Weil Road - BPS extension to Marion Road	$ 1,390,928
23	Pipeline along Klein Road - FM 1044 to FM 725	$ 2,589,869
24	830' EST @ Hardy Rd and Union Wine	$ 2,323,485
25	Pipeline from FM 725 to CRWA Lake Dunlap WTP	$ 568,875
26	16" Pipeline along FM 725 - Union Wine to Altwein	$ 687,853
27	16" Weil Road BPS Fill Pipeline - Youngsford to Weil Rd BPS	$ 1,666,082
28	830' EST @ Youngsford and Short Cut Rd	$ 2,365,485
29	12" Pipeline along N Santa Clara Rd - Weil Rd to Gerdes Rd	$ 2,368,355
30	16" Pipeline along Schumann Rd - Pioneer Rd to Plant 10	$ 1,948,936
31	16" Pipeline along Pioneer Rd (connect)	$ 255,999
32	8" Pipeline along Lower Valley Ln - Weir Rd to Haeckerville Rd	$ 580,557
33	8" Pipeline along Lower Seguin Rd (connect)	$ 431,657
34	8" Pipeline along Bolton Rd (connect)	$ 223,437
35	8" Pipeline along Schmoekel Rd - Stolte Rd to Santa Clara Rd	$ 922,623
36	GVSUD Take-Point Meter Station at Santa Clara Rd & IH10	$ 154,996
37	750' EST @ Gin Road	$ 2,365,485
38	8" Pipeline along FM 775 - Leissner School Rd to Beutnagel Ln	$ 1,177,803
39	12" Pipeline along Abbott Road - FM 1518 to FM 2538	$ 1,335,437
40	8" Pipeline along New Berlin Rd - Gable Ln to Miller Rd	$ 1,121,154
41	8" Pipeline along Engel Rd - Green Valley Rd to Service Boundary	$ 316,789
42	Plant 1 - 1MG Ground Storage Tank	$ 1,402,522
43	16" Pipeline along FM 1044 from Green Valley Rd to Youngsford	$ 3,524,957
44	16" Pipeline along Union Wine from FM 1044 to Sunshine Lane	$ 1,669,664
45	16" Pipeline along Youngsford from FM 1044 to FM 725	$ 3,708,914
46	16" Pipeline along FM 1044 from Youngsford to Wosnig Road	$ 2,488,966
47	830' EST @ Plant 3	$ 2,281,891
48	Trinity Well Development	$ 1,100,000
	Total	**$ 83,163,200**

10.0 CONCLUSIONS AND RECOMMENDATIONS

RCE has analyzed GVSUD's existing water conditions in preparing this report. This analysis involved using historical data and projections in order to predict future growth. Using Attachment 'A', existing pressure planes map, RCE was able to analyze the existing water system and make professional engineering decisions for the future of GVSUD. It was determined that GVSUD will experience a 5% increase in water connections each year and water use of 0.34 acre-feet/connection each year. These growth rates were projected out until the year 2034. TCEQ minimum requirements were then compared to GVSUD historical data and the more stringent requirement was used for future planning. It was determined that GVSUD will need to combine several pressure planes as shown in Attachment 'B', Proposed Pressure Planes map, in order to allow for a simpler, more efficient water system.

In order to meet future demands and move water sources around the CCN service area, GVSUD will need to build additional infrastructure and find additional water rights. The capital improvement projects are identified in Attachment 'C', Proposed Capital Improvements Map. Once infrastructure is built, GVSUD will have a stable, self-sufficient, redundant water system.

It is recommended that the district adopt the proposed pressure planes and proposed capital improvement projects as the future outlook for the GVSUD water system. GVSUD must monitor and prioritize the Capital Improvements Projects listed in this report on a routine basis. GVSUD may shuffle the priority of the proposed CIPs to meet their current needs as their priorities change and growth occurs.

The projections in this report are only intended to serve as a guide. Due to the Study Area's layout, possibility of service expansions through further annexation, and changing political and economic climates, projections beyond a five or ten year horizon involve a great deal of speculation. It is therefore essential that projected water demands and system limitations be evaluated and updated on a routine basis.

ATTACHMENT 1

DETAILED STATEMENT OF PROBABLE COST

Green Valley Special Utility District
16" Pipe Line along Terminal Loop

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare ROW	LF	2,100	$1.00	$2,100.00
2	Install 16" diameter PVC C905 pipe	LF	2,100	$100.00	$210,000.00
3	Install 16" diameter gate valves w/box	EA	2	$5,500.00	$11,000.00
4	Install 16" diameter tie-ins	EA	2	$4,000.00	$8,000.00
5	Ductile Iron Fittings	TON	2	$4,800.00	$9,600.00
6	Install Fire Hydrant Assembly	EA	3	$4,500.00	$13,500.00
7	Fencing Repair	LF	2,100	$1.00	$2,100.00
8	Final Grade & Seed	LF	2,100	$1.00	$2,100.00
9	16" PRV	EA	1	$25,000.00	$25,000.00
	TOTAL CONSTRUCTION				**$283,400.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$28,340.00
	Contingencies	10%			$28,340.00
	TOTAL				**$340,080.00**
	Easements	LF	2,100	$12.00	$25,200.00
	Easement Surveys and Acquisition Costs	LF	2,100	$5.00	$10,500.00
	Easement Acquisition Consultant	LF	2,100	$5.00	$10,500.00
	TOTAL EASEMENT COSTS				**$46,200.00**
	Basic Engineering	12%			$40,809.60
	Surveying	LF	2,100	$2.00	$4,200.00
	Construction Phase Services	1.5%			$5,101.20
	TOTAL ENGINEERING COSTS				**$50,110.80**
	TOTAL PROJECT				**$436,390.80**

Green Valley Special Utility District
24" Pipe Line that Connects Plant 1 to Plant 9

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare ROW	LF	4,100	$1.00	$4,100.00
2	Install 24" diameter Dip Water pipe	LF	4,100	$120.00	$492,000.00
3	Install 24" diameter valves w/box	EA	5	$12,500.00	$62,500.00
4	Install 24" diameter tie-ins	EA	2	$4,500.00	$9,000.00
5	Ductile Iron Fittings	TON	5	$4,500.00	$22,500.00
6	Install Fire Hydrant Assembly	EA	5	$4,500.00	$22,500.00
7	Fencing Repair	LF	4,100	$1.00	$4,100.00
8	Final Grade & Seed	LF	4,100	$1.00	$4,100.00
	TOTAL CONSTRUCTION				**$620,800.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$62,080.00
	Contingencies	10%			$62,080.00
	TOTAL				**$744,960.00**
	Easements	LF	4,100	$12.00	$49,200.00
	Easement Surveys and Acquisition Costs	LF	4,100	$5.00	$20,500.00
	Easement Acquisition Consultant	LF	4,100	$5.00	$20,500.00
	TOTAL EASEMENT COSTS				**$90,200.00**
	Basic Engineering	12%			$89,395.20
	Surveying	LF	4,100	$2.00	$8,200.00
	Construction Phase Services	1.5%			$11,174.40
	TOTAL ENGINEERING COSTS				**$108,769.60**
	TOTAL PROJECT				**$943,929.60**

Green Valley Special Utility District 3
12" Pipe along Youngsford Road from Country Lane to Santa Clara

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare ROW	LF	5,400	$1.00	$5,400.00
2	Install 12" diameter PVC C909 pipe	LF	5,400	$65.00	$351,000.00
3	Install 12" diameter gate valves w/box	EA	2	$2,500.00	$5,000.00
4	Install 12" diameter tie-ins	EA	2	$3,000.00	$6,000.00
5	Ductile Iron Fittings	TON	2	$4,500.00	$9,000.00
6	Install Fire Hydrant Assembly	EA	4	$4,500.00	$18,000.00
7	Fencing Repair	LF	5,400	$1.00	$5,400.00
8	Final Grade & Seed	LF	5,400	$1.00	$5,400.00
	TOTAL CONSTRUCTION				**$405,200.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$40,520.00
	Contingencies	10%			$40,520.00
	TOTAL				**$486,240.00**
	Easements	LF	5,400	$12.00	$64,800.00
	Easement Surveys and Acquisition Costs	LF	5,400	$5.00	$27,000.00
	Easement Acquisition Consultant	LF	5,400	$5.00	$27,000.00
	TOTAL EASEMENT COSTS				**$118,800.00**
	Basic Engineering	12%			$58,348.80
	Surveying	LF	5,400	$2.00	$10,800.00
	Construction Phase Services	1.5%			$7,293.60
	TOTAL ENGINEERING COSTS				**$76,442.40**
	TOTAL PROJECT				**$681,482.40**

Green Valley Special Utility District
GVSUD Take-Point Meter Station at Zuehl Road & IH10

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare Site	AC	0.25	$2,500.00	$625.00
2	8" Cla Val	EA	1	$25,000.00	$25,000.00
3	Install 16" diameter DIP Class 350 pipe	LF	100	$100.00	$10,000.00
4	Install 8" diameter DIP Class 350 pipe	LF	25	$60.00	$1,500.00
5	Install 16" diameter valves w/box	EA	1	$5,500.00	$5,500.00
6	Install 16" diameter tie-ins	EA	1	$4,000.00	$4,000.00
7	Ductile Iron Fittings	TON	1	$4,500.00	$2,250.00
8	Install Fire Hydrant Assembly	EA	0	$4,500.00	$0.00
9	Metering Station Concrete & Buidling	SF	288	$35.00	$10,080.00
10	Site Power	LS	1	$2,500.00	$2,500.00
11	Site Electrical	LS	1	$12,000.00	$12,000.00
12	Chemical Building and Chemical Yard Pipe	LS	1	$15,000.00	$15,000.00
13	Site Controls and Communication	LS	1	$15,000.00	$15,000.00
14	Driveway	SY	200	$45.00	$9,000.00
15	Fencing	LF	120	$12.00	$1,440.00
16	Landscaping	LS	1	$500.00	$500.00
	TOTAL CONSTRUCTION				**$114,395.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$11,439.50
	Contingencies	10%			$12,583.45
	TOTAL				**$138,417.95**
	Property	AC	0.25	$5,000.00	$1,250.00
	Easement Surveys and Acquisition Costs	LS	1.00	$5,000.00	$5,000.00
	Attorney	LS	1.00	$5,000.00	$5,000.00
	TOTAL EASEMENT COSTS				**$11,250.00**
	Basic Engineering	12%			$16,610.15
	Surveying	LS	1	$2,000.00	$2,000.00
	Geotechnical	LS	2	$1,200.00	$2,400.00
	TOTAL ENGINEERING COSTS				**$21,010.15**
	TOTAL PROJECT				**$170,678.10**

Green Valley Special Utility District
16" Pipe Line Along Green Valley Road, Plant 1 to Plant 2

Engineers Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare Site	LF	43,600	$1.00	$43,600.00
2	Install 16" diameter PVC C905 Pipe	LF	43,600	$100.00	$4,360,000.00
3	Install 16" diameter gate valves w/box	EA	22	$5,500.00	$121,000.00
4	Install 16" diameter tie-ins	EA	2	$4,000.00	$8,000.00
5	Ductile Iron Fittings	TON	10	$4,500.00	$45,000.00
6	Install Fire Hydrant Assembly	EA	22	$4,500.00	$99,000.00
7	Fencing Repair	LF	43,600	$1.00	$43,600.00
8	Final Grade & Seed	LF	43,600	$1.00	$43,600.00
	SUBTOTAL				**$4,763,800.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$476,380.00
	Contingencies	10%			$476,380.00
	TOTAL				**$5,716,560.00**
	Easements	LF	43,600	$12.00	$523,200.00
	Easement Surveys and Acquisition Costs	LF	43,600	$3.00	$130,800.00
	Easement Acquisition Consultant	LF	43,600	$5.00	$218,000.00
	TOTAL EASEMENT COSTS				**$872,000.00**
	Basic Engineering	12%			$685,987.20
	Surveying	LF	43,600	$2.00	$87,200.00
	Construction Phase Services	1.5%			$85,748.40
	TOTAL ENGINEERING COSTS				**$858,935.60**
	TOTAL PROJECT				**$7,447,495.60**

Green Valley Special Utility District
12" Pipe from Wells to Plant 1

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare ROW	LF	6,500	$1.00	$6,500.00
2	Install 12" diameter PVC C909 Pipe	LF	6,500	$65.00	$422,500.00
3	Install 12" diameter valves w/box	EA	10	$2,500.00	$25,000.00
4	Install 12" diameter tie-ins	EA	2	$3,000.00	$6,000.00
5	Ductile Iron Fittings	TON	4	$4,500.00	$18,000.00
6	Install Fire Hydrant Assembly	EA	10	$4,500.00	$45,000.00
7	Fencing Repair	LF	6,500	$1.00	$6,500.00
8	Final Grade & Seed	LF	6,500	$1.00	$6,500.00
	TOTAL CONSTRUCTION				**$536,000.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$53,600.00
	Contingencies	10%			$53,600.00
	TOTAL				**$643,200.00**
	Easements	LF	6,500	$12.00	$78,000.00
	Easement Surveys and Acquisition Costs	LF	6,500	$5.00	$32,500.00
	Easement Acquisition Consultant	LF	6,500	$5.00	$32,500.00
	TOTAL EASEMENT COSTS				**$143,000.00**
	Basic Engineering	12%			$77,184.00
	Surveying	LF	6,500	$2.00	$13,000.00
	Construction Phase Services	1.5%			$9,648.00
	TOTAL ENGINEERING COSTS				**$99,832.00**
	TOTAL PROJECT				**$886,032.00**

Green Valley Special Utility District
12" Pipe along FM 1518 from Abbott to Kusmierz

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare ROW	LF	3,100	$1.00	$3,100.00
2	Install 12" diameter PVC C909 pipe	LF	3,100	$65.00	$201,500.00
3	Install 12" diameter gate valves w/box	EA	3	$2,500.00	$7,500.00
4	Install 12" diameter tie-ins	EA	2	$3,000.00	$6,000.00
5	Ductile Iron Fittings	TON	2	$4,500.00	$9,000.00
6	Install Fire Hydrant Assembly	EA	4	$4,500.00	$18,000.00
7	Fencing Repair	LF	3,100	$1.00	$3,100.00
8	Final Grade & Seed	LF	3,100	$1.00	$3,100.00
	TOTAL CONSTRUCTION				**$251,300.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$25,130.00
	Contingencies	10%			$25,130.00
	TOTAL				**$301,560.00**
	Easements	LF	3,100	$12.00	$37,200.00
	Easement Surveys and Acquisition Costs	LF	3,100	$5.00	$15,500.00
	Easement Acquisition Consultant	LF	3,100	$5.00	$15,500.00
	TOTAL EASEMENT COSTS				**$68,200.00**
	Basic Engineering	12%			$36,187.20
	Surveying	LF	3,100	$2.00	$6,200.00
	Construction Phase Services	1.5%			$4,523.40
	TOTAL ENGINEERING COSTS				**$46,910.60**
	TOTAL PROJECT				**$416,670.60**

Green Valley Special Utility District
GVSUD Take-Point Meter Station at Linne Road & IH10

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare Site	AC	0.25	$2,500.00	$625.00
2	8" Cla Val	EA	1	$25,000.00	$25,000.00
3	Install 16" diameter DIP Class 350 pipe	LF	100	$100.00	$10,000.00
4	Install 8" diameter DIP Class 350 pipe	LF	25	$60.00	$1,500.00
5	Install 16" diameter valves w/box	EA	1	$5,500.00	$5,500.00
6	Install 16" diameter tie-ins	EA	1	$4,000.00	$4,000.00
7	Ductile Iron Fittings	TON	1	$4,500.00	$2,250.00
8	Install Fire Hydrant Assembly	EA	0	$4,500.00	$0.00
9	Metering Station Concrete & Buidling	SF	288	$35.00	$10,080.00
10	Site Power	LS	1	$2,500.00	$2,500.00
11	Site Electrical	LS	1	$12,000.00	$12,000.00
12	Chemical Building and Chemical Yard Pipe	LS	1	$15,000.00	$15,000.00
13	Site Controls and Communication	LS	1	$15,000.00	$15,000.00
14	Driveway	SY	200	$45.00	$9,000.00
15	Fencing	LF	120	$12.00	$1,440.00
16	Landscaping	LS	1	$500.00	$500.00
	TOTAL CONSTRUCTION				**$114,395.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$11,439.50
	Contingencies	10%			$12,583.45
	TOTAL				**$138,417.95**
	Property	LS	1.00	$40,000.00	$40,000.00
	Easement Surveys and Acquisition Costs	LS	1.00	$20,000.00	$20,000.00
	Attorney	LS	1.00	$5,000.00	$5,000.00
	TOTAL EASEMENT COSTS				**$65,000.00**
	Basic Engineering	12%			$16,610.15
	Surveying	LS	1	$2,000.00	$2,000.00
	Geotechnical	LS	2	$1,200.00	$2,400.00
	TOTAL ENGINEERING COSTS				**$21,010.15**
	TOTAL PROJECT				**$224,428.10**

Green Valley Special Utility District
24" Pipe Line from Wells to Plant 9 Improvements

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare Site	LF	16,500	$1.00	$16,500.00
2	Install 24" diameter DIP	LF	16,500	$175.00	$2,887,500.00
3	Install 24" diameter valves w/box	EA	8	$7,750.00	$62,000.00
4	Install 24" diameter tie-ins	EA	4	$4,700.00	$18,800.00
5	Ductile Iron Fittings	TON	4	$4,500.00	$18,000.00
6	Install Fire Hydrant Assembly	EA	8	$4,500.00	$36,000.00
7	Fencing Repair	LF	16,500	$1.00	$16,500.00
8	Final Grade & Seed	LF	16,500	$1.00	$16,500.00
	TOTAL CONSTRUCTION				**$3,071,800.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$307,180.00
	Contingencies	10%			$307,180.00
	TOTAL				**$3,686,160.00**
	Easements	LF	16,500	$12.00	$198,000.00
	Easement Surveys and Acquisition Costs	LF	16,500	$5.00	$82,500.00
	Easement Acquisition Consultant	LF	16,500	$5.00	$82,500.00
	TOTAL EASEMENT COSTS				**$363,000.00**
	Basic Engineering	12%			$442,339.20
	Surveying	LF	16,500	$2.00	$33,000.00
	Construction Phase Services	1.5%			$55,292.40
	TOTAL ENGINEERING COSTS				**$530,631.60**
	TOTAL PROJECT				**$4,579,791.60**

Green Valley Special Utility District
12" Pipe Line Along FM 482

Engineering Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL COST
1	Prepare Site	LF	22,000	$1.00	$22,000.00
2	Install 12" diameter PVC C900 Pipe	LF	22,000	$65.00	$1,430,000.00
3	Install 12" diameter gate valves w/box	EA	11	$2,500.00	$27,500.00
4	Install 12" diameter tie-ins	EA	2	$3,000.00	$6,000.00
5	Ductile Iron Fittings	TON	8	$4,500.00	$36,000.00
6	Install Fire Hydrant Assembly	EA	11	$4,500.00	$49,500.00
7	Fencing Repair	LF	22,000	$1.00	$22,000.00
8	Final Grade & Seed	LF	22,000	$1.00	$22,000.00
	TOTAL CONSTRUCTION				**$1,615,000.00**
	Bonds, Mobilization, Prep ROW & Insurance	10%			$161,500.00
	Contingencies	10%			$161,500.00
	TOTAL				**$1,938,000.00**
	Easements	LF	22,000	$12.00	$264,000.00
	Easement Surveys and Acquisition Costs	LF	22,000	$2.00	$44,000.00
	Easement Acquisition Consultant	LF	22,000	$1.00	$22,000.00
	TOTAL EASEMENT COSTS				**$330,000.00**
	Basic Engineering	12%			$232,560.00
	Surveying	LF	22,000	$2.00	$44,000.00
	Construction Phase Services	1.5%			$29,070.00
	TOTAL ENGINEERING COSTS				**$305,630.00**
	TOTAL PROJECT				**$2,573,630.00**