

**Bastrop County**

**WCID #2**

**Board Packet**

**for**

**May 15, 2025**

**BASTROP COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT NO. 2  
MEETING AGENDA**

TO: THE BOARD OF DIRECTORS OF BASTROP COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT NO. 2, BASTROP COUNTY, TEXAS AND TO ALL INTERESTED PARTIES:

**NOTICE IS HEREBY GIVEN THAT A MEETING OF THE GOVERNING BODY OF THE ABOVE-NAMED POLITICAL SUBDIVISION WILL BE HELD ON THURSDAY MAY 15, 2025 AT 6:30 P.M IN THE BOARD ROOM LOCATED AT 112 CORPORATE DRIVE, BASTROP, TX 78602.**

**MEETING DISCUSSION TOPICS**



- 1.) Call to Order and Establish a Quorum – O’Hanlon
- 2.) Salute to Flags – O’Hanlon
- 3.) Public Comments/Announcements: (The Board respectfully requests that people limit comments to three (3) minutes. Under the Open Meeting Act, the Board may not deliberate or take action in response to any matter raised during public comment that is not a separate agenda item.)
- 4.) Discussion and possible action regarding schedule of future meeting dates:
  - a. Regular (Special Date) Board of Director’s Meeting scheduled for Thursday, June 26, 2025 at 6:30 p.m.
  - b. Regular (Special Date) Board of Director’s Meeting scheduled for Thursday, July 24, 2025 at 6:30 p.m.
- 5.) CONSENT AGENDA: (*Consent Agenda items are generally routine. Unless removed by a member of the Board or General Manager, items listed on the consent agenda may be acted on together and without prior discussion.*)
  - a. Approval of minutes from the April 17, 2025 Meeting of the Board of Directors; and
  - b. Approval of minutes from the March 29, 2025 Annual Road Meeting ; and
  - c. Approval of monthly financial reports for April 2025; and
  - d. Approval of Release of Liens held by District on Real Property.
- 6.) Discussion regarding the following items to be presented in the General Manager’s report:
  - a.) Update on District facilities, water plants and lift stations
  - b.) Update on Water/Wastewater Maintenance & Improvement projects
  - c.) Update on Roads maintenance & improvement projects
  - d.) Employee & Administrative Update
- 7.) Discussion and review of capital improvement projects to be funded with bond proceeds–Hightower
- 8.) Discussion and possible action related to Fiscal Year 2023 Financial Audit Report – Hightower
- 9.) Discussion and possible action regarding Bid Openings and possible award of contract for Test Well- Hightower

- 10.) Discussion and possible action regarding sale of District property (Bastrop County Parcel R# 62318) to Texas Rural Water Association – Hightower
  - a.) Adopt Order Approving Property to be Surplus Property and Not Needed
  - b.) Approve contract for sale and conveyance of the Property
- 11.) Discussion and possible action relating to statements made by plumbing contractor(s) regarding the District’s public water system – O’Hanlon / Hightower
- 12.) Discussion regarding Aquifer Storage and Recovery Meetings with Austin Water and Bastrop County - Hightower
- 13.) Board suggestions on future agenda items
- 14.) Adjourn

*Paul Hightower*

Digitally Signed & Certified  
May 8, 2025 @ 0822 hours  
Kofax Power PDF Solutions

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Authorized Signature

The Board of Directors may go into Executive Session at any time during the meeting pursuant to the applicable section of Subchapter D, Chapter 551, Texas Government Code, of the Texas Open Meetings Act, on any of the matters set forth on this agenda regardless of whether Executive Session is specifically referenced. No final action, decision or vote will be taken on any subject or matter in Executive Session. The District is committed to compliance with the Americans with Disabilities Act. Reasonable modifications and equal access to communications will be provided upon request. Please call 512-321-1688 for further information.

# Agenda

## Item #5

Consent

Agenda

**5a. April 17<sup>th</sup>**

# **Board Meeting Minutes**

Minutes of the Regular Board Meeting for  
BASTROP COUNTY WATER CONTROL  
AND IMPROVEMENT DISTRICT #2

A regular meeting of the Board of Directors of Bastrop County Water Control and Improvement District #2 was held on Thursday, April 17, 2025, beginning at 6:30 p.m. The meeting was held at the District office, located at 112 Corporate Drive.

**Present BCWCID #2 Board Members:**

Mary Beth O'Hanlon, President  
Scott Ferguson, VP  
Michele Plummer, Secretary  
Ron Whipple, Director  
Ruth Bullock, Treasurer

**BCWCID #2 Staff:**

Paul Hightower, General Manager  
Patricia Lujan, District Administrator  
Darrel Culberson, District Comptroller  
Tyler Walsh, Senior Operations  
Adam Brown, Operations Manager

**Remote Participation**

Tony Corbett, Attorney

- 1.) Call to Order and Establish a Quorum – O'Hanlon

**By: MaryBeth O'Hanlon                      Time: 6:30PM**

- 2.) Salute to Flags – O'Hanlon

- 3.) Public Comments/Announcements (The Board respectfully requests that persons limit comments to three (3) minutes. Under the Open Meeting Act, the Board may not deliberate or take action in response to any matter raised during public comment that is not a separate agenda item.)

Commissioner Carmack addressed the Board regarding the ASR project that Austin Water has kicked off here in Bastrop County. He explained the process, that Austin Water is wanting to inject their treated water, into the aquifers within Bastrop County. There have been several meetings around the County and Commissioners Court. Butch wants the District to be a part of the meetings and process. He will send an invite for us to be accepted into the group.

Charles Brading asked if the Road District was on track and staff explained that it was still moving forward. Construction and paving is still slated with the County at this time.

**No further comments or discussion.**

- 4.) Discussion and possible action regarding scheduling of future meeting dates:
  - a. Regular Board of Director's Meeting scheduled for Thursday, May 15, 2025 at 6:30 p.m.
  - b. Regular (Special Date) Board of Director's Meeting scheduled for Thursday, June 26, 2025 at 6:30 p.m.

**Mrs. O'Hanlon stated that the District's June Board meeting was moved 1-week later, to June 26<sup>th</sup> due to the Holiday and the July Board meeting is moved to July 24<sup>th</sup> due to Staff training. All Board Members stated they should be available.**

**No further comments or suggestions.**

- 5.) **CONSENT AGENDA:** (*Consent Agenda items are generally routine. Unless removed by a member of the Board or General Manager, items listed on the consent agenda may be acted on together and without prior discussion.*)
- a. Approval of minutes from the March 20, 2025 Meeting of the Board of Directors; and
  - b. Approval of monthly financial reports for March 2025;; and
  - c. Approval of Release of Liens held by District on Real Property.

**No comments regarding the Board Meeting minutes.**

**Mr. Culberson presented the District's financial & cash statements. Board expressed no issues or concerns.**

**Paul Hightower read the Release of Liens as noted in the report.**

**No further questions or comments.**

**Mrs. O'Hanlon called the question.**

**Motion: Scott Ferguson moved to approve the Consent Agenda.**

**Seconded: Michele Plummer**

**Vote: Five (5) in favor, motion carries.**

- 6.) Discussion regarding the following items to be presented in the General Manager's report:
- a. Update on District facilities, water plants and lift stations
  - b. Update on Water/Wastewater Maintenance & Improvement projects
  - c. Update on Roads maintenance & improvement projects
  - d. Employee & Administrative Update

**Mr. Hightower read the GM report as posted in the Board packet.**

**No further comments or discussion.**

- 7.) Discussion and review of 2023 capital improvement projects to be funded with bond proceeds– Hightower

**Mr. Hightower stated that SPI Engineers asked for this to be tabled until next month. They are compiling some new information regarding the test well and new meter counts. They planned on bringing back some suggestions in May.**

**No comments or discussion.**

- 8.) Discussion and possible action related to approval of Fiscal Year 2023 Financial Audit Report – Hightower

**Cherry Bekaert presented a report to the Board via a Teams meeting, to discuss the 2023 audit. They stated some recommendations on amounts and accounts, that will go in as general entries, so that the auditors can correct the books & errors moving forward. They stated that we would be engaging an auditor in the near future and get the accounts completed.**

**No further comments or discussion.**

- 9.) Discussion and possible action regarding engagement of auditor for the District's 2024 Fiscal Year Audit Report– Hightower

**Staff stated that we had selected Patillo, Hill & Brown (PBH) as the auditing firm. The decision was made after Cherry Bekaert had given staff 3 recommendations, with PBH having the stronger background with GASB entities, which is what we needed. They were engaged with a cost of \$33,600 for the 2023 audit. Board expressed agreement with the choice and moving forward with getting it all completed.**

**No comments or discussion.**

- 10.) Discussion regarding sale of BCWCID2 property R# 62318 to TRWA – Hightower

**Staff has met with TRWA and they have expressed interest in purchasing the piece of property behind our McAllister station, to use for their storage and training facility. The Board has agreed to move ahead. Staff expressed that the next steps would be to surplus out the property and obtain real estate comps in the area, so that the appropriate price could be obtained. Staff stated that we will keep this on the agenda as we move forward through the next steps. Board agreed.**

**No further comments or discussion.**

- 11.) Discussion and possible action regarding Bid Openings and possible award of contract for Test Well.– Hightower

**Staff presented the bid opening documents as shown in the packet. Staff explained that the bids came in much higher than expected and that only 1 was received. SPI has asked the Board to table this, so that they could bring some recommendations back to the next meeting. Board agreed.**

**No further comments or discussion.**

- 12.) Discussion and possible action relating to statements made by plumbing contractor(s) regarding the District's public water system – O'Hanlon / Hightower

**President O'Hanlon & staff presented a communications issue, to the rest of the Board. The District is needing to communicate information to the customers, regarding water pressure and water quality. Recommendations were made about an email blast, flyers at the front desk and possibly an insert in the monthly bill. Board tabled this for next month.**

**No further comments or discussion.**

- 13.) Board suggestions on future agenda items

**Staff expressed concerns to the Board about a serious drought we are in and the possibility of more coming. Staff expressed adding a discussion item in the future.**

- 14.) Adjourn 8:05 pm

**Mrs. O'Hanlon called the question.**

**Motion: Scott Ferguson moved to adjourn.**

**Seconded: Ron Whipple**

**Vote: Five (5) in favor, motion carries.**

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Authorized Signature

**5b. March 29<sup>th</sup>**

**Annual Road  
Meeting Minutes**

Minutes of the Annual Road Meeting of the  
**BASTROP COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #2**

**An annual road meeting of the Board of Directors of Bastrop County Water Control and Improvement District #2 was held on Saturday, March 29, 2025, beginning at 9:00 a.m. The meeting was held at the District office, located at 112 Corporate Drive.**

**Present BCWCID #2 Board Members:**

Mary Beth O'Hanlon, President  
Scott Ferguson, Vice President  
Ron Whipple, Director  
Michele Plummer, Director

**BCWCID #2 Staff:**

Paul Hightower, General Manager  
Patricia Lujan, Office Supervisor  
Tyler Walsh, Senior Operations  
Nicki McPherson

**Absent:**

Ruth Bullock, Treasurer

**MEETING DISCUSSION TOPICS**

- 1.) Call meeting to Order – O'Hanlon
- 2.) Salute to Flags – O'Hanlon
- 3.) Introduction of the Board and Special Guests –O'Hanlon

**Mrs. O'Hanlon introduced Precinct 1 Commissioner Butch Carmack and Retired Commissioner Mel Hamner.**

- 4.) Update from Bastrop County Precinct 1 Commissioner regarding road projects-  
Commissioner Hamner

**Commissioner Carmack gave an update regarding several items within the Tahitian Village subdivision. He stated that with the County accepting all the Tahitian roads into the County system, they were working on several this year and that their GIS only shows approximately 6 miles left. Commissioner Carmack stated that his plan was to keep on schedule and planned on getting the all the roads completed within 2 to 3 years.**

**No further comments or questions**

- 5.) Presentation of proposed updates to District's Master Road Plan for District Road Projects– Hightower

**Mr. Hightower presented the Road plan, as shown in the packet.**

**No further comments or questions.**

- 6.) Public Hearing and Comment regarding proposed revisions to the District's Master Road Plan (the Board respectfully requests you limit your comments and/or questions to three (3) minutes)

**Customer inquired about ravine lots in Tahitian since the County is putting up end of maintenance signs. Staff explained that most are being marked as drainage or greenscape for future drainage purposes.**

**Customer inquired as to what happens with the current WCID road crew since County was taking over the roads. Staff explained that everyone will transfer over to the Utility side and remain employees, should they want to stay on.**

**Customer inquired about 2026 road & property fees. Staff explained that the road fees will be going away after 2025 but that property taxes were still the responsibility of the County and that they would continue on.**

**2 Customers inquired about the Diamond Head area for road paving and expressed concerns of the paving taking so long. Staff explained that it had been a slow growth area and that WCID had used it for a training area mostly but it was being slated for paving in 2026. They were concerned about the pot holes that keep showing up due to the growth and large trucks in the area. Staff stated that they would grade the area and try to get some base down to help prolong the issue. The customer also inquired about the road fees and what happens to the leftover funds. Staff explained that funds collected from the 2025 calendar year, would be transferred to the County after the District closes the Road side in January 2026. Any funds not used for road construction will go directly to Bastrop County.**

**Customer inquired about what happens to delinquent road fee accounts. Staff explained that we continue to collect on those and we will continue to file liens on properties, for past due fees. Staff explained the process, that each year the Board votes to apply liens to delinquent accounts and that we had the authority to do so, from the Texas Water Code. As the District enters a new year, the past due monies become due to the Water District, instead of the Road District and that we would continue to collect them as long as needed.**

**No further comments or questions**

- 7.) Review and possible action regarding approval of updates to the District's Master Road Plan – BCWCID2 Board of Directors

**Mrs. O'Hanlon called the question.**

**Motion: Scott Ferguson moved to approve the plan as presented, with correction to date & times shown for the road meeting.**

**Seconded: Ron Whipple.**

**Vote: Four (4) in favor, One (1) absentee, motion carries.**

8.) Adjournment

**Mrs. O'Hanlon called the question.**

**Motion: Scott Ferguson moved to adjourn.**

**Seconded: Ron Whipple.**

**Vote Four (4) in favor, One (1) absentee, motion carries..**

**Meeting ended at 10:02 a.m.**

# **5b. Financials**

**Bastrop County Water Control and Improvement District #2**  
**Cash & Investment Report**  
**As of April 30, 2025**

<b>Fund</b>	<b>Account Name</b>	<b>Account Number</b>	<b>Bank Name</b>	<b>Yield</b>	<b>Prior Month Balance</b>	<b>Current Balance</b>
<b>Standby Fund</b>						
	Standby Operating Account	2687	Roscoe State Bank	0.00%	\$ 103,194	\$ 103,194
<b>Standby Fund Total</b>					<b>\$ 103,194</b>	<b>\$ 103,194</b>
<b>Roads Fund</b>						
	Roads Construction Account	9330	Roscoe State Bank	0.00%	\$ 338,309	\$ 418,049
	Roads Construction MMA	3131	Roscoe State Bank	1.75%	2,660	2,661
<b>Roads Fund Total</b>					<b>\$ 340,969</b>	<b>\$ 420,710</b>
<b>Debt Service Fund</b>						
	TWDB Reserve Fund - DS	0001	Texpool	3.98%	\$ 455,385	\$ 456,981
	Annual TWDB MMA - DS	4385	First National Banl	0.50%	77,674	115,414
	Wastewater Escrow TWDB Loan -	1041	Amegy Bank		93,520	93,834
	Debt Service Fund - DS	0004	Texpool	3.98%	556,515	558,499
<b>Debt Service Fund Total</b>					<b>\$ 1,183,095</b>	<b>\$ 1,224,727</b>
<b>Capital Fund</b>						
	Water Capital Projects Fund	7780	First National Banl	0.50%	\$ 17,908	\$ 16,648
	Capital Project - Bond Series 2021	0005	Texpool	3.98%	4,786,880	4,803,937
	Water Capital Projects Fund	3653	First National Banl	0.50%	16,441	16,441
	Capital Project - Bond Series 2023	0006	Texpool	3.98%	2,560,328	2,569,451
<b>Capital Fund Total</b>					<b>\$ 7,381,556</b>	<b>\$ 7,406,477</b>
<b>Water Fund</b>						
	Water Operating Account	1469	First National Banl	0.50%	\$ 285,425	\$ 212,933
	Wastewater TWDB Checking	3289	First National Banl	0.00%	572	572
<b>Operating Total:</b>					<b>\$ 285,997</b>	<b>\$ 213,505</b>
	Wastewater /Water MMA	0002	Texpool	3.98%	\$ 445,661	\$ 447,249
	Wastewater /Water Capital	3543	First National Banl	0.50%	104,440	104,449
	Wastewater MMA ( Water)	5076	First National Banl	0.50%	92,544	138,077
<b>Water Fund Total</b>					<b>\$ 928,641</b>	<b>\$ 903,280</b>
<b>Total Cash &amp; Investments</b>					<b>\$ 9,937,456</b>	<b>\$ 10,058,389</b>

# **5c. Liens Release**

## Lien List Recap for:

APRIL 2025

Total Amount of Liens Released	\$20,060.75
Road Assessments Paid	\$43,911.26
Standby Assessments Paid	\$0.00
Attorney Fees	\$3,013.22
Total actually collected	\$46,924.48
Total Write-Offs	\$280.00

\*\*\*Note: The reason the amount collected **could** be lower than the amount released is because the report must show a release amount for each lien filed. The accounts were all paid in full.\*\*\*

# Agenda

## Item #6

### General Manager's Report

# **BASTROP COUNTY WCID NO. 2**

## **General Manager's Update**

**May 15, 2025**

### **6a. Update on District water plants and lift stations:**

All plants and stations are currently running at 100%. No major issues at the moment.

### **6b. W/WW Maintenance & Capital Improvements / Engineering update:**

There is quite a bit under this discussion topic that is being covered under current agenda items this month.

No GM comments at this time.

### **6c. Roads maintenance & improvement projects update:**

Our crews are prepping this years roads for the County. County is currently working in Tahitian.

### **6d. Employee & Administrative update:**

No current updates.

# Agenda

## Item #7

Discussion and review of  
Capital Improvement Plans  
to be funded with bond  
proceeds

# **Bastrop County Water Control Improvement District No. 2**

**New Water Well, Storage, and Treatment  
Facilities**

**Preliminary Engineering Report**

**5/9/25  
DRAFT 90%**

May 2025

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## EXECUTIVE SUMMARY

### Existing and Ultimate Buildout

Bastrop County Water Control and Improvement District No. 2 (“District”) currently provides water to approximately 8,300 people with 2,376± service connections in two (2) separate pressure planes (see **Table 2**). Based on the projected future land use within the District’s CCN, the system is expected to grow to serve 21,300 people with 6,097± service connections at ultimate buildout (see **Table 23**). Connections are projected to be added at about 3% per year based on the Texas Water Development Board 2021 Region K Water Plan (See **Table 37**).

### TCEQ Minimum Capacity Requirements for Current System and Connections

As a regulated entity under the Texas Commission on Environmental Quality (TCEQ), the District is required to comply with the minimum capacity standards specified in §290.45 of Title 30, Texas Administrative Code, Chapter 290 – Public Drinking Water. SPI conducted a comprehensive assessment of the existing infrastructure throughout the system, evaluating each pressure plane individually against these standards. The findings of these assessments are detailed in this report. Based on the results, the following upgrades are necessary to achieve immediate compliance - excluding any enhancements required for future capacity needs:

1. **Distribution:** Replace approximately 0.737 miles of existing water lines with larger diameter pipes.
2. **Source:** Add a minimum of 163 gallons per minute (gpm) of well capacity usage below 85% of total capacity.
3. **Treatment:** Expand current treatment facilities or install new ones to accommodate the increased well output.
4. **High Service Pumps:** Increase pumping capacity in Pressure Plane 2 by at least 249 gpm.
5. **Pressure Tanks:** No immediate upgrades are required.
6. **Storage\*:** Add a minimum of 50,824 gallons of ground storage capacity to Pressure Plane 1 and 83,235 gallons to Pressure Plane 2.

\*Elevated storage may be used in lieu of ground storage.

### Potential Alternative Capacity Requirement (“ACR”) for Current System and Connections

The Texas Commission on Environmental Quality (TCEQ) offers a process through which Public Water System (PWS) owners can apply for an Alternative Capacity Requirement (ACR). This allows for customized capacity standards based on historical pumping data and connection trends, rather than relying solely on TCEQ’s default assumptions. Typically, TCEQ evaluates the highest daily pumping volumes from the past three years, calculates an average flow per connection, and then applies a 15% safety margin to determine the ACR. Standard TCEQ guidelines assume a flow rate of 0.6 gallons per minute (gpm) per connection.

Based on SPI’s analysis of the District’s historical pumping and estimated connection data, it appears the District may qualify for an ACR that reduces the flow per connection to approximately 0.39 gpm. SPI recommends the District pursue an ACR application. If approved, the ACR could significantly reduce the number of immediate upgrades needed for compliance, allowing the District to implement infrastructure improvements more gradually and strategically.

It is important to note that ACRs are considered temporary and may be revoked at any time. Factors such as customer complaints, shifting usage patterns, population growth, new developments, or changes in commercial or industrial demand can prompt TCEQ to rescind an ACR.

Assuming the estimated ACR is approved, the following upgrades would likely be required for immediate compliance, excluding those needed to meet future demands:

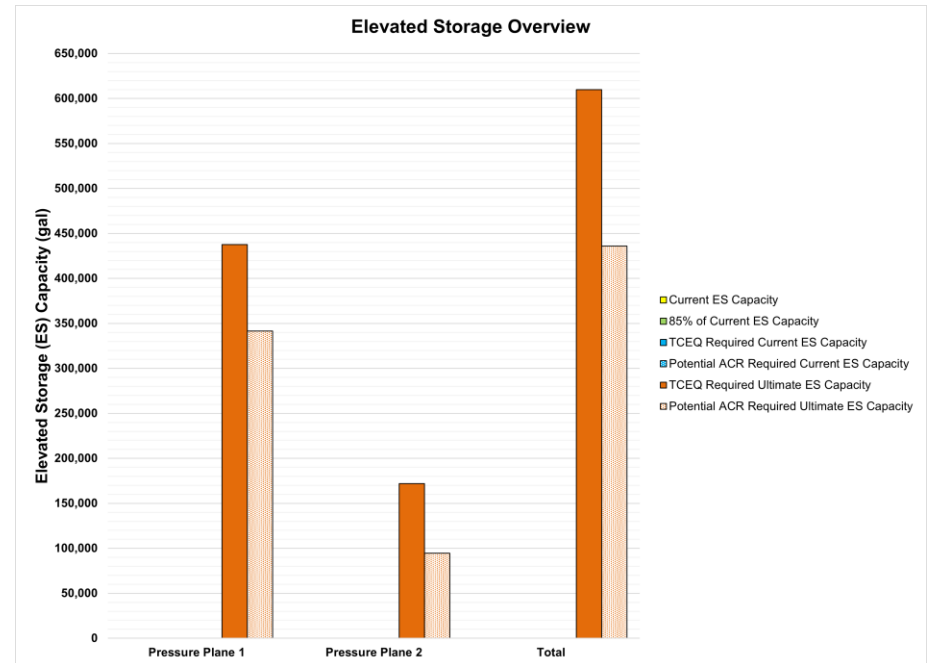
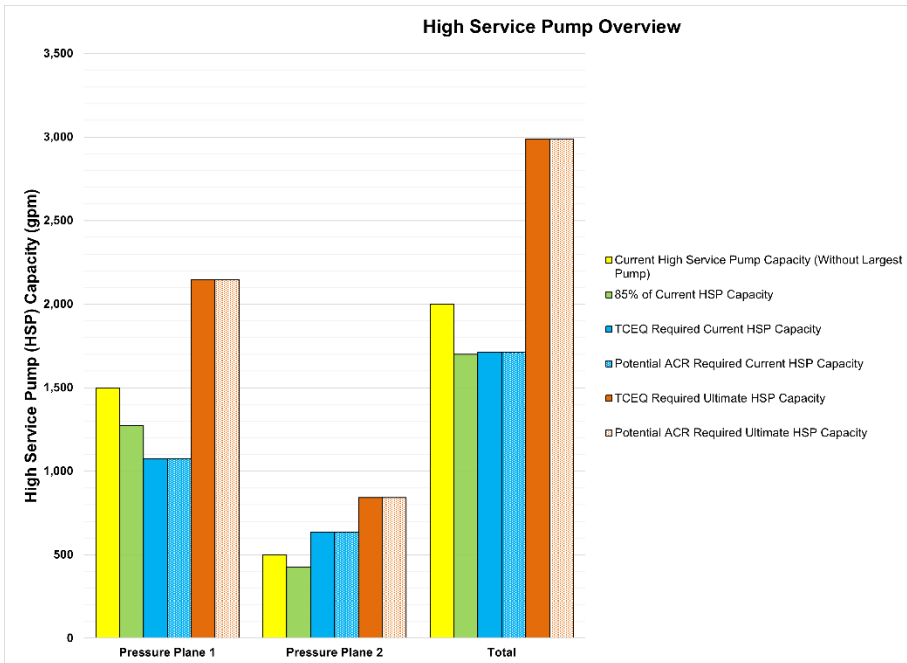
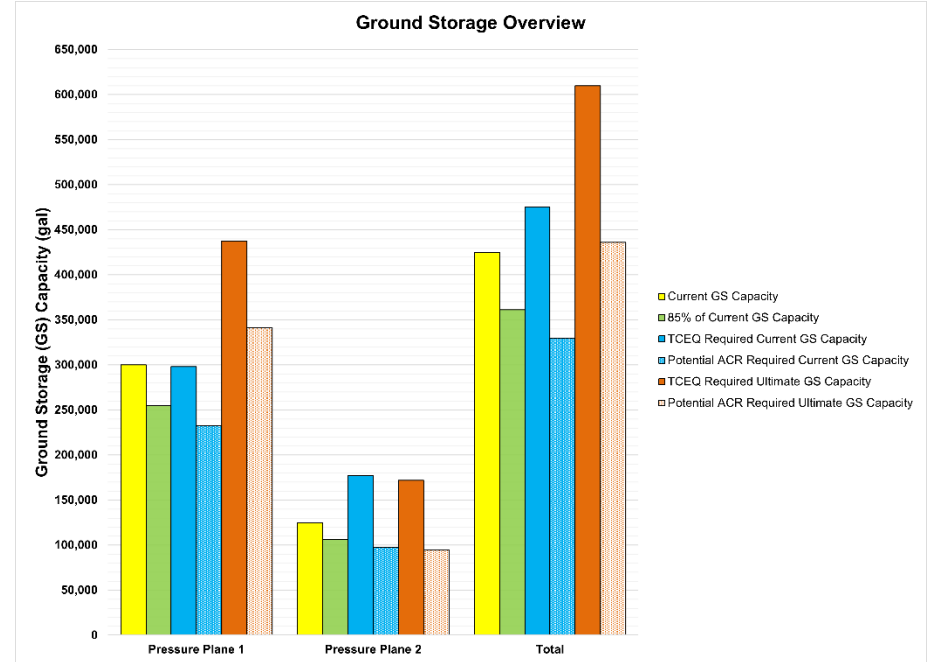
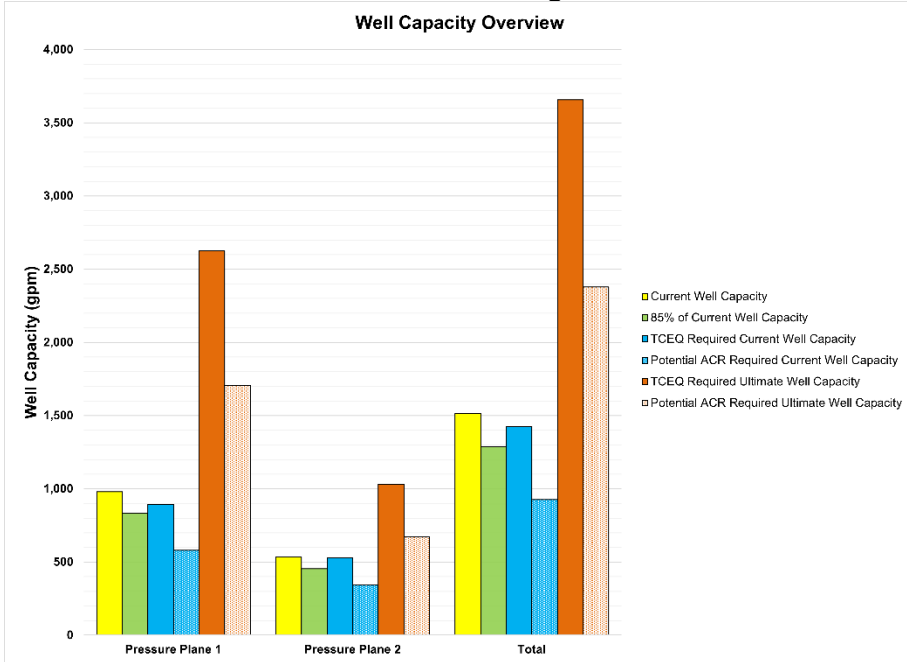
1. **Distribution:** Replace approximately 0.737 miles of water mains with larger diameter piping.
2. **Source:** No immediate upgrades required.
3. **Treatment:** No immediate upgrades required.
4. **High Service Pumps:** Increase capacity in Pressure Plane 2 by at least 249 gpm.
5. **Pressure Tanks:** No immediate upgrades required.
6. **Storage:** No immediate upgrades required.

### Overview of Existing Capacities vs Current and Ultimate Capacity Requirements

A visual overview of the capacity analysis results are shown on the figures below:

BCWCID No. 2: New Water Well, Storage, and Treatment Facilities

3



### Recommendations for Future Compliance

SPI recommends that the District proceed with submitting an ACR application to TCEQ at the earliest opportunity. TCEQ typically requires 100 days to complete its review and issue a determination. Depending on whether the ACR is approved, SPI advises the District to pursue the following improvements accordingly.

If the ACR is approved, SPI recommends the District implement the following improvements (Estimated costs include engineering and construction admin):

1. **2025/2026** – Upsize approximately 0.737 miles of water main.  
*Estimated Cost: \$1,328,000*
2. **2025/2026** – Install a 350 gallons-per-minute (gpm) or larger high service pump at Plant 3.  
*Estimated Cost: \$150,000*
3. **2025/2026** – Construct a 400,000-gallon multi-column elevated storage tank at Plant 1 to enhance storage capacity and system pressure.  
*Estimated Cost: \$3,887,000*
4. **2026** – Drill a standard 4-inch diameter, 800-foot deep test well at the District’s maintenance facility, including one water quality sample.  
*Estimated Cost: \$350,000*

If the ACR is not approved, SPI recommends the District implement the following improvements:

1. **2025/2026** – Upsize approximately 0.737 miles of water main.  
*Estimated Cost: \$1,328,000*
2. **2025** – Solicit bids and begin construction of a standard 4-inch diameter, 800-foot deep test well at the District’s maintenance facility site, including one water quality sample.  
*Estimated Cost: \$350,000*
3. **2025/2026** – Contingent upon favorable test well results, develop a new well with a capacity of about 400 gpm at the maintenance facility site. This includes installation of treatment systems, high service pumps, a pressure tank, a 100,000-gallon ground storage tank, and an emergency generator.  
*Estimated Cost: \$3,316,830*
4. **2025/2026** – Construct a 400,000-gallon multi-column elevated storage tank at Plant 1 to enhance storage and pressure reliability.  
*Estimated Cost: \$3,887,000*

## INTRODUCTION AND BACKGROUND

### Contact Information

Bastrop County Water Control and Improvement District No. 2 (“District”) is the owner of the project. Schaumburg & Polk, Inc. (“SPI”) is the engineer for the project.

Contact information for the owner and engineer are listed below:

#### Owner

Bastrop County Water Control and Improvement District No. 2  
Paul Hightower, General Manager  
112 Corporate Drive  
Bastrop, TX 78602  
Phone: (512) 321-1688

#### Engineer

Schaumburg & Polk, Inc.  
John Schmeling, P.E., Project Manager  
165 Elmhurst Drive, Suite B  
Kyle, TX 78640  
Phone: (512) 262-0440

### Location

The District is located approximately 30 miles east of Austin, Texas, at State Highways 21, 71, 95, and the Colorado River, adjacent to the City of Bastrop in Bastrop County. A map of the District’s boundary and their Certificate of Convenience and Necessity (“CCN”) is shown in **Figure 1** below.

Bastrop County Water Control and Improvement District No. 2

### District Location Map

September 24, 2024

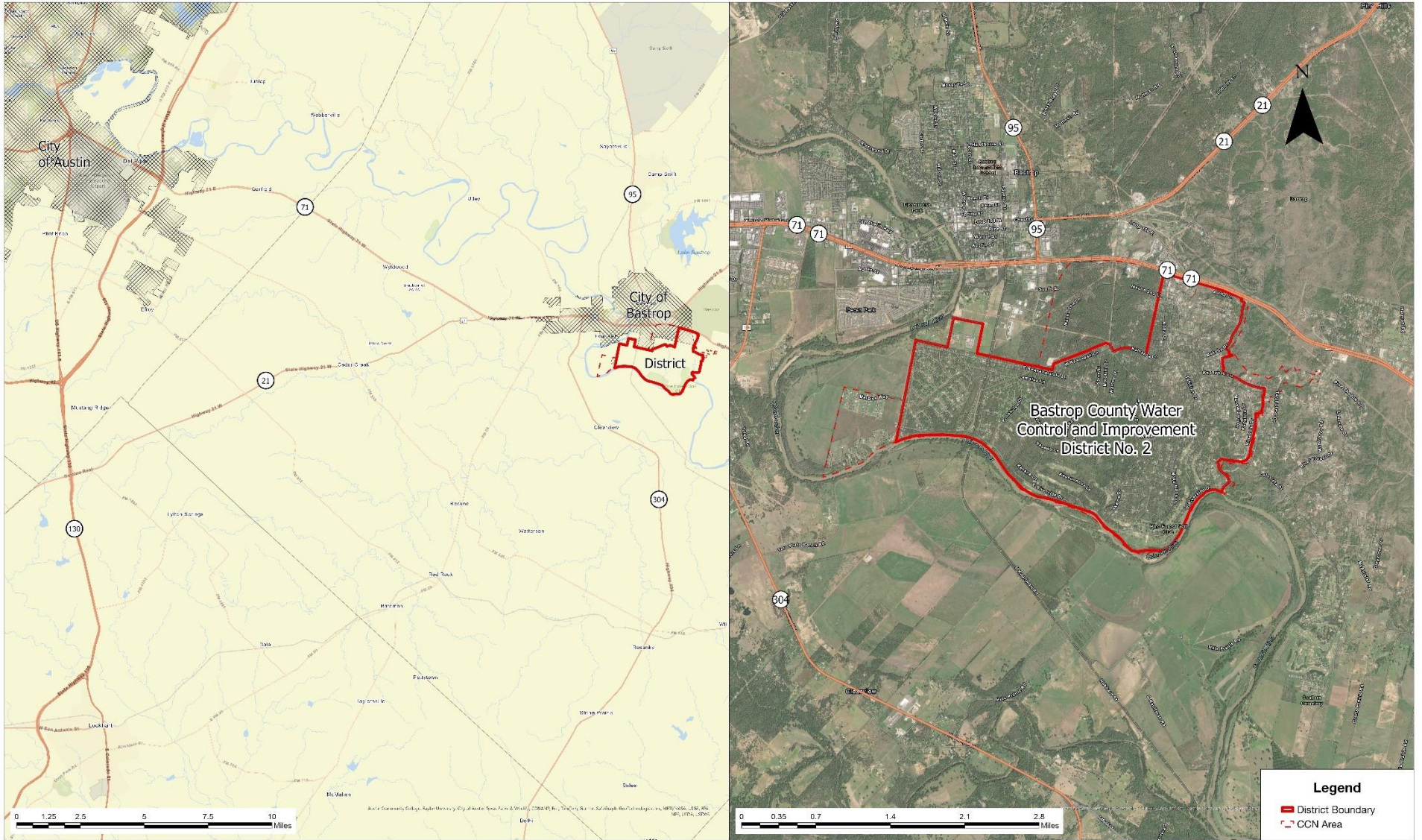


Figure 1: District Location Map

## Background Data Sources

The information and materials used in preparation of this report include:

- District system maps
- District personnel testimony
- District water pumping records
- Engineer review of field conditions
- KY Pipe water model (Provided by BEFCO Engineering, Inc. and edited by SPI)
- Bastrop County Water Control and Improvement District #2 Bond Application Preliminary Engineering Report (Dated 2/22/2021 by BEFCO Engineering, Inc.)
- Bastrop County Water Control & Improvement District No. 2 Water System Presentation for August 2023 Board Meeting (By BEFCO Engineering, Inc.)
- Bastrop County WCID #2 Groundwater and Well Siting and Planning Study (Dated 8/26/2024 by Advanced Groundwater Systems (“AGS”))
- Texas Water Development Board 2021 Region K Water Plan
- City of Bastrop Comprehensive Plan 2016-2036 (Adopted 11/22/2016)
- City of Bastrop Water Master Plan Report (Dated 5/24/2024 by Freese and Nichols, Inc.)
- Texas Commission on Environmental Quality (“TCEQ”) Rules in Title 30 Part 1 Chapter 290 of the Texas Administrative Code (“TAC”)

## TCEQ Water System Requirements

### Water System Capacity

The following are the TCEQ minimum water system capacity rules for systems with more than 250 connections (Per TAC Title 30 Part 1 Chapter 290 Subchapter D Rule 290.45):

1. Two or more wells having a total capacity of 0.6 gpm per connection. Where an interconnection is provided with another acceptable water system capable of supplying at least 0.35 gpm for each connection in the combined system under emergency conditions, an additional well will not be required as long as the 0.6 gpm per connection requirement is met for each system on an individual basis. Each water system must still meet the storage and pressure maintenance requirements on an individual basis unless the interconnection is permanently open. In this case, the systems' capacities will be rated as though a single system existed;
2. A total storage capacity of 200 gallons per connection;

3. Two or more pumps that have a total capacity of 2.0 gpm per 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, at each pump station or pressure plane. For systems which provide an elevated storage capacity of 200 gallons per connection, two service pumps with a minimum combined capacity of 0.6 gpm per connection are required at each pump station or pressure plane. If only wells and elevated storage are provided, service pumps are not required;
4. An elevated storage capacity of 100 gallons per connection or a pressure tank capacity of 20 gallons per connection. If pressure tanks are used, a maximum capacity of 30,000 gallons is sufficient for up to 2,500 connections. An elevated storage capacity of 100 gallons per connection is required for systems with more than 2,500 connections. Alternate methods of pressure maintenance may be proposed and will be approved if the criteria contained in subsection (g)(5) of this section are met; and
5. Emergency power for systems which serve more than 250 connections and do not meet the elevated storage requirement. Sufficient emergency power must be provided to deliver a minimum of 0.35 gpm per connection and meet minimum pressure requirements to the distribution system in the event of the loss of normal power supply. Alternately, an emergency interconnection can be provided with another public water system that has emergency power and is able to supply at least 0.35 gpm for each connection in the combined system. Emergency power must be maintained as required by §290.46(m)(8) of this title.

### Water Pipe Sizing

The following are the TCEQ minimum water pipe sizing rules (Per TAC Title 30 Part 1 Chapter 290 Subchapter D Rule 290.44):

Minimum waterline sizes. The minimum waterline sizes are for domestic flows only and do not consider fire flows. Larger pipe sizes shall be used when the licensed professional engineer deems it necessary. It should be noted that the required sizes are based strictly on the number of customers to be served and not on the distances between connections or differences in elevation or the type of pipe. No new waterline less than two inches in diameter will be allowed to be installed in a public water system distribution system. These minimum line sizes do not apply to individual customer service lines.

Figure: 30 TAC §290.44(c)

Maximum Number of Connections	Minimum Line Size (inches)
10	2
25	2.5
50	3
100	4
150	5
250	6
>250	8 and larger

#### TCEQ Alternative Capacity Requirement

According to TCEQ regulations outlined in TAC Title 30, Part 1, Chapter 290, Subchapter D, Rule 290.45(g), public water system owners may request reduced capacity requirements. Generally, the District can apply for alternative capacity standards by submitting daily pumping data and connection counts for the past three years. TCEQ will evaluate the days with the highest pumping volumes for each individual pressure plane and for the overall system. Based on this analysis, TCEQ will determine alternative capacity values using the maximum daily pumping per connection, incorporating a 15% safety margin.

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**EXISTING WATER SYSTEM**

*Service Area/Population*

The District water service area currently provides water to approximately 2,353 meters serving about 2,376 connections. One connection represents about 3.5 people. The population being served is approximately 8,300 people.

The District serves land with a variety of land uses. Descriptions for each land use are shown in **Table 1** below.

**Table 1: Land Use Descriptions**

<b>Land Use</b>	<b>Description</b>
Commercial	These areas are used for office, retail, or restaurant space.
Public or Institutional	These areas are used for public, non-profit, or religious institutions.
Medical	These areas are used for medical facilities such as clinics, hospitals, or emergency rooms.
Multi Family	These areas are used for medium to high density residential such as townhomes or apartments.
Single Family	These areas are used for single family residential uses with standard size lots (0.125-acres – 0.5-acres typical).
Rural Single Family	These areas are used for single family residential uses with large lots (>1-acre typical).
Open Space	These areas are used for park, drainage, natural, or other areas to remain open without many buildings.
Vacant Land	These areas are vacant with no specific use.

The existing land uses and water meter connections served by the District within their CCN are shown in **Figure 2** below.

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Bastrop County Water Control and Improvement District No. 2

### Existing Land Use Map

September 19, 2024

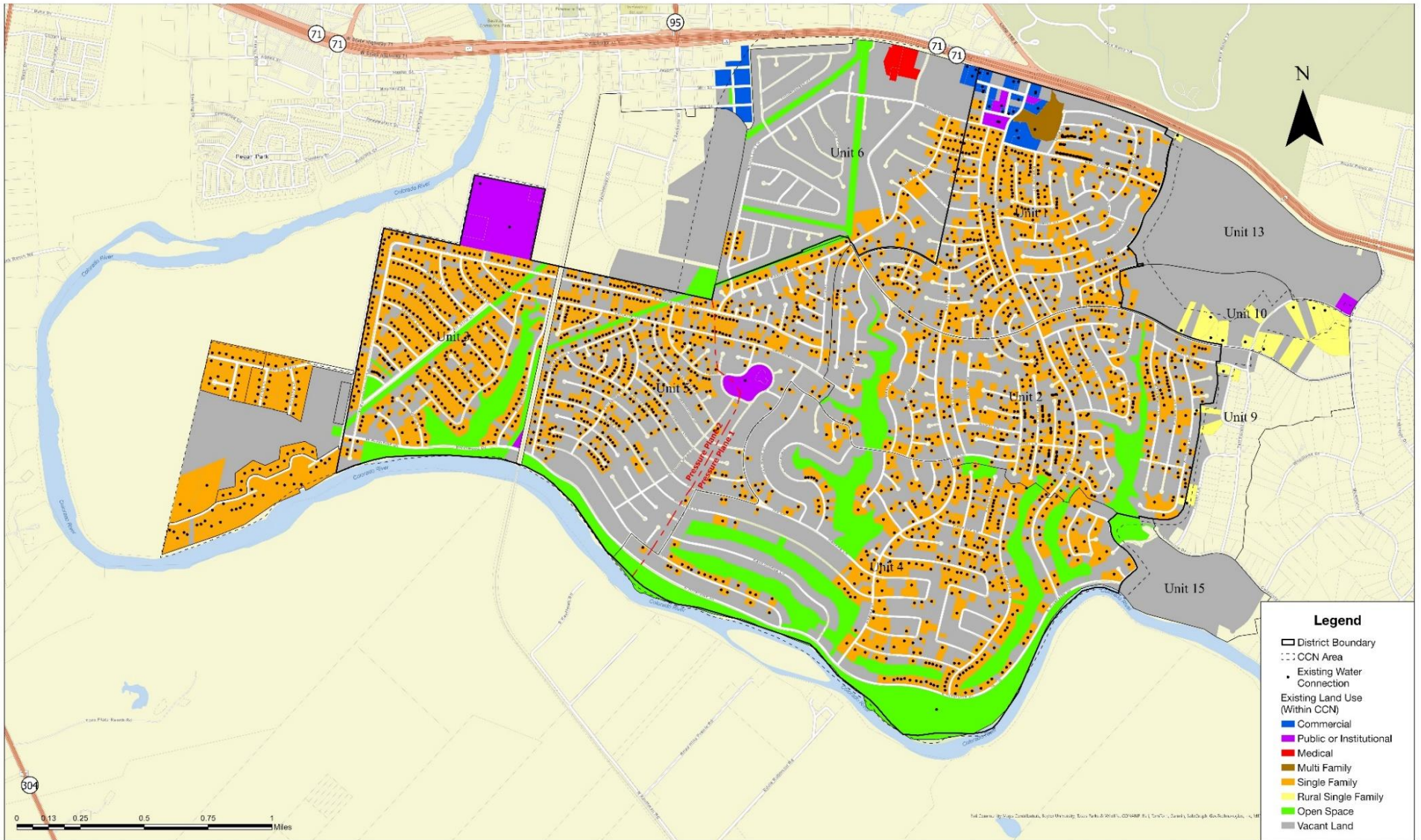


Figure 2: Existing Land Use Map

The current land uses and connections serviced by the District are shown in **Table 2** below.

**Table 2: Existing Land Use Areas by Pressure Plane**

Land Use	Area (acres)			Connections		
	Plane 1	Plane 2	Total	Plane 1	Plane 2	Total
Commercial	33.41		33.41	29		29
Public or Institutional	19.89	52.01	71.90	11	2	13
Medical	9.64		9.64			
Multi Family	12.00		12.00	8		8
Single Family	687.21	462.75	1,149.96	1,430	883	2,313
Rural Single Family	52.79		52.79	12		12
Open Space	347.28	88.95	436.23	1		1
Vacant Land	1,700.42	356.35	2056.77			
<b>Total:</b>	<b>2,862.64</b>	<b>960.06</b>	<b>3,822.70</b>	<b>1,491</b>	<b>885</b>	<b>2,376</b>

**TCEQ Customer Information**

The District is currently considered a regulated entity of TCEQ. The current customer information is as follows:

- **RN No:** RN100824945
- **CN No:** CN600739544
- **PWS No:** TX0110020
- **CCN No:** 10990
- **Notice of Violations:** None Active

**Water Demand**

Highest Pumping Volumes by Period

The District’s monthly water pumping totals by month from January 2020 through August 2024 are shown in **Figure 3, Figure 4, and Figure 5** below for each pressure plane and the combined system. The highest pumping volumes by period are:

- Annual: 181.5 MG in 2022
- Monthly: 24.0 MG in August 2023
- Daily (Pressure Plane 1): 0.76 MG on July 21, 2023
- Daily (Pressure Plane 2): 0.31 MG on July 10, 2022
- Daily (Combined): 0.97 MG on July 10, 2022



### Estimated Peak Hour Flow Rate

Based on historical pumping data for the combined system, the average flow rate per connection on the highest-use day was approximately 0.34 gallons per minute (gpm) per connection. Applying the Texas Commission on Environmental Quality (TCEQ) required 15% safety factor, the maximum daily flow is about 0.39 gpm/connection. According to TCEQ guidelines for systems without elevated storage that rely solely on pressure tanks, the peak hour flow rate is calculated as 1.85 times the maximum daily flow. Therefore, the estimated peak hour flow per connection is approximately 0.72 gpm/connection. (If elevated storage was provided, the peak hour flow rate would be calculated as 1.25 times the maximum daily flow, resulting in a peak hour flow of about 0.49 gpm/connection.)

### Potential Alternative Capacity Requirement

The potential alternative capacity requirements are estimated below based on historical pumping data and historical connection counts per **Table 3** below. **Table 4** shows the potential equivalency factors.

**Table 3: Estimated Connection Counts for Past Three (3) Years**

Year	Approximate Connections*		
	Pressure Plane 1	Pressure Plane 2	Total
2024	1,285	815	2,100
2023	1,284	813	2,097
2022	1,216	766	1,982

\*The exact number of connections by year is in the process of being gathered from meter data. These numbers are conservative estimations.

**Table 4: Potential Alternative Capacity Requirement (ACR) Equivalency Factors**

Area	Date	Volume Pumped (gallons)	Connections That Year	Flow Per Connection (gpm)	With 15% Safety Factor	Equivalency Factor
Pressure Plane 1	7/21/2023	755,766	1,284	0.41	0.47	0.78
Pressure Plane 2	7/10/2022	314,000	766	0.28	0.33	0.55
Combined	7/10/2022	971,129	1,982	0.34	0.39	0.65

Water Demand per Connection

To estimate future water demand based on connections, the three-year (2022-2024) average combined monthly water use, including the calculated use per connection, is shown in **Table 5** below. The system is assumed to have served 2,376 connections during this period.

**Table 5: Three Year Average Combined Water Use by Month**

Month	2022	2023	2024	2022-2024 Average (gal)	2022-2024 Average (gal/connection/month)
January	10,980,840	10,760,239	10,742,789	10,827,956	4,557
February	10,311,316	10,147,969	9,733,921	10,064,402	4,236
March	12,528,882	12,454,621	11,994,303	12,325,935	5,188
April	15,127,456	11,537,934	11,662,091	12,775,827	5,377
May	17,583,275	12,462,381	12,460,572	14,168,743	5,963
June	21,155,965	17,314,556	13,951,837	17,474,119	7,354
July	22,987,965	23,286,067	14,534,984	20,269,672	8,531
August	17,302,582	23,964,892	17,748,387	19,671,954	8,279
September	16,468,129	17,613,065	16,524,854	16,868,683	7,100
October	15,529,134	12,646,027	18,326,500	15,500,554	6,524
November	11,026,904	10,525,332	13,401,272	11,651,169	4,904
December	10,452,243	11,076,270	10,902,025	10,810,179	4,550
<b>Total:</b>	<b>181,454,691</b>	<b>173,789,353</b>	<b>161,983,535</b>	<b>172,409,193</b>	

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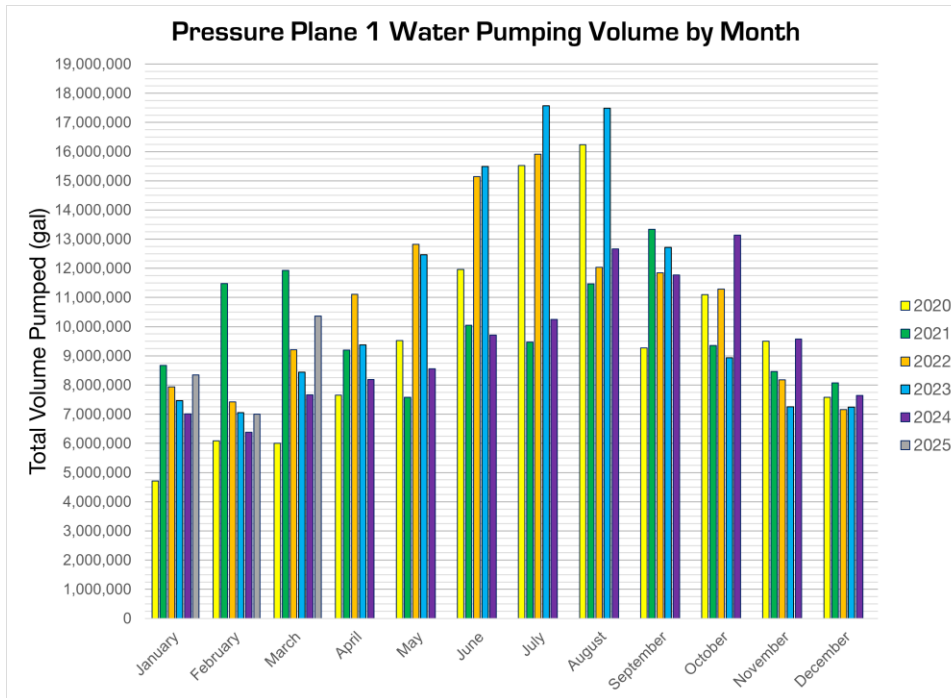


Figure 3: Pressure Plane 1 Historical Water Pumping by Month

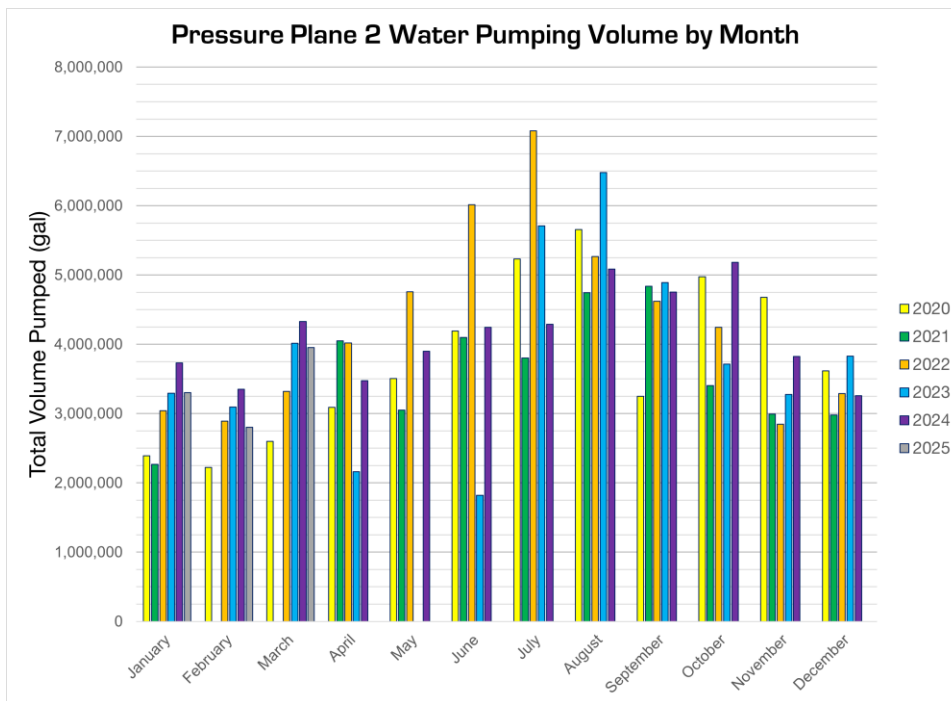


Figure 4: Pressure Plane 2 Historical Water Pumping by Month

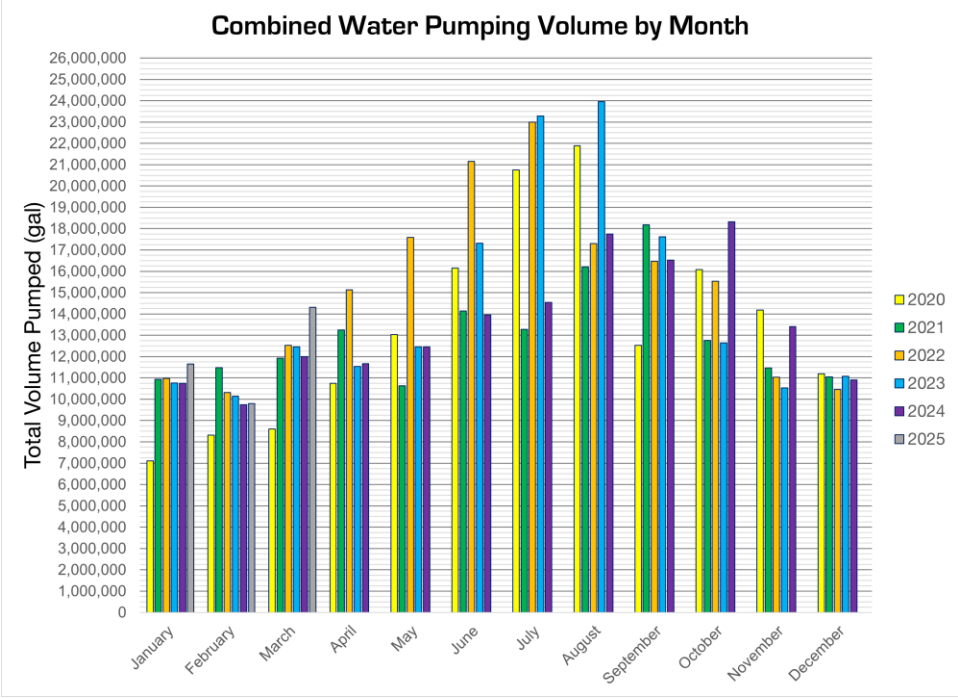


Figure 5: Combined Historical Water Pumping by Month

Minimum System Requirements

The minimum system capacities required based on the current service area and population are shown in **Table 6** below for typical TCEQ requirements and **Table 7** for potential alternative capacity requirements.

Table 6: Minimum Water System Capacities for Existing System

Item	Plane 1	Plane 2	Total
Total Connections	1,491	885	2,376
Wells	895 gpm	531 gpm	1,426 gpm
High Service Pumps <sup>4</sup> (Overall)	2,982 gpm	1,770 gpm	4,752 gpm
(With Largest Pump Out of Service)	<u>1074 gpm<sup>1</sup></u>	<u>637 gpm<sup>1</sup></u>	<u>1,711 gpm<sup>1</sup></u>
Pressure Tanks	20,000 gal <sup>2</sup>	10,000 gal <sup>2</sup>	30,000 gal <sup>2</sup>
Ground Storage	298,200 gal	177,000 gal	475,200 gal
Elevated Storage	NA <sup>3</sup>	NA <sup>3</sup>	NA <sup>3</sup>

<sup>1</sup> Estimate based on historical peak hour use of 0.72 gpm/connection. See [Water Demand](#) on page 12 for more details.

<sup>2</sup> 30,000 gallons total is required since there are less than 2,500 connections served.

<sup>3</sup> Elevated storage is not required since there are less than 2,500 connections.

<sup>4</sup> The required high service pump capacity is the lower of the overall and with largest pump out of service numbers.



**Table 7: Potential ACR Minimum Water System Capacities for Existing System**

Item	Plane 1	Plane 2	Total
Total Connections	1,491	885	2,376
Wells	582 gpm	345 gpm	927 gpm
High Service Pumps <sup>4</sup> (Overall)	2,325 gpm	974 gpm	3,299 gpm
(With Largest Pump Out of Service)	<u>1074 gpm<sup>1</sup></u>	<u>637 gpm<sup>1</sup></u>	<u>1,711 gpm<sup>1</sup></u>
Pressure Tanks	20,000 gal <sup>2</sup>	10,000 gal <sup>2</sup>	30,000 gal <sup>2</sup>
Ground Storage	232,596 gal	97,350 gal	329,946 gal
Elevated Storage	NA <sup>3</sup>	NA <sup>3</sup>	NA <sup>3</sup>

<sup>1</sup> Estimate based on historical peak hour use of 0.72 gpm/connection. See [Water Demand](#) on page 12 for more details.

<sup>2</sup> 30,000 gallons total is required since there are less than 2,500 connections served.

<sup>3</sup> Elevated storage is not required since there are less than 2,500 connections.

<sup>4</sup> The required high service pump capacity is the lower of the overall and with largest pump out of service numbers.

*[This space is left blank intentionally.]*

## Distribution

### Existing System

A map of the District's water distribution system is shown in **Figure 6**. The District's existing water distribution system consists of over 67 miles of pipes and 191 hydrants as shown in **Table 8** and **Table 9** below.

**Table 8: Existing Pipe System**

Pipe Size (in)	Pressure Plane 1 Length (mi)	Pressure Plane 2 Length (mi)	Total Length (mi)
2	9.766	1.164	10.929
4	16.001	3.789	19.790
6	26.106	5.757	31.863
8	3.018	0.868	3.886
10	0.720	0.000	0.720
16	0.214	0.000	0.214
<b>Total:</b>	<b>55.823</b>	<b>11.578</b>	<b>67.402</b>

**Table 9: Existing Hydrants**

Pressure Plane 1	Pressure Plane 2	Total
124	67	191

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Bastrop County Water Control and Improvement District No. 2

### Existing Water System Map

September 19, 2024

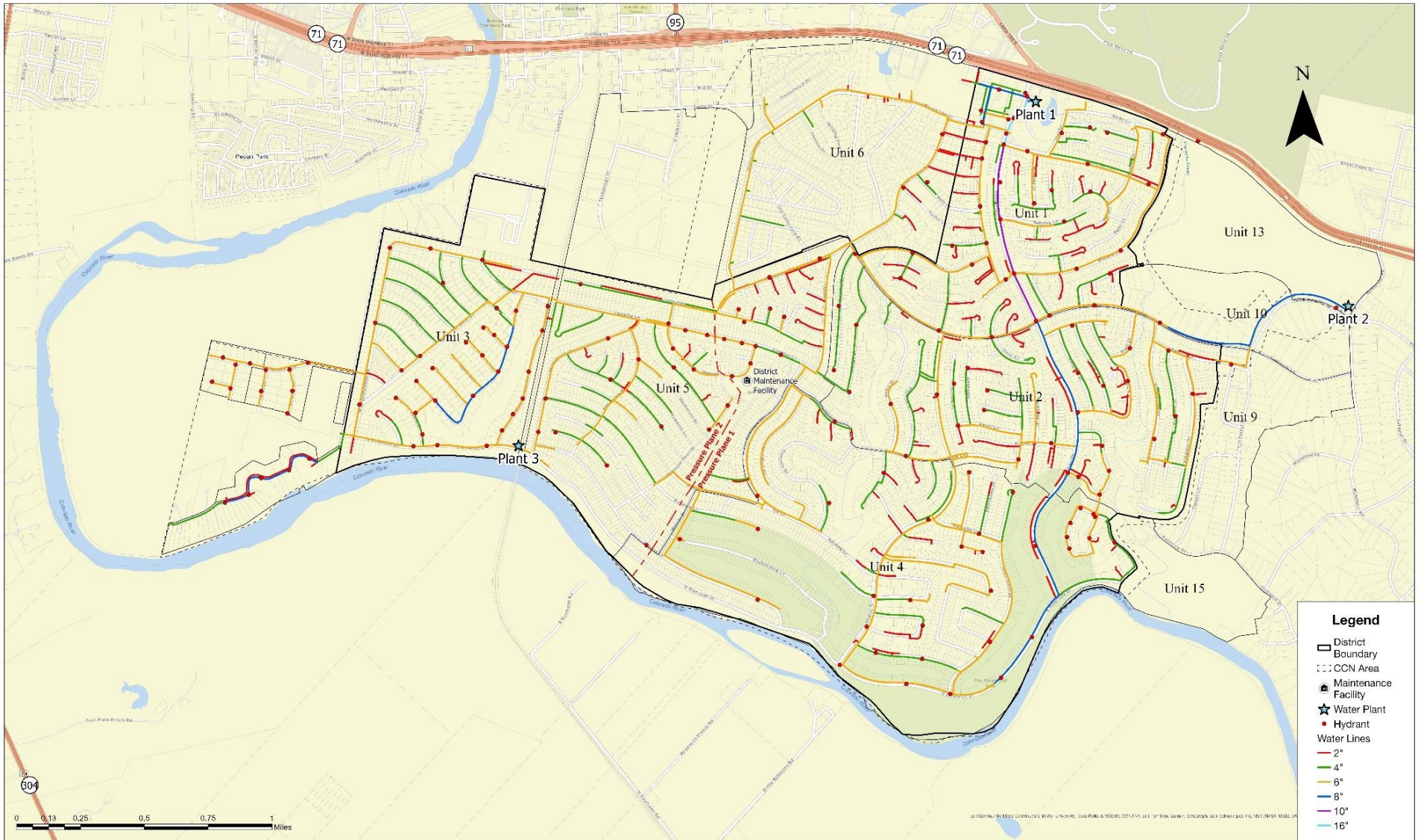


Figure 6: Existing Water System Map

Minimum Pipe Size Status

The existing system was analyzed to identify undersize lines based on TCEQ requirements. A map of the proposed lines to upsize is shown in **Figure 7** and is summarized below:

1. 2,261 feet (0.428 miles) of 2" water lines should be upsized to 4"
2. 1,630 feet (0.309 miles) of 4" water lines should be upsized to 6"

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Bastrop County Water Control and Improvement District No. 2

### Water Line Upsizing Map

May 07, 2025

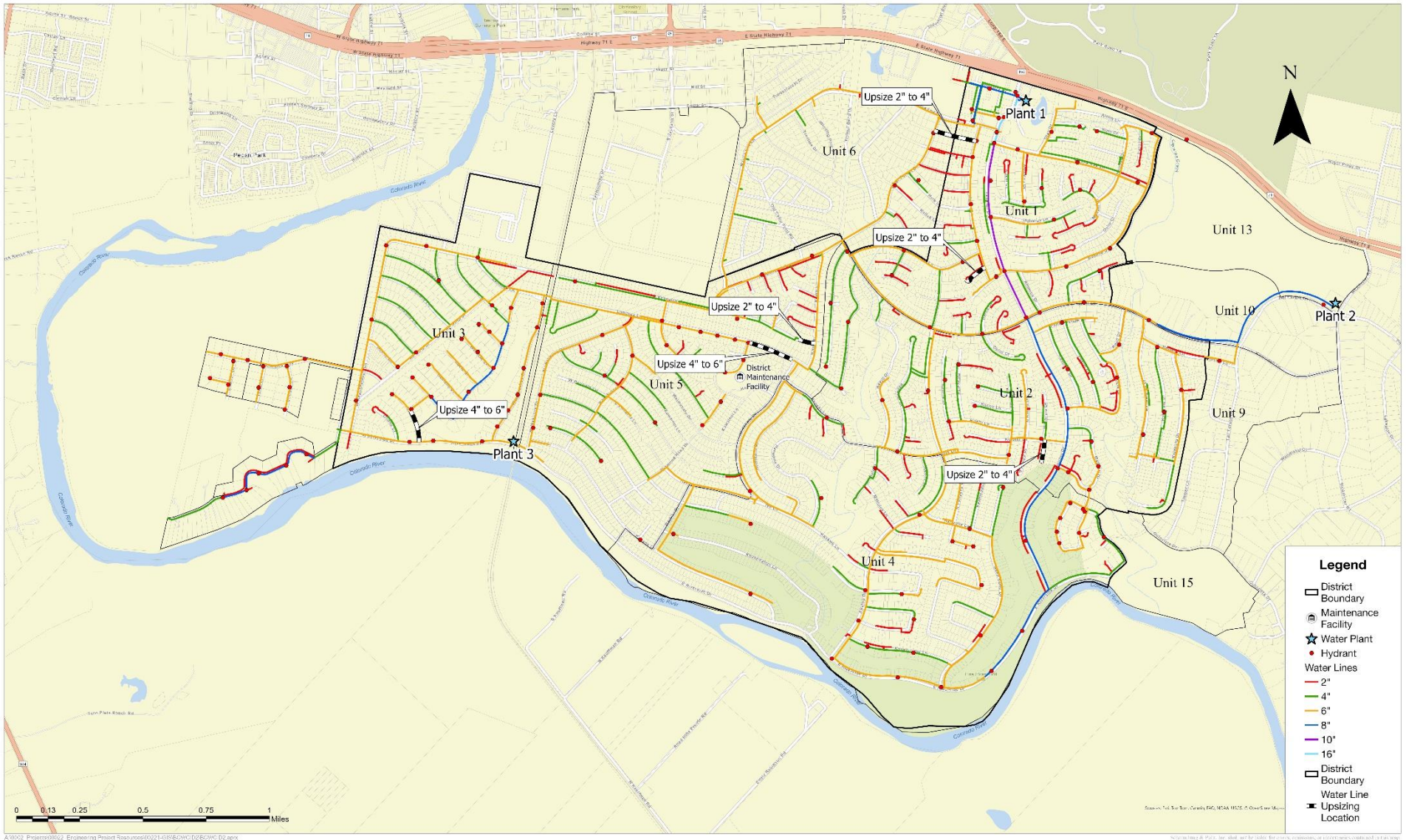


Figure 7: Proposed Waterline Upsizing Map

Source

Aquifers

All water wells in the District are currently sourced from the Calvert Bluff Aquifer.

Wells

The District’s source of water is five (5) existing wells. Wells 1-2 are located at Water Plant 1 and serve pressure plane 1. Wells 3-4 are located at Water Plant 2 and serve pressure plane 1. Well 5 is located at Water Plant 3 and serves pressure plane 2. Detailed information on each well is shown in **Table 10** below.

**Table 10: Existing Well Information**

Well	Pressure Plane	Install Year	Source	Size	Tested Cap. <sup>1</sup> (gpm)	Rehab Year	Proj. Cap. (gpm)
1	1	1973	Calvert Bluff	6" X 4" 4" Screen 465' – 515'	86	2024	110 <sup>2</sup>
2	1	1979	Calvert Bluff	8" X 4" 4" Screen 613' – 720'	160	2024	220 <sup>2</sup>
3	1	1986	Calvert Bluff	12" X 8" X 6" 6" Screen 940' – 1,004'	452	2025 <sup>3</sup>	500
4	1	1990	Calvert Bluff	10" X 6" 6" Screen 380' – 450'	160	NA	150 <sup>2</sup>
<b>Pressure Plane 1 Subtotal:</b>					<b>858</b>		<b>980</b>
5	2	2002	Calvert Bluff	14" X 8" 8" Screen 455' – 510'	360	2024	535 <sup>2</sup>
<b>Pressure Plane 2 Subtotal:</b>					<b>360</b>		<b>535</b>
<b>Total Well Pumping Capacity:</b>					<b>1,218</b>		<b>1,515</b>

<sup>1</sup> Per TCEQ DWW Information.  
<sup>2</sup> Tested pumping rate as of 5/7/2025.  
<sup>3</sup> Work starting late 2025.



### Minimum Well Capacity Status

A comparison of projected well capacities to TCEQ minimum capacity standards is shown in **Table 11** below. Both pressure plans and the combined system meet the minimum well capacity requirements. However, both pressure planes and the combined system are **over 85% capacity** which requires submission of a future planning report, which this Report provides.

**Table 11: Provided vs Required Well Capacity**

Pressure Plane	Projected Capacity <sup>1</sup> (gpm)	Required Capacity (gpm)	Percent Capacity	Meets Minimums
1	980	895	91%	Yes
2	535	531	99%	Yes
<b>Total</b>	<b>1,515</b>	<b>1,426</b>	<b>94%</b>	<b>Yes</b>

<sup>1</sup> Based on projected pumping rates after current well rehabilitations are complete.

A comparison of projected well capacities to potential alternative capacity requirements is shown in **Table 12** below. Both pressure plans and the combined system would meet the minimum well capacity requirements and be under 85% capacity.

**Table 12: Potential ACR Provided vs Required Well Capacity**

Pressure Plane	Projected Capacity <sup>1</sup> (gpm)	Required Capacity (gpm)	Percent Capacity	Meets Minimums
1	980	582	59%	Yes
2	535	345	64%	Yes
<b>Total</b>	<b>1,515</b>	<b>927</b>	<b>61%</b>	<b>Yes</b>

<sup>1</sup> Based on projected pumping rates after current well rehabilitations are complete.

### Treatment

The District currently has three treatment plants as shown in **Figure 6**. Details on their sources, pressure planes, and treatment components are shown in **Table 13** below.

**Table 13: Existing District Treatment Facilities**

Plant	Fed by Wells	Pressure Plane	Treatment Components		
			Chlorine Disinfection	Phosphate Treatment	Granular Activated Carbon Filtration
1	1-2	1	Yes	No	No
2	3-4	1	Yes	Yes	Yes
3	5	2	Yes	Yes	No

### High Service Pumps

The District currently has high service pumps at all three (3) water plants as detailed in **Table 14** below.

**Table 14: Existing High Service Pumps**

Plant	Pressure Plane	Number of High Service Pumps	Capacity/Pump (gpm)	Total Capacity (gpm)
1	1	2	500	1,000
2	1	2	500	1,000
<b>Pressure Plane 1 Subtotal:</b>				<b>2,000</b>
3	2	2	500	1,000
<b>Pressure Plane 2 Subtotal:</b>				<b>1,000</b>
<b>Total High Service Pump Capacity:</b>				<b>3,000</b>

### Minimum High Service Pump Capacity Status

A comparison of the high service pump capacity to TCEQ requirements is shown in **Table 15** below. Pressure plane 1 and the combined system meet the minimum high service pump capacity requirements. However, pressure plane 2 does not.

**Table 15: Provided vs Required High Service Pump Capacity**

Pressure Plane	Current Capacity with Largest Pump Out of Service (gpm)	Required Capacity (gpm)	Meets Minimums
1	1,500	1,074	Yes
2	500	637	No
<b>Total</b>	<b>2,000</b>	<b>1,711</b>	<b>Yes</b>

A comparison of the high service pump capacity to potential alternative capacity requirements is shown in **Table 16** below. Pressure plane 1 and the combined system would meet the minimum high service pump capacity requirements. However, pressure plane 2 would not.

**Table 16: Potential ACR Provided vs Required High Service Pump Capacity**

Pressure Plane	Current Capacity with Largest Pump Out of Service (gpm)	Required Capacity (gpm)	Meets Minimums
1	1,500	1,074	Yes
2	500	637	No
<b>Total</b>	<b>2,000</b>	<b>1,711</b>	<b>Yes</b>

### Pressure Tanks

The District currently has four (4) pressure tanks with a total storage capacity of 30,000 gallons as detailed in **Table 17** below.

**Table 17: Existing Pressure Tanks**

Plant	Pressure Plane	Number of Pressure Tanks	Capacity/Tank (gal)	Total Capacity (gal)
1	1	2	5,000	10,000
2	1	1	10,000	10,000
<b>Pressure Plane 1 Subtotal:</b>				<b>20,000</b>
3	2	1	10,000	10,000
<b>Pressure Plane 2 Subtotal:</b>				<b>10,000</b>
<b>Total Pressure Tank Capacity:</b>				<b>30,000</b>

### Minimum Pressure Tank Capacity Status

A comparison of the pressure tank capacity to TCEQ requirements is shown in **Table 18** below. Both pressure planes and the combined system meet the minimum pressure tank capacity requirements.

**Table 18: Provided vs Required Pressure Tank Capacity**

Pressure Plane	Existing Capacity (gal)	Required Capacity (gal)	Meets Minimums
1	20,000	20,000	Yes
2	10,000	10,000	Yes
<b>Total</b>	<b>30,000</b>	<b>30,000</b>	<b>Yes</b>

A comparison of the pressure tank capacity to potential alternative capacity requirements is shown in **Table 19** below. Both pressure planes and the combined system would meet the minimum pressure tank capacity requirements.

**Table 19: Potential ACR Provided vs Required Pressure Tank Capacity**

Pressure Plane	Existing Capacity (gal)	Required Capacity (gal)	Meets Minimums
1	20,000	20,000	Yes
2	10,000	10,000	Yes
<b>Total</b>	<b>30,000</b>	<b>30,000</b>	<b>Yes</b>

### Storage

#### Ground Storage

The District currently has four (4) ground storage tanks with a total storage capacity of 425,200 gallons as detailed in **Table 20** below.

**Table 20: Existing Ground Storage**

Plant	Pressure Plane	Number of Ground Storage Tanks	Volume/Tank (gal)	Total Volume (gal)
1	1	2	100,000	200,000
2	1	1	100,000	100,000
<b>Pressure Plane 1 Subtotal:</b>				<b>300,000</b>
3	2	1	125,200	125,200
<b>Pressure Plane 2 Subtotal:</b>				<b>125,200</b>
<b>Total Ground Storage:</b>				<b>425,200</b>

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Minimum Ground Storage Capacity Status

A comparison of the ground storage capacity to TCEQ requirements is shown in **Table 21** below. Pressure Plane 2 and the combined system do not meet minimum ground storage capacity requirements. Pressure Plane 1 is **over 85% capacity**, therefore, a future planning report is required, which this Report provides.

**Table 21: Provided vs Required Ground Storage Capacity**

Pressure Plane	Existing Capacity (gal)	Required Capacity (gal)	Percent Capacity	Meets Minimums
1	300,000	298,200	99%	Yes
2	125,200	177,000	141%	No
<b>Total</b>	<b>425,200</b>	<b>475,200</b>	<b>112%</b>	<b>No</b>

A comparison of the ground storage capacity to potential alternative capacity requirements is shown in **Table 22** below. Both pressure planes and the combined system would meet the ground storage capacity requirement and be under 85% capacity.

**Table 22: Potential ACR Provided vs Required Ground Storage Capacity**

Pressure Plane	Existing Capacity (gal)	Required Capacity (gal)	Percent Capacity	Meets Minimums
1	300,000	232,596	78%	Yes
2	125,200	97,350	77%	Yes
<b>Total</b>	<b>425,200</b>	<b>329,946</b>	<b>78%</b>	<b>Yes</b>

Elevated Storage

The District currently has no elevated storage and is not required to have any since there are fewer than 2,500 connections serviced.

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### System Upgrades Needed

The following upgrades are needed to meet TCEQ minimum standards for connections currently served by the District:

1. **Distribution:** Replace approximately 0.737 miles of existing water lines with larger diameter pipes.
2. **Source:** Add a minimum of 163 gallons per minute (gpm) of well capacity usage below 85% of total capacity.
3. **Treatment:** Expand current treatment facilities or install new ones to accommodate the increased well output.
4. **High Service Pumps:** Increase pumping capacity in Pressure Plane 2 by at least 249 gpm.
5. **Pressure Tanks:** No immediate upgrades are required.
6. **Storage\*:** Add a minimum of 50,824 gallons of ground storage capacity to Pressure Plane 1 and 83,235 gallons to Pressure Plane 2.  
\*Elevated storage may be used in lieu of ground storage.

The following upgrades would be needed to meet potential alternative capacity requirements for connections currently served by the District:

1. **Distribution:** Replace approximately 0.737 miles of water mains with larger diameter piping.
2. **Source:** No immediate upgrades required.
3. **Treatment:** No immediate upgrades required.
4. **High Service Pumps:** Increase capacity in Pressure Plane 2 by at least 249 gpm.
5. **Pressure Tanks:** No immediate upgrades required.
6. **Storage:** No immediate upgrades required.

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## ULTIMATE WATER SYSTEM NEEDS

### Service Area/Population

At ultimate buildout the District water service area is expected to serve about 6,097 connections. One connection represents about 3.5 people. The population expected to be served is approximately 21,300 people.

The District is expected to serve land with a variety of land uses. See **Table 1: Land Use Descriptions** on page 10 for more information about each land use. The projected future land uses are generally based on the City of Bastrop's Future Land Use Plan (Adopted 11/22/2016) as shown in **Appendix A**. The anticipated future land uses and areas served by the District within their CCN are shown in **Figure 8** below.

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Bastrop County Water Control and Improvement District No. 2

### Future Land Use Map

September 23, 2024

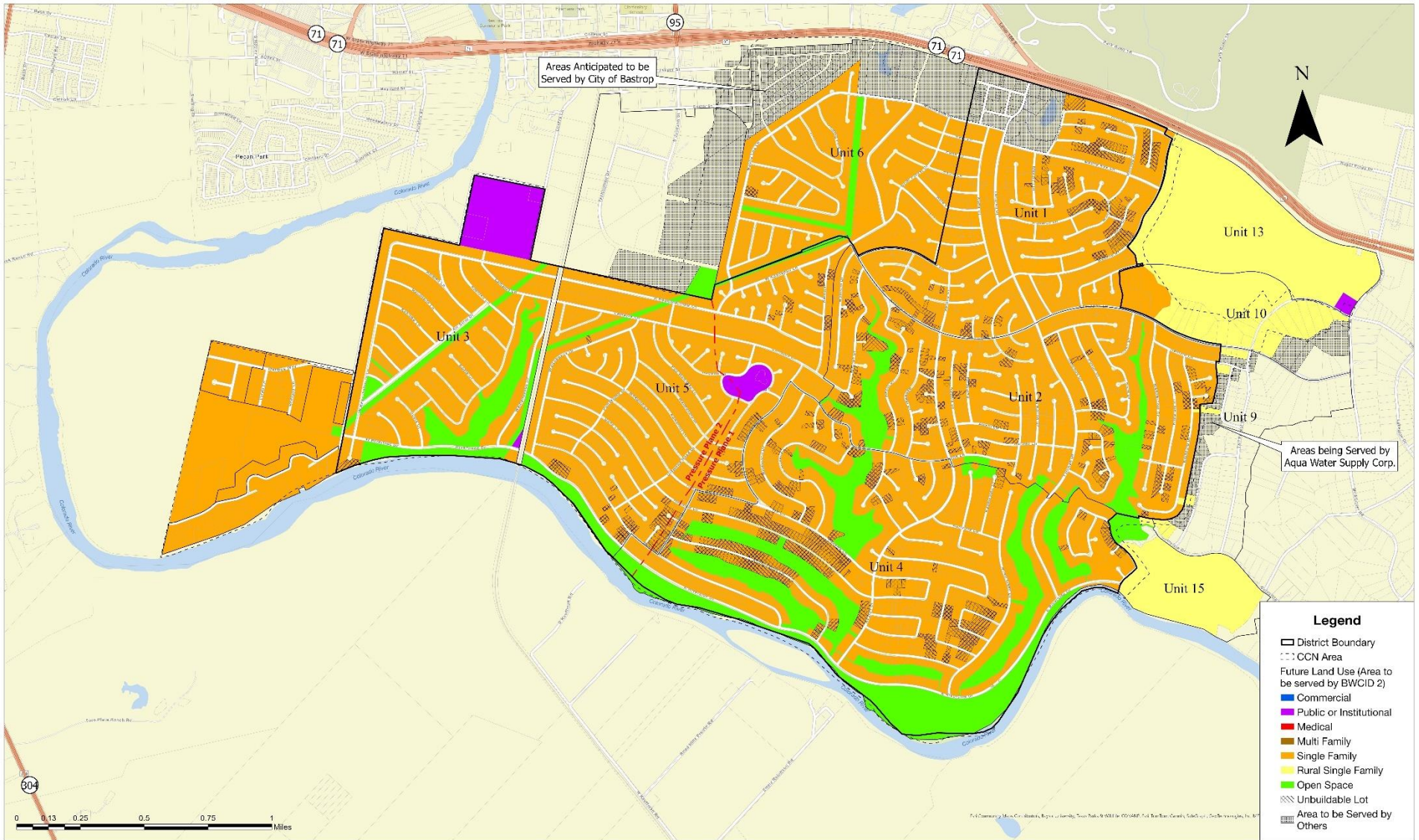


Figure 8: Future Land Use Map

The anticipated land uses and connections expected to be serviced by the District at ultimate buildout are shown in **Table 23** below.

**Table 23: Future Land Use Areas by Pressure Plane**

Land Use	Area (acres)			Connections		
	Plane 1	Plane 2	Total	Plane 1	Plane 2	Total
Public or Institutional	13.99	52.01	66.00	3	32	35
Single Family	1,803.89	819.10	2,622.99	4,262	1,688	5,950
Rural Single Family	307.77		307.77	111		111
Open Space	329.26	88.95	418.21	1		1
Serviced by Others <sup>1,2</sup>	407.73		407.73			
<b>Total:</b>	<b>2,862.64</b>	<b>960.06</b>	<b>3,822.70</b>	<b>4,377</b>	<b>1,720</b>	<b>6,097</b>

<sup>1</sup> Part of the area currently served by the District is anticipated to be served by City of Bastrop per their Water Master Plan Report (Dated 5/24/2024 by Freese and Nichols, Inc.).

<sup>2</sup> Part of the area within the District’s CCN is currently served by Aqua WSC and is anticipated to continue to be served by them through ultimate buildout.

**Water Demand**

**Table 24** and **Figure 9** below show the projected ultimate water demand by month based on the estimated number of connections to be served and the observed three year average water usage for the District.

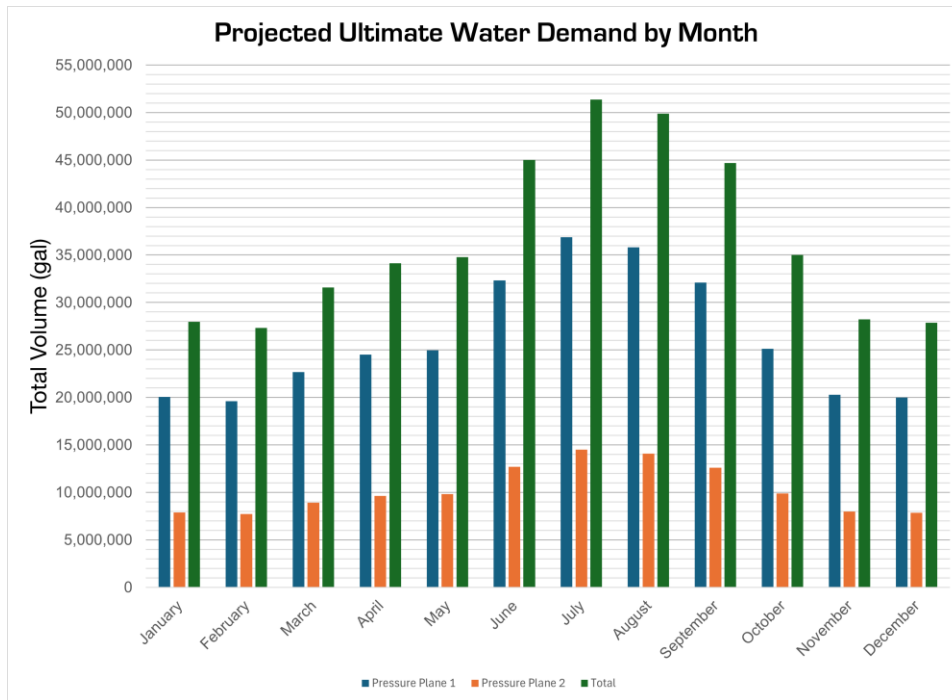
**Table 24: Projected Ultimate Water Demand by Month**

Month	2022-2024 Average (gal/connection)	Total Volume (gal)		
		Pressure Plane 1 <sup>1</sup>	Pressure Plane 2 <sup>2</sup>	Combined
January	4,557	19,946,000	7,838,000	27,784,000
February	4,236	18,541,000	7,285,900	25,826,900
March	5,188	22,707,900	8,923,400	31,631,300
April	5,377	23,535,100	9,248,400	32,783,500
May	5,963	26,100,100	10,256,400	36,356,500
June	7,354	32,188,500	12,648,900	44,837,400
July	8,531	37,340,200	14,673,300	52,013,500
August	8,279	36,237,200	14,239,900	50,477,100
September	7,100	31,076,700	12,212,000	43,288,700
October	6,524	28,555,500	11,221,300	39,776,800
November	4,904	21,464,800	8,434,900	29,899,700
December	4,550	19,915,400	7,826,000	27,741,400
<b>Total:</b>		<b>317,608,400</b>	<b>124,808,400</b>	<b>442,416,800</b>

<sup>1</sup> Assumes 4,377 connections at ultimate buildout.

<sup>2</sup> Assumes 1,720 connections at ultimate buildout.





**Figure 9: Projected Ultimate Water Demand by Month**

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### Minimum System Requirements

The minimum system capacities required based on the anticipated ultimate buildout service area and population are shown in **Table 25** below for typical TCEQ requirements and **Table 26** for potential alternative capacity requirements.

**Table 25: Minimum Water System Capacities for Ultimate Buildout**

Item	Plane 1	Plane 2	Total
Connections	4,377	1,720	6,097
Wells	2,626 gpm	1,032 gpm	3,658 gpm
High Service Pumps <sup>4</sup> (Overall)	8,754 gpm	3,440 gpm	12,194 gpm
(With Largest Pump Out of Service)	<u>2,145 gpm<sup>1</sup></u>	<u>843 gpm<sup>1</sup></u>	<u>2,988 gpm<sup>1</sup></u>
Pressure Tanks	NA <sup>2</sup>	NA <sup>2</sup>	NA <sup>2</sup>
Ground Storage	437,700 gal <sup>3</sup>	172,000 gal <sup>3</sup>	609,700 gal <sup>3</sup>
Elevated Storage	437,700 gal <sup>3</sup>	172,000 gal <sup>3</sup>	609,700 gal <sup>3</sup>

<sup>1</sup> Estimate based on historical peak hour use of 0.49 gpm/connection (Since elevated storage is provided). See [Water Demand](#) on page 12 for more details.

<sup>2</sup> Pressure tanks are not required if elevated storage is provided. Since the ultimate buildout will be more than 2,500 connections, elevated storage is required.

<sup>3</sup> Total storage required is 200 gallons/connection. Since there are more than 2,500 connections, 100 gallons/connection is required for elevated storage.

<sup>4</sup> The required high service pump capacity is the lower of the overall and with largest pump out of service numbers.

*[This space is left blank intentionally.]*

**Table 26: Potential ACR Minimum Water System Capacities for Ultimate Buildout**

Item	Plane 1	Plane 2	Total
Connections	4,377	1,720	6,097
Wells	1,707 gpm	671 gpm	2,378 gpm
High Service Pumps <sup>4</sup> (Overall)	6,828 gpm	1,892 gpm	8,720 gpm
(With Largest Pump Out of Service)	<u>2,145 gpm<sup>1</sup></u>	<u>843 gpm<sup>1</sup></u>	<u>2,988 gpm<sup>1</sup></u>
Pressure Tanks	NA <sup>2</sup>	NA <sup>2</sup>	NA <sup>2</sup>
Ground Storage	341,406 gal <sup>3</sup>	94,600 gal <sup>3</sup>	436,006 gal <sup>3</sup>
Elevated Storage	341,406 gal <sup>3</sup>	94,600 gal <sup>3</sup>	436,006 gal <sup>3</sup>

<sup>1</sup> Estimate based on historical peak hour use of 0.49 gpm/connection (Since elevated storage is provided). See [Water Demand](#) on page 12 for more details.

<sup>2</sup> Pressure tanks are not required if elevated storage is provided. Since the ultimate buildout will be more than 2,500 connections, elevated storage is required.

<sup>3</sup> Total storage required is 200 gallons/connection. Since there are more than 2,500 connections, 100 gallons/connection is required for elevated storage.

<sup>4</sup> The required high service pump capacity is the lower of the overall and with largest pump out of service numbers.

**Distribution**

Expansion of the District’s pipe distribution system will require upsizing various existing pipes and adding additional pipes to the system. It is outside the scope of this report to specifically identify these improvements. Upsizing of pipes and addition of pipes will have to be evaluated on a case-by-case basis as the District builds out. These determinations can be made using the hydraulic water model once the location and magnitude of growth is clear.

**Source**

**Aquifers**

Future District wells may be sourced from the Calvert Bluff Aquifer or Simsboro Aquifer. Where present, the Simsboro Aquifer underlies the Calvert Bluff Aquifer.



Wells

**Table 27** below shows how much well capacity will need to be added to meet TCEQ minimum requirements for ultimate buildout.

**Table 27: Current vs Ultimate Well Capacity Needs**

Pressure Plane	Current Capacity (gpm)	Ultimate Required Capacity (gpm)	Future Capacity to Add (gpm)
1	980	2,626	1,646
2	535	1,032	497
<b>Total</b>	<b>1,515</b>	<b>3,658</b>	<b>2,143</b>

The average capacity of the District's five (5) existing wells is about 300 gpm. **Table 28** below shows how many future wells will be needed, depending on the average well capacity.

**Table 28: Future Wells Needed for Ultimate Buildout**

Average Well Capacity	Future Wells Needed		
	Pressure Plane 1	Pressure Plane 2	Total
100	16	5	21
200	9	3	12
300	6	2	8
400	5	2	7
500	4	1	5

**Table 29** below shows how much well capacity would need to be added to meet potential alternative capacity requirements for ultimate buildout.

**Table 29: Potential ACR Current vs Ultimate Well Capacity Needs**

Pressure Plane	Current Capacity (gpm)	Ultimate Required Capacity (gpm)	Future Capacity to Add (gpm)
1	980	1,707	727
2	535	671	136
<b>Total</b>	<b>1,515</b>	<b>2,378</b>	<b>863</b>

**Table 30** below shows how much well capacity would need to be added to meet potential alternative capacity requirements for ultimate buildout.

**Table 30: Potential ACR Future Wells Needed for Ultimate Buildout**

Average Well Capacity	Future Wells Needed		
	Pressure Plane 1	Pressure Plane 2	Total
100	8	2	10
200	4	1	5
300	3	1	4
400	2	1	3
500	2	1	3

### Treatment

Future treatment plants will be needed for future wells. It is outside the scope of this report to specifically identify these improvements, except for the specific recommendations for the next treatment plant to be built. Future treatment needs will need to be evaluated based on test well and associated water sampling.

### High Service Pumps

The high service pump capacity for each pressure plane will need to be expanded over time to meet peak hour demands assuming the largest pump is out of service. Peak demand will need to be evaluated over time. **Table 31** below shows the future high service pump capacity to be added to the system to meet the TCEQ minimum capacity at ultimate buildout.

**Table 31: Future High Service Pump Capacity Needed for Ultimate Buildout**

Pressure Plane	Current Capacity <i>with Largest Pump Out of Service (gpm)</i>	Ultimate Required <i>Capacity with Largest Pump Out of Service (gpm)</i>	Future Capacity to Add (gpm)
1	1,500	2,145	645
2	500	843	343
<b>Total</b>	<b>2,000</b>	<b>2,988</b>	<b>988</b>

Two (2) 350 gpm high service pump will need to be added to pressure plane 1 and one (1) 350 gpm high service pump will need to be added to pressure plane 2 to meet ultimate buildout requirements.

The high service pump capacity for each pressure plane will need to be expanded over time to meet peak hour demands assuming the largest pump is out of service. Peak demand will need to be evaluated over time. below shows the future high service pump capacity to be added to the system to meet the potential alternative capacity requirements at ultimate buildout.

**Table 32: Potential ACR Future High Service Pump Capacity Needed for Ultimate Buildout**

<b>Pressure Plane</b>	<b>Current Capacity with Largest Pump Out of Service (gpm)</b>	<b>Ultimate Required Capacity with Largest Pump Out of Service (gpm)</b>	<b>Future Capacity to Add (gpm)</b>
1	1,500	2,145	645
2	500	843	343
<b>Total</b>	<b>2,000</b>	<b>2,988</b>	<b>988</b>

Two (2) 350 gpm high service pump would need to be added to pressure plane 1 and one (1) 350 gpm high service pump would need to be added to pressure plane 2 to meet ultimate buildout requirements.

**Pressure Tanks**

Since elevated storage will be required for ultimate buildout, pressure tanks are not required.

*[This space is left blank intentionally.]*



## Storage

Ground Storage

**Table 33** below shows how much ground storage will need to be added in each pressure plane to meet TCEQ minimum standards for ultimate buildout.

**Table 33: Future Ground Storage Needed for Ultimate Buildout**

Pressure Plane	Existing Capacity (gal)	Required Capacity (gal)	Future Capacity to Add (gal)
1	300,000	437,700	137,700
2	125,200	172,000	46,800
<b>Total</b>	<b>425,200</b>	<b>609,700</b>	<b>184,500</b>

The exact sizes and types of ground storage tanks will need to be determined during the design phase.

**Table 34** below shows how much ground storage would need to be added in each pressure plane to meet potential alternative capacity requirements for ultimate buildout.

**Table 34: Potential ACR Future Ground Storage Needed for Ultimate Buildout**

Pressure Plane	Existing Capacity (gal)	Required Capacity (gal)	Future Capacity to Add (gal)
1	300,000	341,406	41,406
2	125,200	94,600	0
<b>Total</b>	<b>425,200</b>	<b>436,006</b>	<b>41,406</b>

The exact sizes and types of ground storage tanks will need to be determined during the design phase.

*[This space is left blank intentionally.]*

Elevated Storage

**Table 35** below shows how much ground storage will need to be added in each pressure plane to meet TCEQ minimum standards for ultimate buildout.

**Table 35: Future Elevated Storage Needed for Ultimate Buildout**

<b>Pressure Plane</b>	<b>Existing Capacity (gal)</b>	<b>Required Capacity (gal)</b>	<b>Future Capacity to Add (gal)</b>
1	0	437,700	437,700
2	0	172,000	172,000
<b>Total</b>	<b>0</b>	<b>609,700</b>	<b>609,700</b>

The exact sizes and types of elevated storage tanks will need to be determined during the design phase.

**Table 36** below shows how much ground storage will need to be added in each pressure plane to meet TCEQ minimum standards for ultimate buildout.

**Table 36: Potential ACR Future Elevated Storage Needed for Ultimate Buildout**

<b>Pressure Plane</b>	<b>Existing Capacity (gal)</b>	<b>Required Capacity (gal)</b>	<b>Future Capacity to Add (gal)</b>
1	0	341,406	341,406
2	0	94,600	94,600
<b>Total</b>	<b>0</b>	<b>436,006</b>	<b>436,006</b>

The exact sizes and types of elevated storage tanks will need to be determined during the design phase.

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## RECOMMENDED IMPROVEMENTS

### Population and Water Service Growth Projection

#### Projected Growth Rate

Based on the Texas Water Development Board's Population Projection Data for Bastrop County shown in **Table 37** below, it is expected that the District will experience a 3% annual population growth rate.

**Table 37: Bastrop County Population Projections for 2020-2070\***

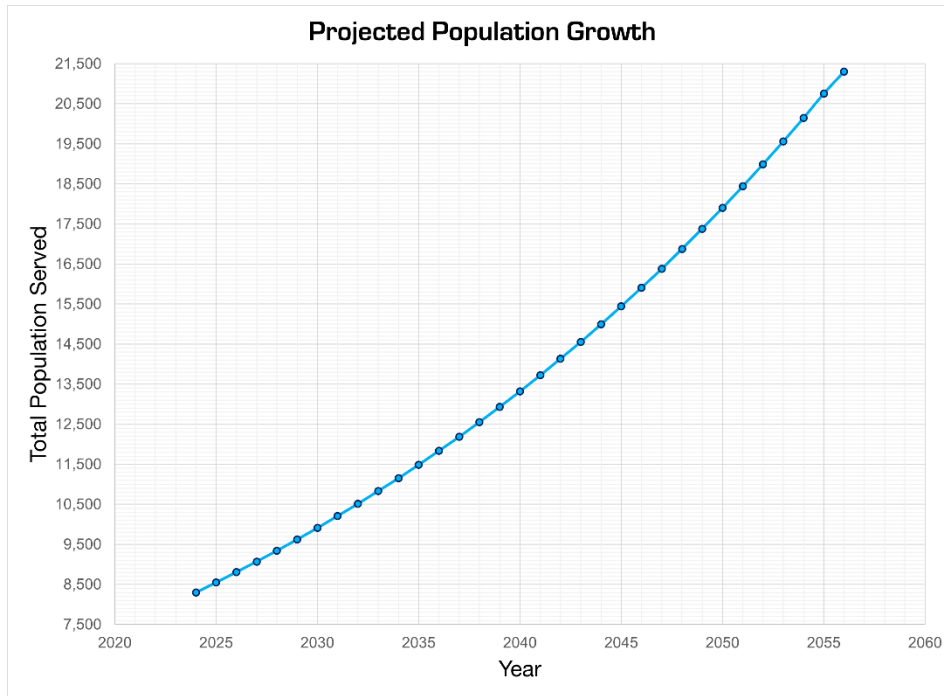
County	2020	2030	2040	2050	2060	2070
Bastrop County	95,487	125,559	164,648	217,608	289,140	384,244

\*From Texas Water Development Board 2021 Region K Water Plan

#### Population Growth

The District's water system currently serves an estimated population of 8,300 people. It is anticipated to serve an estimated population of 21,300 people at ultimate buildout. **Figure 10** below shows projected population growth assuming a 3% annual growth rate until ultimate buildout. **Table 38** below shows the projected annual population for the next ten (10) years.

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**Figure 10: Projected Population Growth**

**Table 38: 10-year Population Projection**

Year	Population
2024	8,300
2025	8,549
2026	8,805
2027	9,069

2028	9,341
2029	9,621
2030	9,910
2031	10,207
2032	10,513

2033	10,828
2034	11,153
2035	11,488

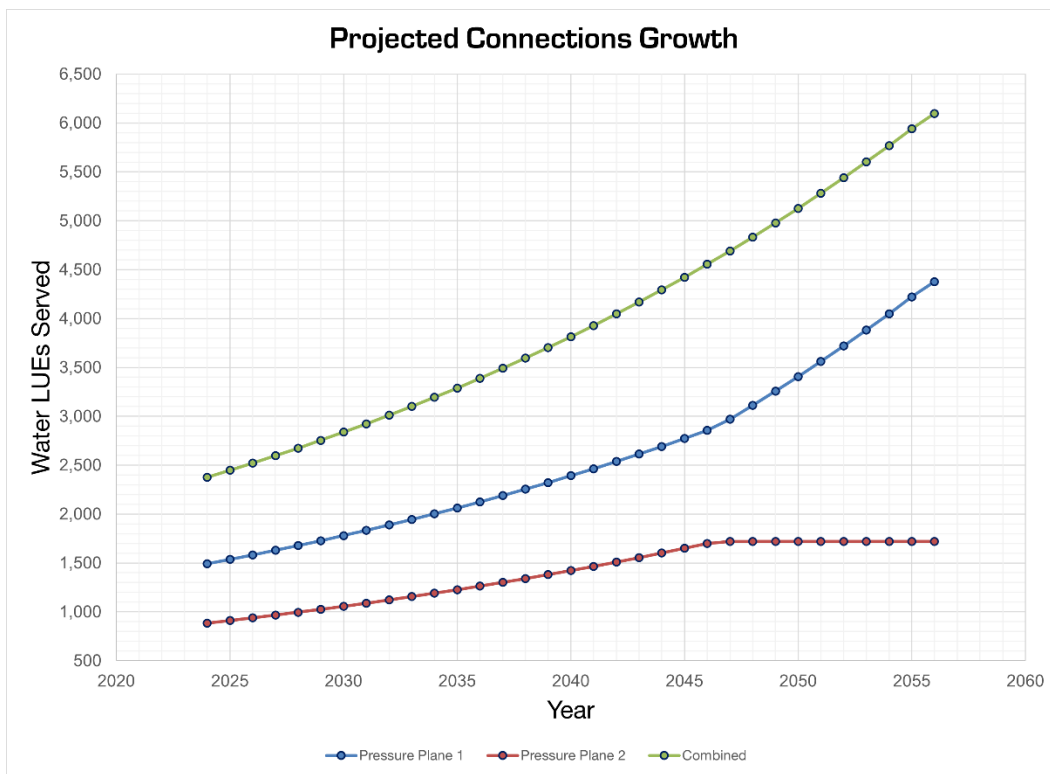
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Water Connections Served Growth

The District’s water system currently serves about 2,376 connections (1,491 connections in Pressure Plane 1 and 885 connections in Pressure Plane 2). It is anticipated to serve about 6,097 connections (4,377 connections in Pressure Plane 1 and 1,720 connections in Pressure Plane 2) at ultimate buildout. **Figure 11** below shows projected water connections served by pressure plane assuming a 3% annual growth rate until ultimate buildout.

**Table 39** below shows the projected water connections served by the District by pressure plane for the next ten (10) years.



**Figure 11: Projected Connections Growth**



Table 39: 10-year Water Connections Service Projection

Year	Water Connections Served		
	Pressure Plane 1	Pressure Plane 2	Total
2024	1,491	885	2,376
2025	1,535	912	2,447
2026	1,581	939	2,520
2027	1,629	967	2,596
2028	1,678	996	2,674
2029	1,728	1,026	2,754
2030	1,780	1,057	2,837
2031	1,833	1,089	2,922
2032	1,888	1,122	3,010
2033	1,944	1,156	3,100
2034	2,002	1,191	3,193
2035	2,062	1,227	3,289

Distribution

Expansion of the District’s pipe distribution system will require upsizing various existing pipes and adding additional pipes to the system. It is outside the scope of this report to specifically identify these improvements. Upsizing of pipes and addition of pipes will have to be evaluated on a case-by-case basis as the District builds out.

Source

Aquifers

See Source on page 34 for details on potential aquifers.

Future Well Locations

To aid in planning future well locations, SPI hired AGS to prepare a Groundwater and Well Siting and Planning Study (“Study”). AGS completed the Study on August 26, 2024. The purpose of the study was to determine future well needs, potential future well/test well locations, and provide a basis to select a location to dig test wells for the next proposed wells. A copy of the Study is attached in Appendix B.

The Study reviewed three (3) potential areas within the District’s service area to consider for the next and future well sites which are designated as Area A, Area B, and Area C. Figure 12 is a map of the District showing the areas studied, current land owned by the District, and our recommendation for the next test well locations.



Bastrop County Water Control and Improvement District No. 2

### Well Planning Study Overview

September 24, 2024

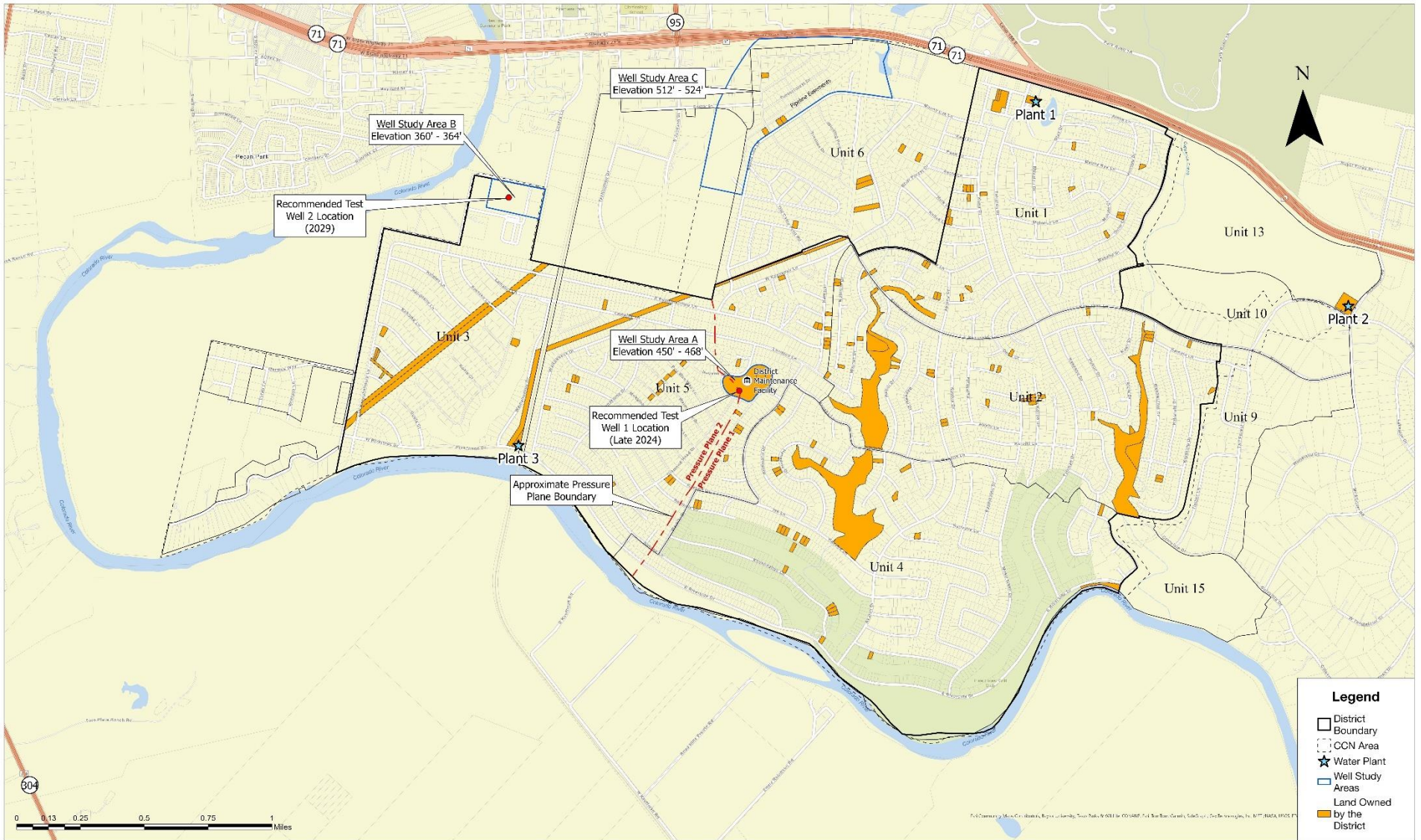


Figure 12: Well Planning Study Overview

**Area A**

Area A is located in Unit 5 and encompasses about 11-acres of land, all of which is owned by the District. It is currently home to the District's maintenance facility. The typical elevation of the land ranges between 450-feet to 468-feet, which is in the central elevations of the District's service area. It is in pressure plane 1 and is near pressure plane 2, making it a desirable location for versatility in serving both planes. A test hole was completed on the site in 1986 and water samples were tested from depths of about 750-feet and 1000-feet. The 1986 water samples had high total dissolved solids (TDS). However, water sampling was not taken from shallower sand formations, which could have better water quality.

**Area B**

Area B is located in Unit 3 and encompasses about 16-acres of land, none of which is owned by the District. It is currently primarily undeveloped green space on Bastrop ISD property. The typical elevation of the land is 360-feet to 364-feet, which is in the lower elevations of the District's service area. It is in pressure plane 2. No previous test wells have been completed in the area. However, there is an Aqua Water Supply Corporation well across the Colorado River that has much higher production than any of the District's current wells. A well drilled in Area B would likely feed from the same underlying source.

**Area C**

Area C is located in Unit 6 and encompasses about 139-acres of land, of which about 1.4-acres are currently owned by the District. The land currently owned by the District consists of three non-contiguous tracts. Two of these tracts are adjacent to pipeline easements that would prohibit placement of a well that meets required setbacks. The third tract is located where future commercial development is anticipated to occur. The District owned land in the area It is primarily undeveloped with many trees. The typical elevation of the land is 512-feet to 524-feet, which is in the higher elevations of the District's service area. It is in pressure plane 1 and not near pressure plane 2. A test hole was completed in 1986 with no water samples tested. The test hole indicated there was not a likelihood of good production at that location.

## Recommended Test Well Locations

Based on the results of the Study we recommend the following future test wells for preparing for future wells:

- Dig one (1) test well (Test Well 1) in the western half of Area A (The District's maintenance facility site). Area A is positioned in a favorable location to serve both pressure planes, it is on District owned land and is at a desirable elevation. We recommend taking and testing water samples at two or three depths ranging from shallower to deeper. Even though the 1986 test hole water sampling indicated high TDS at depths of about 750-feet and 1,000-feet, there may be better water quality at shallower depths. Additionally, depending on the newly observed TDS level, a treatment regimen may be feasible.
- Dig one (1) test well (Test Well 2) in Area B. Though this area is in the low elevations of the District, it is likely to yield a well site with good production and water quality. The District will need to reach out to the current land owner (Bastrop ISD) to negotiate potential purchase of a portion of the property and access for a test well prior to closing on any land. If a test well does not reveal a viable future well location, the District has no need to acquire property in the area. If Bastrop ISD is not amenable to selling the District part of their land, a different location will need to be selected for Test Well 2.

## Wells

Based on the projected growth, the following are recommended well installations:

- Install one (1) new well (Well 6) with about 400 gpm capacity in pressure plane 1 that can serve both pressure planes.

If the potential ACR were granted and remained in place and growth remained at or below 3% annually, the next well may not be needed until 2033/2034.

## Treatment

Based on the recommendation for wells to be added, the following are recommendations for future treatment plant installations:

- Install one (1) treatment plant (Plant 4) with Well 6. The necessary components of this plant will depend on test well results for the site and will be determined during the design phase.

If the potential ACR were granted and remained in place and growth remained at or below 3% annually, the next treatment plant may not be needed until 2033/2034.

## High Service Pumps

Based on the recommendation for wells and treatment plants to be added, the following are recommendations for future high service pumps:

- Install two (2) 350 gpm high service pump at Plant 4. The exact sizing of the high service pump will need to be determined during the design phase.

If the potential ACR were granted, installation of an additional 350 gpm high service pump in 2025/2026 would be needed at Plant 3.

## Pressure Tanks

No additional pressure tanks will be required since elevated storage will be provided. Pressure tanks may be considered during the design phase for future water plants.

If the potential ACR were granted, elevated storage would still be recommended, therefore additional pressure tanks would not be needed.

## Storage

### Ground Storage

Based on the recommendation for wells and treatment plants to be added, the following are recommendations for future ground storage tanks:

- Install one (1) 100,000 gallon ground storage tank at Plant 4.

### Elevated Storage

Since existing ground storage is insufficient and the District is expected to be serving more than 2,500 connections in less than 3 years, the following are recommendations for future elevated storage tanks to be added:

- Install one (1) 400,000 gallon elevated storage tank at Plant 1.

If the potential ACR were granted, 400,000 gallons of elevated storage would still be recommended to ensure compliance with the need for elevated storage when there are more than 2,500 connections.

## PROPOSED 2025/2026 WATER SYSTEM IMPROVEMENTS

**The proposed improvements detailed in this section are based on recommendations to bring the system into compliance with TCEQ standards, including projected growth, and do not consider the potential alternative capacity requirements.**

### Authorized Revenue Note Funded Projects

The District submitted an application to TCEQ on March 30, 2021 for issuance of a revenue note for water line, elevated storage, water well, ground storage, and water treatment improvements. Amongst the application forms provided to the TCEQ was a Preliminary Engineering Report for the improvements, completed by BEFCO Engineering, Inc. which is available in **Appendix C**. TCEQ approved issuance of a \$6,775,000 revenue note to the District on June 15, 2021 per the order shown in **Appendix D**. The revenue note was subsequently issued to the District. The revenue note was issued for the following projects as detailed below:

- Water Line Replacements – \$2,118,747 for construction with contingency
- Elevated Storage Tank – \$2,072,687 for construction with contingency
- Water Well – \$806,045 for construction with contingency
- Ground Storage and Water Plant – \$633,321 for construction with contingency

To date the District has made several water line improvements which are reflected in the information provided in this report. Recommendations for the remaining improvements and their Engineer's Opinion of Probable Construction Cost ("EOPCC") for each are detailed below.

## Water Line Replacements

Recommendation

SPI recommends that the District upsize about 0.737 miles of undersized pipe.

EOPCC

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Contractor Mobilization, Bonds & Insurance	\$ 75,000.00	\$ 75,000.00
2	1	LS	Construction Staking	\$ 5,000.00	\$ 5,000.00
3	1	LS	Storm Water Pollution Prevention Plan	\$ 5,000.00	\$ 5,000.00
4	1,500	SY	Replace HMAC Pavement	\$ 160.00	\$ 240,000.00
5	2,261	LF	Abandon 2" Water Main	\$ 10.00	\$ 22,610.00
6	1,630	LF	Abandon 4" Water Main	\$ 10.00	\$ 16,300.00
7	10	EA	Connect to Existing Water Main	\$ 3,000.00	\$ 30,000.00
8	2,261	LF	4" PVC Water Main	\$ 85.00	\$ 192,185.00
9	1,630	LF	6" PVC Water Main	\$ 100.00	\$ 163,000.00
10	5	EA	4" Gate Valve	\$ 2,500.00	\$ 12,500.00
11	4	EA	6" Gate Valve	\$ 3,000.00	\$ 12,000.00
12	2	EA	Fire Hydrant	\$ 6,000.00	\$ 12,000.00
13	25	EA	Reconnecting Short Service	\$ 1,500.00	\$ 37,500.00
14	26	EA	Reconnecting Long Service	\$ 2,000.00	\$ 52,000.00
15	3,891	LF	Trench Safety	\$ 10.00	\$ 38,910.00
16	2,400	LF	Ditch Reshaping	\$ 15.00	\$ 36,000.00
17	2,400	SY	Hydromulch	\$ 5.00	\$ 12,000.00
<b>Subtotal:</b>					<b>\$ 962,005.00</b>
				Contingency (15%):	\$ 144,301.00
				Engineering (15%):	\$ 144,301.00
				Construction Phase Services (8%):	\$ 76,960.00
<b>ENGINEER'S PRELIMINARY OPINION OF CONSTRUCTION COST:</b>					<b>\$ 1,327,567.00</b>

Elevated Storage Tank

Recommendation

SPI recommends that the District construct a new elevated storage tank at Plant 1. Plant 1 is located in the highest area of the District and releases into the largest feeder mains to the system. Both pressure planes will benefit from elevated storage at this location. The details for the proposed elevated storage tank are as follows:

- Multi-Column Design
- 400,000 gallon volume

EOPCC

**Table 40: Construction Cost Estimate for Elevated Storage Tank**

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Contractor Mobilization, Bonds & Insurance	\$ 150,000.00	\$ 150,000.00
2	1	LS	Construction Staking	\$ 5,000.00	\$ 5,000.00
3	1	LS	Storm Water Pollution Prevention Plan	\$ 5,000.00	\$ 5,000.00
4	1	LS	Site Preparation, Grading, and Seeding	\$ 15,000.00	\$ 15,000.00
5	2	EA	10' Wide Double Gate	\$ 3,000.00	\$ 6,000.00
6	300	LF	Intruder Resistant Fencing	\$ 20.00	\$ 6,000.00
7	1	LS	Tank Foundation	\$ 500,000.00	\$ 500,000.00
8	1	LS	400,000 gal Multi-Column Elevated Storage Tank	\$ 2,000,000.00	\$ 2,000,000.00
9	1	LS	Tie-in System to Existing Plant	\$ 5,000.00	\$ 5,000.00
10	1	LS	Yard Piping	\$ 25,000.00	\$ 25,000.00
11	1	EA	Butterfly Valve	\$ 25,000.00	\$ 25,000.00
12	1	LS	Electrical Improvements	\$ 75,000.00	\$ 75,000.00
<b>Subtotal:</b>					<b>\$ 2,817,000.00</b>
				Contingency (15%):	\$ 422,550.00
				Engineering (15%):	\$ 422,550.00
				Construction Phase Services (8%):	\$ 225,360.00
<b>ENGINEER'S PRELIMINARY OPINION OF CONSTRUCTION COST:</b>					<b>\$ 3,887,460.00</b>



## Water Well

### Test Well 1

The following actions have been taken to date for the test well:

- October 2024 – The Board authorized advertising for bids.
- December 2024 – Two (2) bids were received for a 1,300 foot deep test well with up to three (3) sampling depths. The low bid was \$574,400 which exceeded the preferred budget.
- January 2025 – The Board ordered rebidding.
- February/March 2025 – SPI prepared revised bid documents to allow for three (3) test well options to be bid as follows:
  - Option 1 - 800 foot deep test well with up to two (2) sample depths.
  - Option 2 - Two <800 foot deep PVC test wells with one (1) sample depth each.
  - Option 3 - 1,300 foot deep test well with up to three (3) sampling depths.
- April 2025 – One (1) bid was received with the following pricing for each option:
  - Option 1 – \$383,100
  - Option 2 – \$755,600
  - Option 3 – \$851,200
- April 2025 – The Board tabled potential contract award.

In May 2025 the Board will receive preliminary recommendations from this report and make a decision on whether to award the test well contract or re-bid it in the future.

### Recommendation

SPI recommends installing a water well (Well 6) in the western portion of the District's maintenance facility site. The details of the proposed well will need to be determined after a test well is completed.

EOPCC**Well 6****Table 41: Construction Cost Estimate for Water Well 6\***

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Contractor Mobilization, Bonds & Insurance	\$ 50,000.00	\$ 50,000.00
2	1	LS	Erosion Control	\$ 3,000.00	\$ 3,000.00
3	1	LS	Development of 12" Steel Cased 400 gpm Well (875 LF)	\$ 850,000.00	\$ 850,000.00
4	1	LS	Column Pipe, Submersible Pump, Liner and Screen	\$ 150,000.00	\$ 150,000.00
5	1	LS	Well Head, Yard Piping, Valves, etc.	\$ 60,000.00	\$ 60,000.00
6	1	LS	Water Sampling and Testing	\$ 15,000.00	\$ 15,000.00
7	1	LS	Generator	\$ 50,000.00	\$ 50,000.00
8	1	LS	Electrical Service, Starters, Controls	\$ 50,000.00	\$ 50,000.00
<b>Subtotal:</b>				<b>\$</b>	<b>1,228,000.00</b>
Contingency (15%):				\$	184,200.00
Engineering (15%):				\$	184,200.00
Construction Phase Services (8%):				\$	98,240.00
<b>ENGINEER'S PRELIMINARY OPINION OF CONSTRUCTION COST:</b>				<b>\$</b>	<b>1,694,640.00</b>

\*Well details are assumed based on the average production of the District's existing wells. Well parameters are assumed. Final parameters require results of a test well.

**Ground Storage and Water Plant**Recommendation

SPI recommends installing a 100,000 gallon ground storage tank and water plant (Plant 4) adjacent to Well 6 on the western portion of the District's maintenance facility site. The details for each are shown below.

**Ground Storage**

- 100,000 gallon volume
- Steel material
- Dimensions TBD

**Water Plant**

- Feed with Well 6

EOPCC**Table 42: Construction Cost Estimate for Ground Storage and Water Plant 4\***

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Contractor Mobilization, Bonds & Insurance	\$ 50,000.00	\$ 50,000.00
2	1	LS	Construction Staking	\$ 5,000.00	\$ 5,000.00
3	1	LS	Storm Water Pollution Prevention Plan	\$ 5,000.00	\$ 5,000.00
4	1	LS	Site Preparation, Grading, and Seeding	\$ 15,000.00	\$ 15,000.00
5	2	EA	10' Wide Double Gate	\$ 3,000.00	\$ 6,000.00
6	300	LF	Intruder Resistant Fencing	\$ 20.00	\$ 6,000.00
7	1	LS	Chlorination Equipment	\$ 50,000.00	\$ 50,000.00
8	1	LS	Corrosion Inhibitor Chemical Feed System (Orthophosphate)	\$ 20,000.00	\$ 20,000.00
9	1	LS	Granular Activated Carbon Filtration	\$ 200,000.00	\$ 200,000.00
10	1	LS	Phosphate Treatment	\$ 50,000.00	\$ 50,000.00
11	1	LS	Tie-in System to Existing Well	\$ 3,000.00	\$ 3,000.00
12	100	LF	Yard Piping	\$ 80.00	\$ 8,000.00
13	2	EA	Gate Valve	\$ 4,500.00	\$ 9,000.00
14	1	EA	Interconnections	\$ 2,500.00	\$ 2,500.00
15	1	LS	CMU Block Equipment Building	\$ 120,000.00	\$ 120,000.00
16	40	SY	6' Wide 4" Depth Sidewalk by Building	\$ 150.00	\$ 6,000.00
17	1	LS	10,000 gallon pressure tank	\$ 50,000.00	\$ 50,000.00
18	1	LS	100,000 Gal AWWA Welded Steel Ground Storage Tank	\$ 300,000.00	\$ 300,000.00
19	1	LS	Two (2) 350 GPM High Service Pumps	\$ 100,000.00	\$ 100,000.00
20	1	LS	Generator Shed (Includes Pad)	\$ 20,000.00	\$ 20,000.00
21	1	LS	Electrical Improvements	\$ 150,000.00	\$ 150,000.00
<b>Subtotal:</b>				<b>\$</b>	<b>1,175,500.00</b>
Contingency (15%):				\$	176,325.00
Engineering (15%):				\$	176,325.00
Construction Phase Services (8%):				\$	94,040.00
<b>ENGINEER'S PRELIMINARY OPINION OF CONSTRUCTION COST:</b>				<b>\$</b>	<b>1,622,190.00</b>

\*Parameters or the plant are assumed. Final parameters require results of a test well.

**Proposed Schedule**

**Schedule TBD after May 2025 Board meeting.**






# Appendix A

## City of Bastrop Future Land Use Plan













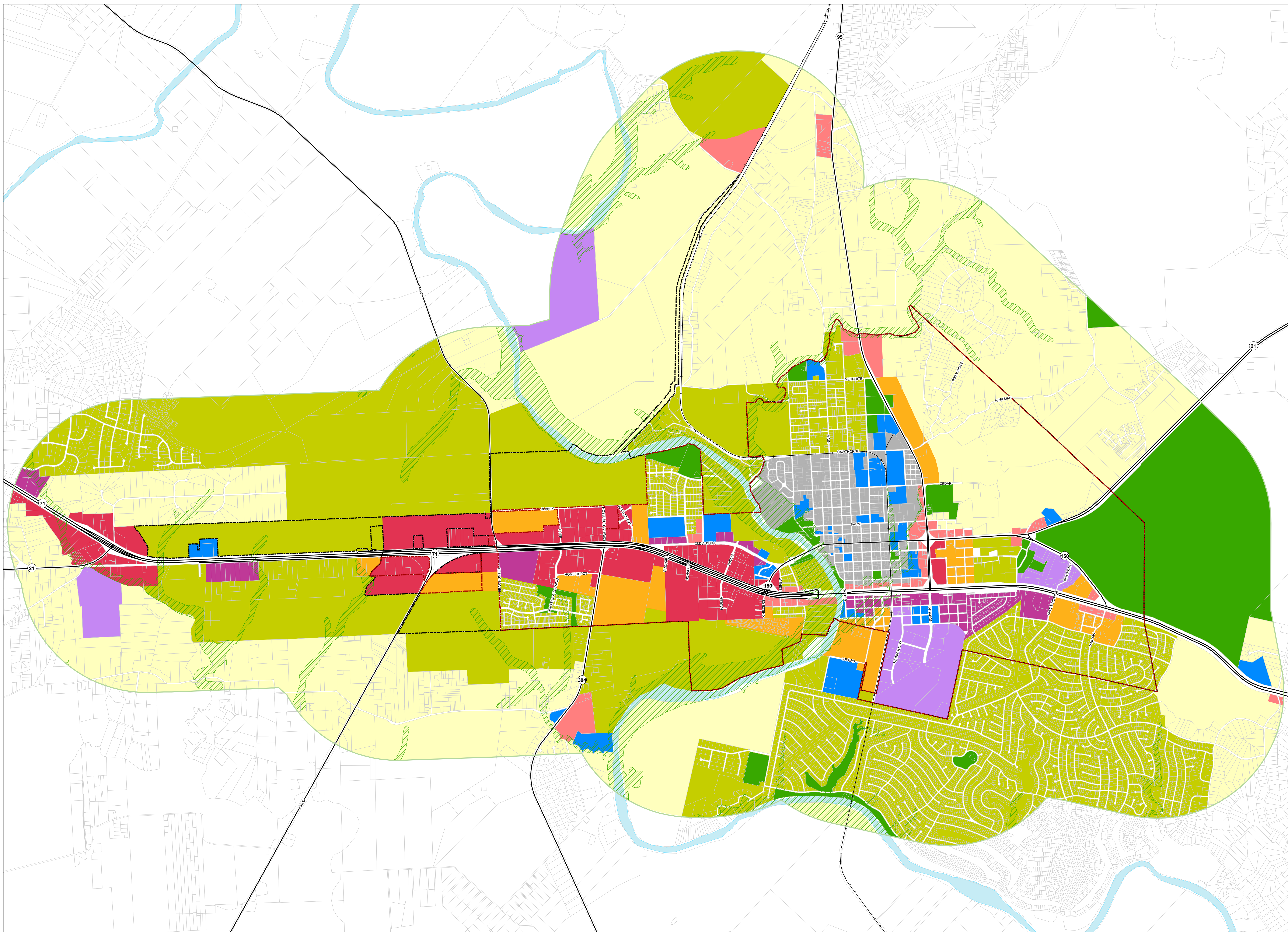
# Future Land Use

## Legend

-  Statutory ETJ
-  City Limit
-  City Boundary
-  Parcels
-  Floodplain Overlay

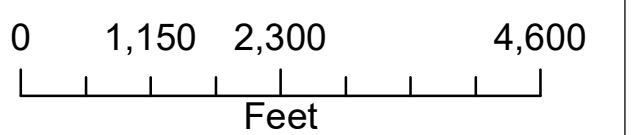
## Land Use Description

-  Parks and Open Space
-  Rural Residential
-  Neighborhood Residential
-  Transitional Residential
-  Neighborhood Commercial
-  General Commercial
-  Professional Services
-  Downtown Bastrop
-  Public and Institutional
-  Industrial




\*Boundary is similar to the DB-FBC

1 inch = 1,700 feet



Date: 4/12/2017

 The accuracy and precision of this cartographic data is limited and should be used for information/planning purposes only. This data does not replace surveys conducted by registered Texas land surveyors nor does it constitute an "official" verification of zoning, land use classification, or other classification set forth in local, state, or federal regulatory processes. The City of Bastrop, nor any of its employees, do not make any warranty of merchantability and fitness for particular purpose, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any such information, nor does it represent that its use would not infringe upon privately owned rights.

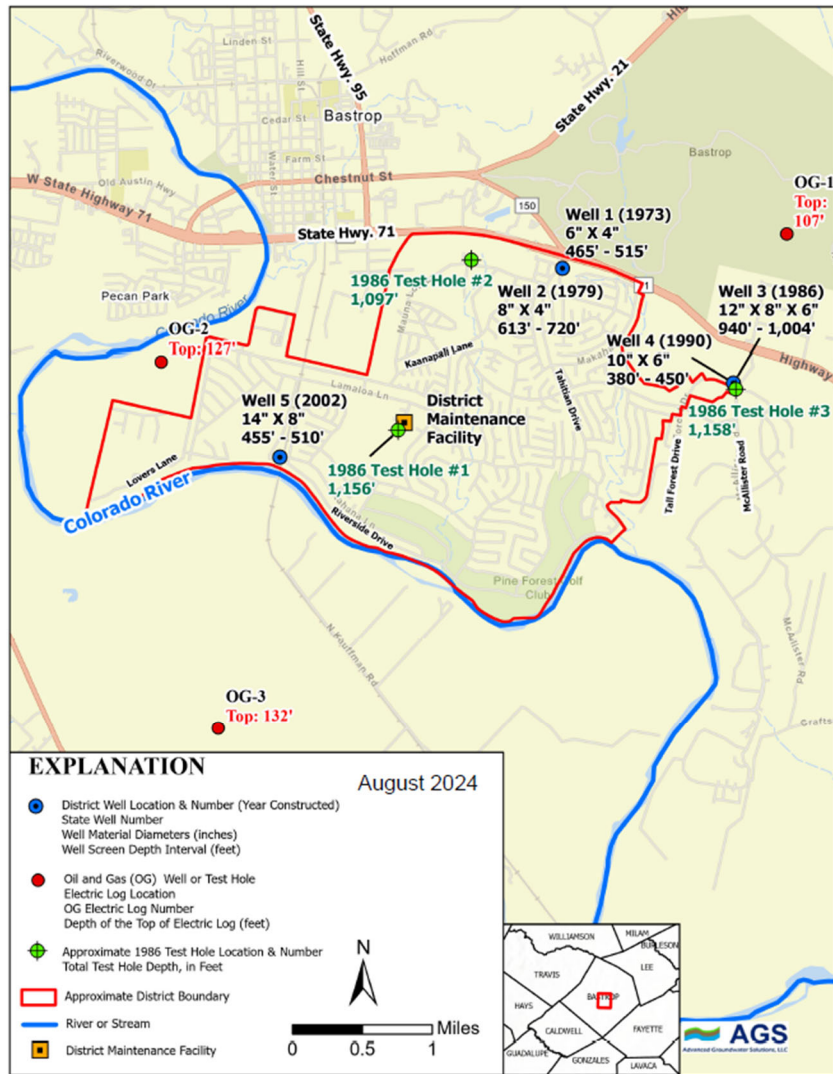
# Appendix B

## Groundwater and Well Siting and Planning Study

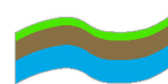


# Bastrop County WCID #2

## Groundwater and Well Siting and Planning Study



Prepared by:



# AGS

Advanced Groundwater Solutions, LLC

August 26, 2024



August 26, 2024

Mr. Allen R. Ross, P.E. and Mr. John Schmeling, P.E.  
Schaumburg & Polk, Inc.  
187 Elmhurst Drive, Suite B  
Kyle, TX 78640  
aross@spi-eng.com, jschmeling@spi-eng.com

Dear Mr. Ross and Mr. Schmeling:

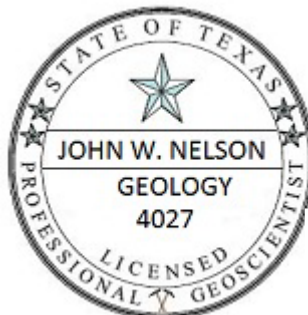
Attached is the Bastrop County WCID #2 Groundwater and Well Siting and Planning Study report prepared by Advanced Groundwater Solutions, LLC (AGS) for Schaumburg & Polk, Inc. and the District. The AGS report includes text, figures, tables and appendices with considerable information regarding the: local hydrogeology and aquifers; well construction and water quality information for the District's five existing public supply wells and three water plants; Aqua WSC public supply wells in the area; District 1986 test hole drilling and water sampling operations and data; electric logs for oil and gas wells and test holes in the area; preliminary assessments of the general District's maintenance facility area and two other areas for possible future District test hole drilling, logging and temporary test well operations prior to construction of a new District water plant(s) and production well(s); preliminary test hole, test well and production well design parameters and estimates and well pumping equipment information; and siting, planning and state and local regulatory information and/or recommendations for one or more future District water plants and public supply wells.

We appreciate the information provided by and discussions with personnel with Schaumburg & Polk, Inc. and Bastrop County WCID #2 during our study. Please review the information in the report and AGS plans to coordinate a meeting with SPI and the District to discuss the report, answer any questions and address related comments.

Sincerely,  
Advanced Groundwater Solutions, LLC

A handwritten signature in black ink that reads "John W. Nelson".

John W. Nelson, P.G.  
Principal Hydrogeologist, TBPG #4027

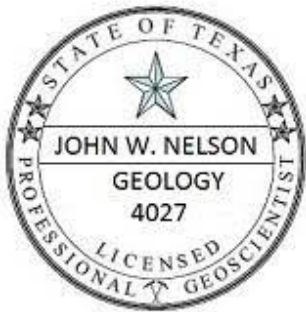


TBPG Geoscience Firm  
No. 50639

8/26/2024

# Bastrop County WCID #2 Groundwater and Well Siting and Planning Study

Geoscientist's Seal:



8/26/2024

A handwritten signature in blue ink that reads "John W. Nelson".

John W. Nelson, P.G.  
Principal Hydrogeologist

The seal appearing on this document was authorized  
by John W. Nelson, P.G., TBPG, P.G. 4027, on 8/26/2024.  
Advanced Groundwater Solutions, LLC,  
TBPG Firm Registration No. 50639

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## Figures

Figure 1	District Water Wells and 1986 Test Holes and Oil and Gas Wells with Logs
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Figure 3	Oil and Gas Electric Logs
Figure 4	District Water Wells and 1986 Test Holes and Possible Future District Test Hole Areas

## Tables

Table 1	Bastrop County WCID #2 - Water Wells and Test Holes, Construction and Testing Data
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## Field Photos

Photos 1 - 4	District Water Plant 1, Well 1 and Well 2 Site, August 18, 2024
Photos 5 – 8	District Water Plant 2, Well 3 and Well 4 Site, August 18, 2024
Photos 9 – 12	District Water Plant 3, Well 5 Site, June 13, 2024
Photos 13 - 16	Area A, District Maintenance Facility Area, August 21, 2024
Photos 17 - 20	Area B, Gateway D.A.E.P. School / Lovers Lane Area, August 18, 2024
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## Appendices

- Appendix A BEFCO Engineering, Inc., August 2023,  
Bastrop County Water Control & Improvement District No. 2  
Water System Presentation (August 2023 Board Meeting)
- Appendix B William F. Guyton Associates, Inc., November 1986,  
Completion Report of Production Well 3, prepared for  
Bastrop County Water Control and Improvement District #2
- Appendix C Driller's Logs for 1986 Test Hole #1, Test Hole #2 and Test Hole #3  
in the Record of Deep Well for Bastrop WCID No. 2 Well No. 3,  
prepared by J. L. Myers Company
- Appendix D TCEQ Rules and Regulations for Public Water Systems,  
Chapter 290, Subchapter D, 290.41(c)(1)(A)-(F) from TCEQ RG-195 and  
TCEQ Well Pollution Hazard Survey Checklist
- Appendix E Lost Pines Groundwater Conservation District (GCD) –  
Form 100 – Well Drilling Application

## Study and Report Overview

Advanced Groundwater Solutions, LLC (AGS) has performed a groundwater and well siting and planning study and prepared this report for Schaumburg & Polk, Inc. (SPI, Engineer) and the Bastrop County Water Control and Improvement District (WCID) No. 2 (District).

The District provides the water supply, wastewater, roads and drainage for the Tahitian Village development, which is located on the east side of the City of Bastrop, Texas in central Bastrop County. As shown on Figures 1, 2 and 4 in the report, the District is located generally southwest, south and southeast of the intersection of State Highway 71 and Tahitian Drive and north of the Colorado River. The District has three existing water plants that are in service and five existing public supply wells that provide the groundwater supply for the District and Tahitian Village.

This AGS report includes text, figures, tables, field photographs and appendices with information regarding the: local hydrogeology and aquifers; well construction, water quality and water treatment information for the District's five existing public supply wells and three water plants; Aqua Water Supply Corporation (WSC) public supply wells that are located in the study area; District 1986 test hole drilling and water sampling operations and water quality data; oil and gas wells and test holes with electric logs in the study area; preliminary assessments of the District's maintenance facility area and two other possible areas within the District boundaries for one or more future District test holes and temporary test wells to be drilled, logged and water samples collected and analyzed; preliminary test hole, test well and production well design parameters and estimates and well pumping equipment information; preliminary estimates of the future District water demands and the number of District wells needed to meet the estimated demand; and siting, planning and state and local regulatory information and/or recommendations for one or more future District water plants and public supply wells.

## Executive Summary Information

AGS has prepared this Executive Summary Information section that provides the principal summary information for most of the sections and major topics described in the report with a list of the related pages, figure(s), table(s) and appendix or appendices that include more detailed and explanatory information.

- **Local Aquifers and Hydrogeology** (Pages 7 and 8): The local aquifer in central Bastrop County is the Carrizo – Wilcox Aquifer that includes the following aquifers or formations from shallowest to deepest and youngest to oldest: The Carrizo Formation and the Wilcox Group, which includes the Calvery Bluff Aquifer, Simsboro Aquifer and Hooper Formation. The District's existing public supply wells screen the Calvert Bluff Aquifer. The depths and thicknesses of the sands in the Calvert Bluff Aquifer in the Bastrop and District area are inconsistent and well productivity is variable and not predictable.

- **District Public Supply Wells** (Pages 8 and 9; Figure 1; Table 1): The District has five public supply wells that provide water to three District water plants. The District’s wells screen the Calvert Bluff Aquifer and the year each well was constructed, the well screen depth interval and the water plant the well serves follow: Well 1 (1973, screen 465 to 515 feet) and Well 2 (1979, screen 613 to 720 feet) provide water to District Water Plant 1. Well 3 (1986, screen 940 to 1,004 feet) and Well 4 (1990, screen 380 to 450 feet) provide water to Water Plant 2. Both District Water Plant 1 and Water Plant 2 are in the District’s upper pressure plane. District Well 5 (2002, screen 455 to 510 feet) provides water to District Water Plant 3, which is in the lower District pressure plane.

The District’s public supply wells have relatively small to intermediate well casing, blank liner and well screen diameters, which may or can limit the depths that the well pumps can be installed and also can limit the potential well production in some cases.

The reported District well pumping rates in 2023 (Appendix A) were:

Well 1, 110 gpm; Well 2, 220 gpm; Well 3, 525 gpm; Well 4, 165 gpm; & Well 5, 525 gpm.

- **District Well Pumping Equipment** (Pages 9 and 10; Table 1): The five existing District wells all have submersible well pump and well motor equipment installed. For future District wells, either similar vertical turbine, submersible well pumping equipment could be installed or vertical turbine, line shaft well pumping equipment with the electric well motor installed above-ground could be installed. AGS recommends that line shaft well pumping equipment be considered by the District because it has some advantages versus the submersible well pumping equipment, particularly as the well motor horsepower increases.
- **District Well and Aquifer Data Collection, Testing and Monitoring** (Page 10): AGS recommends that the District measure, record and monitor the District Well pumping rates, static and pumping water levels (if possible) and daily (if possible), monthly and yearly pumping volumes for the District’s public supply wells.

AGS also recommends that detailed District well field testing be performed on at least an annual basis by a qualified well testing contractor to provide detailed static and pumping water level, well pumping rate, specific capacity, discharge pressure, well pump and motor performance, and sand production data.

- **District Wells and Water Plants – Groundwater Quality and Water Treatments** (Pages 11 – 14; Table 2): The District’s existing public supply wells produce groundwater with acceptable quality that requires disinfection and may also require water treatment with a phosphate for iron prior to distribution. Well 3 (screen 940 to 1,004 feet) water contains

natural gas, iron related bacteria and sulfate reducing bacteria and the well water at Water Plant 2 (Well 3 and Well 4) is disinfected and treated with a phosphate plus activated carbon and the ground storage tank has air vents and a forced air fan.

- **Aqua WSC Public Supply Wells** (Pages 14 and 15); Figure 2; and Table 3): Aqua Water Supply Corporation (WSC) has or had two or three M wells that are located north of District Water Plant 2, Wells 3 and 4 and north of State Highway 71. The Aqua WSC M wells are designated as being completed in the Wilcox Group or Calvert Bluff Aquifer and the M wells screen or screened formations at reported subsurface depths that range from about 611 to 810 feet.

Aqua WSC also has or had a total of eight S wells that are located west of the District boundaries and the Colorado River and south of State Highway 71 along State Highway 304. The Aqua WSC S wells are designated as being completed in the Simsboro Aquifer and the S wells screen or screened formations at reported depths that range from 277 to 600 feet. The Aqua WSC M wells and S wells have relatively small to large well casing, blank liner and well screen diameters.

- **District 1986 Test Holes and Water Sampling** (Pages 15 – 18; Figures 1, 2 and 4; Table 1 and Table 2; Appendix B and Appendix C): In 1986, a well contractor (J. L. Myers Company) drilled and completed geophysical logging in three District test holes (Test Holes #1, total depth 1,158 feet; Test Hole #2, total depth 1,097 feet; and Test Hole #3, total depth 1,156 feet). The test holes drilled through the Calvert Bluff Aquifer and the upper section of the Simsboro Aquifer at these locations. Temporary test well pumping and water sampling was completed in 1986 in Test Hole #1 and Test Hole #3 but no water sampling was performed at the Test Hole #2 site. Additional summary information follows for the three District 1986 test holes.

**Test Hole #1 Site, Total Depth 1,156 feet:** The 1986 Test Hole #1 location was near the District maintenance facility. The 1986 interpretation of the subsurface geophysical logs by William F. Guyton Associates, Inc. indicated that considerable sand thickness was present in the depth interval between 670 and 1,000 feet. Temporary test well water sampling was completed in April and May 1986 at depths of 980 to 1,010 feet and 740 to 770 feet and the water sample analyses indicated that the water was slightly brackish and not acceptable for public water supply at these depths. No Test Hole #1 water sampling was performed at depths shallower than 740 feet.

**Test Hole #2 Site, Total Depth 1,097 feet:** The 1986 Test Hole #2 location was about 0.65 mile west of the District Water Plant 1 site in the north part of the District. The 1986 log interpretation by William F. Guyton Associates, Inc. indicated that the sands encountered

between 400 and 730 feet appeared to contain water of acceptable quality. However, the Test Hole #2 location was evaluated as being unfavorable for the completion of a production well due to the relative shallowness of the uppermost of these sands and the small total thickness of the sands (approximately 80 feet). No Test Hole #2 water sampling is reported to have been performed at any depth.

**Test Hole #3 Site, Total Depth 1,158 feet:** The 1986 Test Hole #3 location was at or in very close proximity to the District Water Plant 2, Well 3 and Well 4 site. Temporary test well water sampling was completed in July 1986 at depths of 970 to 1,000 feet and 380 to 410 feet.

The Test Hole #3 test well water sample from 970 to 1,000 feet was slightly brackish with TDS concentration of more than 1,300 mg/L with high sodium concentrations. The 1986 District report by William F. Guyton Associates, Inc. indicates that there was consultation with personnel with the Texas Department of Health and, after review of the results of the chemical analyses and pumping tests of Test Hole #3 and review of the costs of additional test hole drilling and various well construction alternatives, the District's Board of Directors decided to have District Well 3 (1986, screen 940 to 1,004 feet) completed in the deeper zone because the estimated well production has higher.

The 1986 Test Hole #3 water quality analyses indicated the water at 380 to 410 feet was fresh water and acceptable for public water supply and District Well 4 (screen 380 to 450 feet) was completed at the Water Plant 2 site in 1990.

- **Oil and Gas Wells and Test Holes and Electric Logs** (Pages 18 – 20); Figures 1 and 3): AGS searched the available public and private log sources for oil and gas (OG) wells or test holes that are or were located within or near the District boundaries. AGS did not find any oil or gas wells or test hole with an electric log that was located within the District boundaries. However, AGS identified, purchased and evaluated the electric logs for three OG wells or test holes that are located outside the District boundaries.

The locations of OG-1, OG-2 and OG-3 are shown on Figure 1 and copies of the electric logs are shown on Figure 3. AGS reviewed these electric logs to help in evaluation of the depths, thicknesses and possible general water quality for the sands and formations at their locations and add to the available subsurface data and logs for the Calvert Bluff Aquifer and upper Simsboro Aquifer near the District.

- **Possible Areas for Future District Test Holes and Temporary Test Wells** (Pages 20 – 24); Figure 4; and Photos 13 – 24): Figure 4 and Photos 13 – 24 show three possible areas that AGS has designated Areas A, B and C for possible future District test hole drilling and

logging and temporary test well water sampling. The report provides considerable information regarding the location, estimated elevation, general site conditions and the positive(s) / advantage(s) and negative(s) / disadvantage(s) for the three possible areas that should be reviewed by the District and SPI.

**Area A – District Maintenance Facility Area:** The District maintenance facility at 194 Nuwana Lane is in the central District area and the adjoining District property has an area of about 11 acres. This is a large area with good access and hilly topography with lots of trees, brush and vegetation. The District 1986 Test Hole #1 was drilled within or close to Area A and temporary test well water sampling in Test Hole #2 was completed in April and May 1986 at depths of 980 to 1,010 feet and 740 to 770 feet and the lab analyses indicated that the water was slightly brackish and not acceptable for public water supply at these depths between 740 and 1,010 feet.

**Area B – Gateway D.A.E.P. School / Lovers Lane Area:** Area B is located near the northwest boundary of the District and includes large area of flat, undeveloped land that is located north of the Gateway D.A.E.P. School and the GoldStar Transit facility and is believed to be owned by the Bastrop Independent School District (ISD).

**Area C – Mauna Loa Lane Area:** Area C is located in the north part of the District in a large undeveloped area with hilly topography and considerable trees, brush and vegetation. Access ranges from a good to poor gravel and dirt road sections of Mauna Loa Lane to the west of Briar Forest Drive and gravel and blacktop road sections of Mauna Loa Lane in the south part of Area C and no road access between.

- **Future District Test Hole Drilling, Logging and Water Sampling (Pages 24 - 27):** AGS prepared test hole drilling and logging and temporary test well water sampling information and recommendations for future District test holes. Based on the unreliable and inconsistent subsurface conditions and variable well production for the Calvert Bluff Aquifer in central Bastrop County and the District area described in this report, AGS recommends that the District plan for the drilling and geophysical logging of a minimum of two or three District test holes in the future.

The preliminary estimated costs for a District test hole drilling, geophysical logging with water sampling in two depths using a small-diameter, temporary test well installed in the test hole ranges from \$215,000 to \$275,000 (2024 dollars), if a minimum of two to four qualified and experienced, mid-sized water well drilling companies bid the project.

- **Preliminary Future District Public Supply Well Parameters and Estimates (Pages 27 – 29):** Based on evaluation of the records, reports, data and logs described in this report, AGS prepared preliminary well construction parameters and estimates for a future District

public supply well constructed with large 20-inch well casing and 14-inch diameter blank liner and well screen materials and completed in the Calvert Bluff Aquifer.

The preliminary well material depths should be adjusted, as needed, and more detailed well, well pump and well motor parameters and technical specifications should be prepared, based on the location selected for a new District well and evaluations of the existing data and logs available plus any future District test hole drilling, logging and water sampling operations that are completed.

- **Possible Future Replacement Wells for Existing District Wells** (Pages 29 and 30): The existing District public supply wells range in age from 22 years (Well 5) to 45 years (Well 2) to 51 years (Well 1) old and have relatively small to intermediate well casing, blank liner and well screen diameters. AGS recommends that the District consider and plan for the construction of larger diameter replacement wells for District Well 1 and Well 2 (1979) located at or near the Water Plant 1 site within the next five to ten years.
- **Preliminary Estimated Future District Water Demand and Wells to Meet District Water Demands** (Pages 31 - 33; Appendix A): BEFCO Engineering, Inc. prepared a presentation to the District Board in August 2023 that is Appendix A and includes considerable information regarding the District's water system, existing wells, water demands and future water system improvements and future wells needed for the District.

The BEFCO information included estimates regarding the future District water demands and an estimate that 15 District wells could be required to meet the District's ultimate buildout water demand in the future. The preliminary AGS estimate at this time is that the BEFCO estimate for future District wells is reasonable for current District planning. However, the BEFCO estimates should be reevaluated in the future as more District water demand and District well and aquifer monitoring data are available and future District test holes and public supply wells are drilled, logged and constructed.

- **Water Plant Site Layout, Access and Spacing Information and Recommendations** (Pages 33 and 34): The report provides general information, guidance and recommendations for the site planning for future District water plants and public supply wells.
- **State and Local Regulatory Requirements** (Pages 34 - 37; Appendix D and Appendix E): The report and Appendix D and Appendix E include information regarding Texas Commission on Environmental Quality (TCEQ) and Lost Pines Groundwater Conservation District (GCD) and possible Bastrop County and City of Bastrop rules and requirements for public supply water plants and wells for review. There are many TCEQ rules and requirements for a new District water plant(s) and public supply well(s) with relevant

requirements for the minimum well spacing or setback distances from pollution hazards and the sanitary control easement.

Lost Pines GCD will require a Form 100 – Well Drilling Application to be submitted and approved prior to the drilling of any future District test hole.

Lost Pines GCD has rules and requirements for well operating permits, well spacing and well production limits. AGS recommends that the District or the District and AGS contact the Lost Pines GCD to discuss the District’s operating permits for the existing District wells and whether any update or adjustment of the existing District permits is needed and discuss the GCD’s well spacing rules and production limits for the planned future construction of one or more additional District public supply wells.

## Local Aquifers and Hydrogeology

In the District area and central Bastrop County, the principal aquifer is the Carrizo – Wilcox Aquifer, which includes the upper Carrizo Formation and three aquifer units in the Wilcox Group, which are from youngest to oldest and shallowest to deepest are the Calvert Bluff, Simsboro and Hooper Aquifers or Formations, as listed below. The Carrizo Formation is too shallow and relatively thin in the District area to be considered for a District public supply well.

### **Carrizo – Wilcox Aquifer, Central Bastrop County**

Carrizo Formation

Wilcox Group

Calvert Bluff Aquifer

Simsboro Aquifer

Hooper Formation

In central Bastrop County, the Calvert Bluff Aquifer can be more than 1,000 feet thick and it is a mix of fine to coarse sand and sandstone with some silt, mudstone, clay, and lignite. There is generally some unreliability and variability in the depths and thicknesses of the Calvert Bluff sands and formations. As a result, well productivity is not predictable and it depends on the depths, thicknesses, grain sizes and permeabilities of the subsurface sands and sediments encountered in the test hole at a particular site. The District’s existing public supply wells are completed in the Calvert Bluff Aquifer.

Where present, the Simsboro Aquifer or Formation underlies the Calvert Bluff Aquifer and the Simsboro Aquifer has generally thick and productive sands and many production wells are completed in the Simsboro Aquifer within some parts of Bastrop County and Lee County. Three District test holes were drilled in 1986 to total depths of about 1,100 to 1,160 feet and were

believed to have penetrated into the upper section of the Simsboro Aquifer. The 1986 Test Hole Drilling and Water Sampling for District Well 3 section that follows in this report provides more information regarding the District's 1986 test holes.

Additional information regarding the groundwater resources, aquifers and hydrogeology in Bastrop County is provided in: Texas Water Development Board (TWDB) Report 109, Ground-Water Resources of Bastrop County, Texas (Follett, C. R, 1970).

## District Public Supply Wells

Figure 1 shows the locations and lists well construction information for the five District public supply wells and Table 1 includes considerable well construction and testing information for the five District wells, based on District well records, reports and data that the District provided to AGS and Texas Water Development Board (TWDB), United States Geological Survey (USGS) and other public data sources.

The water wells shown on Figure 1 and listed in Table 1 are for the District's public supply wells and do not show other public, industrial, irrigation or domestic wells located in the study area.

As shown on Figure 1 and listed in Table 1, general summary well construction and testing information follows for the five District public supply wells.

District Wells – Year of construction; well material diameters; well screen depth intervals:

District Well 1: 1973; 6 x 4 inches; 4-inch well screen depth interval 465 to 515 feet.

District Well 2: 1979; 8 x 4 inches; 4-inch well screen depth interval 613 to 720 feet.

District Well 3: 1986; 12 x 8 x 6 inches; 6-inch well screen depth interval 940 to 1,004 feet.

District Well 4: 1990; 10 x 6 inches; 6-inch well screen depth interval 380 to 450 feet.

District Well 5: 2002; 14 x 8 inches; 8-inch well screen depth interval 455 to 510 feet.

- The District wells have upper well casing diameters that range from six (6) inches for Well 1 to fourteen (14) inches for Well 5 and blank liner and well screen diameters that range from four (4) inches for Well 1 to eight (8) inches for Well 5.

- The reported well pumping or testing rates for the District wells listed in Table 1 ranged from approximately 78 gallons per minute (gpm) (Well 1) to 350 gpm (Well 5) at the time that they were originally constructed and 505 gpm when Well 5 was tested in November 2023.

- A copy of the BEFCO Engineering, Inc. (BEFCO) August 2023 Board presentation is in Appendix A of this report and includes the District 2023 well capacity information that follows.

Upper Pressure Plane:           Water Plant 1, Well 1, 110 gpm and Well 2, 220 gpm.  
  Water Plant 2, Well 3, 525 gpm and Well 4, 165 gpm.  
  Total Capacity for Wells 1 – 4 = 1,020 gpm.

Lower Pressure Plane: Water Plant 3, Well 5, 525 gpm.

- The District's five water wells have submersible well pump and motor equipment installed.
- In June 2024 and August 2024, AGS personnel took field photographs of the three District water plant sites and five District public supply wells and the AGS photos follow the report text and Tables 1, 2 and 3 in the report.

## District Well Pump and Well Motor Equipment

Well Pump and Well Motor Equipment (Submersible): The five existing District wells have vertical turbine, submersible pump and motor equipment installed. The far right column in Table 1 lists the depth of the submersible well pump setting (top) and the well motor horsepower for the five District wells, based on information that the District provided to AGS, and summary information follows.

- Well Pump Settings: Well 1, 357 feet; Well 2, 440 feet; Well 3, 680 feet; Well 4, 390 or 399 feet (Well 4); and Well 5, 380 feet.
- Well Motor Horsepower (Hp): Well 1, 15 Hp; Well 2, 30 Hp; Well 3, no information reported; Well 4, 20 Hp; and Well 5, 75 Hp.

The submersible pump and motor equipment in each District well has an electrical cable that is connected to the submersible motor that is installed below the submersible pump and the cable is strapped to the pump column pipe and extends up from the depth of the pump setting to the well discharge head or elbow above land surface.

If desired, or preferred, the District can install vertical turbine, submersible well pump and well motor equipment in a future District public supply well(s), similar to the submersible well pumping equipment installed in the District's Wells 1 – 5. For wells with submersible well pumping equipment, the well pump, well motor and a submersible electrical cable are installed below the well pumping level at a depth within a well casing or blank liner section.

Well Pump and Well Motor Equipment (Line Shaft): For one or more of the future District public supply wells, AGS recommends that the District consider installation of vertical turbine, line shaft well pump and well motor equipment with the well pump installed below the pumping water level and the well motor is installed on a well discharge head above ground. As a result, if there is a well motor problem or failure, then existing electric well motor can be inspected, repaired and/or replaced or a temporary well motor installed by a well service contractor without the need to remove and inspect the well pump and well motor equipment, which is necessary for submersible well pumping equipment. For an above-ground electric well motor, a well service contractor can furnish or install either a temporary rental well motor or new electric motor in a relatively short period of time with an estimated well down time of commonly one to two days

for a temporary contractor well motor installation or possibly one week or so for a new well motor installation, if available from the well contractor or a local supplier.

The AGS experience for many moderate to large capacity water wells with well motor horsepower of about 100 Hp or more is that wells that have line shaft, vertical turbine well pump and well motor equipment cost more but are more dependable with longer well motor life versus submersible well pump and well motor equipment that commonly runs at higher speeds (3,500 to 3,600 rpm) and has a submersible electrical cable from land surface down to the submersible motor that is installed below the pump. The submersible motor equipment and submersible electrical cable are underwater and the well motor is susceptible to possible failure due to overheating and/or electrical power supply surges or nearby lightning, even when motor monitoring and protection equipment is installed.

## District Well and Aquifer Data Collection, Testing and Monitoring

AGS recommends that the District measure, record and monitor the District Well pumping rates, static and pumping water levels (if possible) and daily (if possible), monthly and yearly pumping volumes for the District's public supply wells.

AGS also recommends that detailed District well field testing be performed on at least an annual basis by a qualified well testing contractor to provide detailed static and pumping water level, well pumping rate, specific capacity, discharge pressure, well pump and motor performance, and sand production data.

As described in the previous District Well Pump and Well Motor Equipment section, the five District wells have submersible well pump and well motor equipment installed and the motor has an electrical cable that extends from the depth of the pump setting to land surface. The well pump column pipe, electrical cable and submersible pump and motor equipment are installed inside the relatively small well casing diameters, particularly small well casing diameters for District Well 1 and Well 2, which leaves limited room for an electric line or sounder and probe to be lowered down inside the well and used to measure static and pumping water levels in a District well. As a result, District personnel and/or a well testing contractor personnel may not be able to measure the static and pumping water levels with an electric line and may need to utilize an airline and pressure gauge, if functional, and a portable pressure tank to measure the water levels in the District wells.

The District and its Engineer and/or consultant should review and evaluate the District water well, aquifer and well testing and monitoring data regularly to help in the short-term to long-term District water supply planning, including decisions regarding existing well rehabilitation work and well pumping equipment repair and replacement and future District test hole and public supply well construction projects.

## District Wells and Water Plants - Groundwater Quality

Table 2 lists well data and laboratory analyses for selected water quality constituents for District Wells 1, 3, 4 and 5, 1986 Test Hole 1, 1986 Test Hole 3 plus District Water Plant 1 (Well 1 and Well 2), Water Plant 2 (Well 3 and Well 4) and Water Plant 3 (Well 5) and summary information follows for the total dissolved solids (TDS), chloride, total hardness, iron and fluoride concentrations for the District wells and water plants. AGS did not locate any well water quality data for District Well 2, which provides water to District Water Plant 1 along with Well 1.

For the water quality analyses that are listed in Table 2 of this report and this section, **Highlighted & bold concentration** = Concentration is equal to or exceeds the corresponding Texas Commission on Environmental Quality (TCEQ) Maximum Contaminant Level (MCL) or Secondary Constituent Level (SCL) concentration for a public water supply.

**Total Dissolved Solids (TDS):** TCEQ SCL = 1,000 milligrams per liter (mg/L).

District Well 1, 58-62-302, Screen 465 to 515 feet: TDS = 490 & 509 mg/L.

District Well 2, 58-62-304, Screen 613 to 720 feet: No water quality data.

District Water Plant 1 (Well 1 and Well 2 blended), TDS = 560 to 580 mg/L.

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District Well 3, 58-62-305, Screen 940 to 1,004 feet: **TDS = 1,383.3 mg/L** (dissolved residue).

District Well 4, 58-62-307, Screen 380 to 450 feet: TDS = 331 mg/L.

District Water Plant 2 (Well 3 and Well 4 blended), TDS = 356 to 810 mg/L.

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District Well 5, 58-62-508, Screen 455 to 510 feet: TDS = 580 to 598 mg/L.

District Water Plant 3 (Well 5), TDS = 356 to 810 mg/L.

**Chloride**, TCEQ SCL = 300 mg/L.

District Well 1, 58-62-302, Screen 465 to 515 feet: Chloride = 38 & 36 mg/L.

District Well 2, 58-62-304, Screen 613 to 720 feet: No water quality data.

District Water Plant 1 (Well 1 & Well 2 blended), Chloride = 55 to 58 mg/L.

-----

District Well 3, 58-62-305, Screen 940 to 1,040 feet: Chloride = 279 mg/L.

District Well 4, 58-62-307, Screen 380 to 450 feet: Chloride = 37 & 48 mg/L.

District Water Plant 2 (Well 3 & Well 4 blended), Chloride = 43 to 139 mg/L.

-----  
District Well 5, 58-62-508, Screen 455 to 510 feet: Chloride = 17.2 mg/L.

District Water Plant 3 (Well 5), Chloride = 21 to 23 mg/L.

**Total Hardness (as CaCO<sub>3</sub>)**, There is No TCEQ MCL or SCL for Total Hardness.

District Well 1, 58-62-302, Screen 465 to 515 feet: Total Hardness = 162 & 134 mg/L.

District Well 2, 58-62-304, Screen 613 to 720 feet: No water quality data.

District Water Plant 1 (Well 1 & Well 2 blended), Total Hardness = 48.1 to 62.6 mg/L.

-----  
District Well 3, 58-62-305, Screen 940 to 1,040 feet: Total Hardness = 13.7 mg/L.

District Well 4, 58-62-307, Screen 380 to 450 feet: Total Hardness = 160 & 162 mg/L.

District Water Plant 2 (Well 3 & Well 4 blended), Total Hardness = 103 to 160 mg/L.

-----  
District Well 5, 58-62-508, Screen 455 to 510 feet: Total Hardness = 94 mg/L.

District Water Plant 3 (Well 5), Total Hardness = 3.52 to 3.62 mg/L.

*Total Hardness Scale for Water:*

*Soft = 0 to 60 mg/L; Moderately Hard = 61 to 120 mg/L;*

*Hard = 121 to 180 mg/L; Very Hard = 181 mg/L or higher*

**Iron**, TCEQ SCL = 0.3 mg/L.

District Well 1, 58-62-302, Screen 465 to 515 feet: Iron = **0.36 & 0.85** mg/L.

District Well 2, 58-62-304, Screen 613 to 720 feet: No water quality data.

District Water Plant 1 (Well 1 & Well 2 blended), Iron = 0.049 to 0.202 mg/L.

-----  
District Well 3, 58-62-305, Screen 940 to 1,040 feet: Iron = 0.06 mg/L.

District Well 4, 58-62-307, Screen 380 to 450 feet: Iron = 0.20 & 0.16 mg/L.

District Water Plant 2 (Well 3 & Well 4 blended), Iron = 0.052 to **1.03 mg/L**.

-----  
District Well 5, 58-62-508, Screen 455 to 510 feet: Iron = 0.06 mg/L.

District Water Plant 3 (Well 5), Iron = <0.01 mg/L.

**Fluoride**, TCEQ MCL = 4 mg/; TCEQ SCL = 2 mg/L.

District Well 1, 58-62-302, Screen 465 to 515 feet: Fluoride = 0.3 & <0.1 mg/L.

District Well 2, 58-62-304, Screen 613 to 720 feet: No water quality data.

District Water Plant 1 (Well 1 & Well 2 blended), Fluoride = 0.14 to 0.17 mg/L.

-----  
District Well 3, 58-62-305, Screen 940 to 1,040 feet: Fluoride = **2.3 mg/L**.

District Well 4, 58-62-307, Screen 380 to 450 feet: Fluoride = 0.1 & 0.22 mg/L.

District Water Plant 2 (Well 3 & Well 4 blended), Fluoride = 1.54 to 1.75 mg/L.

-----  
District Well 5, 58-62-508, Screen 455 to 510 feet: Fluoride = **2.35 mg/L**.

District Water Plant 3 (Well 5), Fluoride = **2.06 to 2.11 mg/L**.

Fresh water is water that has a TDS concentration of less than 1,000 milligrams per liter (mg/L). Slightly brackish water contains TDS concentrations of >1,000 to 3,000 mg/L and brackish water has TDS concentrations of >3,000 mg/L.

Based on the groundwater quality data collected and reviewed by AGS for this study, including the data in Table 2 and the summary information in this section, the overall groundwater quality for the District's wells is generally acceptable for public water supply with the AGS comments that follow. Also note that water treatment information provided by District personnel follows in the next section.

- District Well 1 (Water Plant 1): Well 1 (well screen depth 465 to 515 feet) produced groundwater in 1974 and 1980 with elevated iron that exceeded the TCEQ SCL of 0.3 mg/L.
- District Well 3 (Water Plant 2): Well 3 is the deepest District well (well screen depth 940 to 1,004 feet) and the well produced groundwater when originally tested in 1986 with elevated fluoride and TDS concentrations that exceeded the corresponding TCEQ SCL of 2 mg/L and 1,000 mg/L, respectively, and the Well 3 water contains natural gas, iron related bacteria and sulfate reducing bacteria.

- District Well 5 (Water Plant 3): Well 5 (well screen depth 455 to 510 feet) produced groundwater in 2002 with elevated fluoride that exceeded the TCEQ SCL of 2 mg/L for fluoride. TCEQ water samples collected in 2011, 2017, 2020 and 2023 at Water Plant 3 also had fluoride concentrations that exceeded the TCEQ SCL of 2 mg/L.

## District Wells and Water Plants – Water Treatments

AGS discussed the District well water quality and water treatments for the groundwater produced by the District wells and the District water plants with District personnel and a summary of the related water plant, well and water treatment information follows.

District Water Plant 1 (Well 1 and Well 2) and Water Plant 3 (Well 5). Chlorine gas is used for disinfection at Water Plant 1 and Water Plant 3.

Water Plant 2 (Well 3 and Well 4): Well 3 produces natural gas and the Well 3 water is disinfected with chlorine gas and the well water is treated with a phosphate plus activated carbon and the ground storage tank has air vents and a forced air fan.

Water Plant 3 (Well 5): Well 5 water is disinfected with gas chlorine and the well water is treated with a phosphate for iron.

## Aqua WSC Public Supply Wells

Figure 2 shows the locations and lists well construction information for the Aqua Water Supply Corporation (WSC) “M” public supply wells that are located to the north of State Highway 71 and north of District Water Plant 2, Well 3 and Well 4 and the Aqua WSC “S” public supply wells that are located west of the District boundaries and west of the Colorado River along State Highway 304. TWDB information reviewed by AGS lists the Aqua WSC M wells as being completed in the Wilcox Group or Calvert Bluff Aquifer and the Aqua WSC S wells as completed in the Simsboro Aquifer or Formation.

Table 3 includes considerable well construction and testing information for the Aqua WSC M and S wells, based on TWDB, USGS or other well records and data sources. As shown on Figure 2 and listed in Table 3, summary well construction and testing information follows for the Aqua WSC M and S public supply wells.

Aqua WSC M Wells – Year of construction; well material diameters; well screen depth intervals:

Well M: 1978; 8 x 4 inches; 4-inch well screen depth interval 626 to 711 feet (plugged).

Well M-1: 1999; Well material diameters and well screen depth unknown; total depth 810 feet.

Well M-2: 2002; 16 x 10 inches; 10-inch well screen depth interval 611 to 708 feet.

Aqua WSC S Wells – Year of construction; well material diameters; well screen depth intervals:

Well S-1: 1977; 8 x 6 inches; 6-inch well screen depth interval 308 to 480 feet.

Well S-2: 1978; 8 x 4 inches; 4-inch well screen depth interval 342 to 492 feet.

Well S-3: 1982; 8 x 5 inches; 5-inch well screen depth interval 306 to 491 feet.

Well S-4: 1985; 14 x 8 inches; 8-inch well screen depth interval 362 to 512 feet.

Well S-5: 1986; 14 x 8 inches; 8-inch well screen depth interval 441 to 600 feet.

Well S-6: 1998; 18 x 14 x 10 inches; 10-inch well screen depth interval 277 to 476 feet.

Well S-7: 1999; 18 x 14 x 10 inches; 10-inch well screen depth interval 285 to 510 feet.

Well S-8: 2005; 18 x 14 x 12 inches; 12-inch well screen depth interval 435 to 592 feet.

- The Aqua WSC M and S wells have upper well casing diameters that range from eight (8) inches to eighteen (18) inches and blank liner and well screen diameters that range from four (4) inches to twelve (12) inches.

- The reported well pumping or testing rates for the Aqua WSC wells listed in Table 3 ranged from approximately 201 gpm (Well M) to 1,100 gpm (Well S-8) and 1,200 gpm (Well S-7) at the time that they were originally constructed.

### District 1986 Test Hole Drilling and Water Sampling for District Well 3

In early – mid 1986, J. L. Myers Company drilled and logged Test Hole #1, Test Hole #2 and Test Hole #3 for the District at three separate locations within the District boundaries prior to the subsequent construction and testing of District Well 3 at the Test Hole #3 site in 1986. Figures 1, 2 and 4 in this report show the locations of the three 1986 District test holes. The 1986 Test Hole #1 site was located in the general vicinity of the District’s maintenance facility (194 Nuana Lane). The 1986 Test Hole #2 site was located in the north part of the District about 0.65 mile west of the District Well 1, Well 2 and Water Plant 1 location. The 1986 Test Hole #3 site was located at or in very close proximity to the current site of District Well 3, Well 4 and Water Plant 2.

The District provided copies of the following reports and logs to AGS: a copy of the 1986 Completion Report of Production Well 3 report that was prepared by William F. Guyton Associates, Inc. (Appendix B); the Record of Deep Well for Bastrop WCID No. 2 Well No. 3 report that was prepared by J. L Myers Company (Appendix C); field copies of the 1986 Test Hole #1 and Test Hole #2 electric logs; and other District well and water quality records and data. AGS has reviewed the District’s 1986 reports and the 1986 test hole information, logs and data for this groundwater study and some of the 1986 report, 1986 test hole and District Well 3 information and data are summarized in this report text, Table 1 and Table 2.

In November 1986, William F. Guyton Associates, Inc. prepared a report for the District titled “Completion Report of Production Well 3” and a copy of the report is included in Appendix B of this report. The 1986 report in Appendix B provides considerable text, figures and water quality analyses regarding Test Hole #1, Test Hole #2, Test Hole #3 and the District Well 3 drilling,

construction and testing. In addition, copies of the driller's logs for the 1986 Test Hole #1, Test Hole #2 and Test Hole #3 that were prepared by J. L. Myers Company are included in Appendix C.

**1986 Well 3 Test Hole #1:** The 1986 Well 3 Test Hole #1 location was in the general vicinity of the District maintenance facility (194 Nuwana Lane).

District Test Hole #1 was drilled and logged to a total depth of about 1,156 feet. Below a depth of 450 feet, the J. L Myers Company driller's log for Test Hole #1 list some general sand description at the following depths: 450 to 470 feet (Sandy shale), 600 to 625 feet (Sand streaks), 625 to 629 feet (Broken sand), 700 to 722 feet (Sandy shale), 722 to 775 feet (Sand), 823 to 843 feet (Sand), 855 to 922 feet (Sand), 955 to 964 feet (Sand), 974 to 1,015 feet (Sand), 1,020 to 1,035 feet (Sand), and 1,035 to 1,100 feet (Sand and broken shale).

The overall quality of the field copy of the April 1986 Test Hole #1 geophysical log reviewed by AGS is relatively poor but the log includes a single point resistivity log and spontaneous potential electric log and a gamma ray log. Below a depth of 400 feet, the Test Hole #1 logs show sands with relatively low to moderate resistivity values with limited to modest sand thicknesses in part of the depth intervals between approximately 410 and 600 feet, 665 and 770 feet, and 820 and 1,095 feet. However, due to the quality of the 1986 Test Hole #1 geophysical logs, it is hard to make a good assessment regarding the actual sand thicknesses and whether the sands in these depth intervals contain fresh water or slightly brackish water from the test hole log by itself.

The November 1986 William F. Guyton Associates, Inc. report is included in Appendix B and provides information regarding the drilling, logging, water sampling and water quality for the 1986 Test Holes #1, #2 and #3. Pages 1, 2 and 3 in the Introduction section of the William F. Guyton Associates, Inc. 1986 report are included in Appendix B of this report. Table 2 in this report includes test hole water quality data from the Appendix – Chemical Analyses in the 1986 report.

Based on the information and water sample analyses in the 1986 District report, AGS has prepared the summary information that follows for the 1986 Test Holes #1, #2 and #3.

#### **District 1986 Test Hole #1: Information in the Introduction section in the 1986 Report**

- The 1986 Test Hole #1 was drilled through the Calvert Bluff and Simsboro Formations to a depth of 1,156 feet.
- A total sand thickness of almost 200 feet was encountered between the depths of 670 and 1,020 feet.
- Subsequent pumping tests and water sampling operations in this test hole indicated that the quality of water contained in these sands was not acceptable for a public water supply system.

AGS Note: "these sands" used in the 1986 report refers to the two deeper Test Hole #1 water samples (980 to 1,010 feet, and 740 to 770 feet) and related AGS comments and information follow.

**AGS comments regarding the 1986 Test Hole #1 water sampling and water quality:** As shown in Table 2 in this AGS report, the 1986 report describes water sampling that was completed in the 1986 Test Hole #1 at depths of 980 to 1,010 feet (Sample 1, 4/24/1986) and 740 to 770 feet (Sample 2, 5/01/1986) and these two test hole water samples contained water with TDS concentrations of more than 2,000 mg/L for the two water samples, which is slightly brackish water, and the TDS concentrations exceed the TCEQ SCL of 1,000 mg/L for a public water supply.

However, the 1986 report does not indicate that any Test Hole #1 water sampling was completed for depths shallower than 740 feet in 1986. Thus, the AGS opinion is that the water quality for the shallower sand(s) or formation(s) that are shallower than 740 feet at or near the 1986 Test Hole #1 location was not investigated in 1986 by installing, pumping and water sampling a temporary test well(s) in a shallower depth interval(s) in Test Hole #1.

#### **District 1986 Test Hole #2: Information in the Introduction section in the 1986 Report**

- The 1986 Test Hole #2 was drilled through the Calvert Bluff and Simsboro Formations to a depth of 1,097 feet.
- Although sands that appeared to contain water of acceptable quality was encountered between 400 and 730 feet, the relative shallowness of the uppermost of these sands and the small total thickness of the sands (approximately 80 feet) combined to make the location of the test hole unfavorable for the completion of a production well.

**AGS comments regarding 1986 Test Hole #2:** No water sampling was completed in Test Hole #2 at any depth at 1986, so there is no available data to assess the groundwater quality for the Calvert Bluff Aquifer at or near the 1986 Test Hole #2 location.

#### **District 1986 Test Hole #3: Information in the Introduction section in the 1986 Report**

- The 1986 Test Hole #3 was drilled through the Calvert Bluff and the top of the Simsboro Formations to a depth of 1,158 feet.
- Since the quality of water in the Simsboro appeared to be poor, two separate sand intervals in the Calvert Bluff were tested for productivity and water quality and the two intervals tested were at depths of 970 to 1,000 feet and 380 to 410 feet.
- The water from the deep zone contained relatively high concentrations of total dissolved solids and sodium and there was consultation with personnel with the Texas Department of Health regarding these analyses and the water quality for a public water supply system.
- The water quality of the shallow zone was considerably better than that of the deep zone. However, due to the relative shallowness of the zone, it appear that only about 100 to 150 gallons per minute of the desired 300 gallons per minute could be expected as the production rate of the shallow zone.

- After review of the results of the chemical analyses and pumping tests of Test Hole #3 and review of the costs of additional test hole drilling and various well construction alternatives, the District's Board of Directors decided to have the production well (Well 3) completed in the deeper zone.

## Oil and Gas Wells and Test Holes and Electric Logs

AGS searched available public and private oil and gas (OG) well and test hole records and databases for OG wells or test holes with electric logs located within the District boundaries and elsewhere within the study area. Figure 1 shows the locations and depths of the tops of the electric logs for three OG wells or test holes that the logs start at a subsurface depth that range from about 107 to 132 feet and the OG locations are generally northeast of the District and State Highway 71 (OG-1), west of the District boundaries near the Colorado River. (OG-2), and south of the District boundaries and Colorado River (OG-3). Unfortunately, AGS was not able to locate any OG well or test hole with electric logs that is located within the District boundaries.

AGS prepared Figure 3, Oil and Gas Electric Logs, which shows the subsurface electric logs for OG-1, OG-2 and OG-3. The upper part or headers of these three OG logs show or list the oil or gas company name, the well name and number, general location information, dates drilled and considerable other information that may be or is difficult to read.

The OG-1, OG-2 and OG-3 electric logs show self-potential or spontaneous potential (SP) on the left side of the logs and electrical resistivity on the right side (OG-1 and OG-2) or middle (OG-3) of each log. For the OG-1, OG-2 and OG-3 electric logs shown on Figure 3, AGS added the electrical resistivity scale in red that is either zero to ten (0 to 10) ohm-meters (ohm-m) for OG-1 or zero to twenty (0 to 20) ohm-meters for OG-2 and OG-3 because the small numbers for the resistivity scale are difficult to read; and 2) AGS added the estimated or approximate depth (feet) of the electric log below land surface in black.

Approximate Depth of the Top of the Electric Logs:

OG-1 = 107 feet / OG-2 = 127 feet / OG-3 = 132 feet.

AGS evaluated the electrical resistivity logs for these three OG electric logs to help assess the subsurface hydrogeology at the locations of each of these electric logs.

Based on AGS review of the OG-1, OG-2 and OG-3 electric logs shown on Figure 3, AGS evaluations follow regarding the estimated depths and thicknesses and preliminary assessments regarding the presence of possible fresh water, slightly brackish water or brackish water for the principal aquifer sands or sandy units below a depth of about 400 feet at the locations of the OG-1 and OG-2 electric logs and below a depth of about 310 feet at the OG-3 electric log location.

**OG-1, Location is North of the District and State Highway 71, Top of Electric Log at 107 feet**

Approx. 405 to 440 feet (35 feet = estimated sand thickness); estimated fresh water and/or slightly brackish water.

Approx. 560 to 820 feet (100 to 110 feet = estimated sand thickness); estimated fresh water and/or slightly brackish water.

Approx. 925 to 980 feet (55 feet = estimated sand thickness); estimated fresh water and/or slightly brackish water.

The deeper sands at >1,000 feet are estimated to contain slightly brackish water and overall poorer water quality.

**OG-2, Location is West of the District Near the Colorado River, Top of Electric Log at 127 feet**

Approx. 425 to 470 feet (40 to 45 feet = estimated sand thickness); estimated fresh water and/or slightly brackish water.

Approx. 505 to 770 feet (165 feet or more = estimated sand thickness); estimated fresh water.

Approx. 795 to 850 feet (50 to 55 feet = estimated sand thickness); estimated fresh water.

Approx. 915 to 1,220 feet (120 to 130 feet = estimated sand thickness); estimated to contain some fresh water and slightly brackish water and overall poorer water quality with higher TDS and chloride concentrations versus the shallower sands.

**OG-3, Location is South of the District and the Colorado River, Top of Electric Log at 132 feet**

Approx. 310 to 530 feet (160 to 170 feet = estimated sand thickness); estimated fresh water.

Approx. 650 to 760 feet (80 to 90 feet = estimated sand thickness); estimated limited fresh water and slightly brackish water.

Approx. 800 to 910 feet (70 to 75 feet = estimated sand thickness); estimated slightly brackish water.

Approx. 950 to 1,110 feet (120 to 125 feet = estimated sand thickness); estimated slightly brackish water.

Approx. 1,215 to 1,295 feet (70 to 75 feet = estimated sand thickness); estimated slightly brackish water.

Approx. 1,380 to 1,400 feet (20 feet = estimated sand thickness); estimated limited fresh water and/or slightly brackish water.

The deeper sands at >1,400 feet shown on the OG-3 log are estimated to contain brackish water and overall poorer water quality with higher TDS and chloride concentrations versus the sands and formations that are present at shallower depths.

Gamma Ray Log (OG-3): The OG-3 log also includes a gamma ray log on the left side of the log and the gamma ray log scale is 0 to 150 American Petroleum Institute (API) units. A gamma ray log measures natural radioactivity in close proximity to the borehole. The OG-3 log shows relatively low to moderate gamma ray readings of about 15 to 120 API units in the depths from about 135 to 1,940 feet, which is good. The highest gamma ray readings occur at depths of approximately 1,050 feet (115 API units), 1,430 feet (115 API units) and 1,840 and 1,860 feet (120 API units).

## Possible Areas for Future District Test Holes and Temporary Test Wells

Due to the unpredictable, hit or miss subsurface hydrogeologic conditions in the Calvert Bluff Aquifer in central Bastrop County and the District area, AGS recommends that the District plan that test holes probably will need to be drilled and logged and temporary test well construction, testing and water sampling will need to be completed at a minimum of two or three prospective sites to evaluate the subsurface hydrogeologic conditions and make site-specific assessment if there are adequate sand depths and thicknesses with acceptable water quality for construction of a new District public supply well at a future District water plant site or remote District well site.

Based on the available water and oil and gas well and test hole records, reports, data and logs reviewed and evaluated by AGS and described in this study report and cursory field visits to a limited part of the large District service area by AGS personnel on June 13 (District maintenance facility and the Water Plant 3 and Well 5 site only), August 18 and August 22, 2024, AGS has prepared the information that follows regarding three possible areas for consideration for future District test hole drilling and logging and temporary test well water sampling.

Figure 4 shows three possible areas that AGS has designated Areas A, B and C for possible future District test hole drilling and logging and temporary test well water sampling for consideration by the District and SPI and further discussions and evaluations, as needed.

Field photographs of Areas A, B and C (Photos 13 – 24) that were taken by AGS in August 2024 follow Tables 1, 2 and 3 in the report and show a limited part of these three possible areas for future test hole drilling.

### **Area A - District Maintenance Facility Area**

**Area A – Location and Estimated Elevation:** The District maintenance facility is located at 194 Nuwana Lane, and the facility location is shown on Figures 1, 2 and 4. The District property at and adjoining the maintenance facility has a reported area of about 11 acres. Based on AGS review of the 1982 topographic map for the Bastrop quadrangle, the preliminary estimated elevation is

about 440 to 470 feet at the District maintenance facility and the adjoining undeveloped land to the west, southwest and west of the District facility.

**Area A - General Area Site Conditions** (see Photos 13 - 16 that follow the report tables): The areas that adjoin and are generally west, southwest and south of the District's maintenance facility include irregular topography and considerable existing trees, brush and vegetation. Photo 15 and Photo 16 show Honolulu Lane, which is a gravel and dirt road that intersects Nuwana Lane west of the District maintenance facility and adjoins the west, southwest and south boundaries of the District property.

**Area A - Preliminary Assessment of the Positive(s) / Advantage(s):**

(1) The approximate 11 acre tract is owned by the District and has considerable area(s) for test hole drilling and temporary test well water sampling and a possible future District water plant, water storage tank(s) or public supply well(s), if favorable subsurface conditions exist.

(2) The District has previously discussed possible construction of a new water plant or water storage tank(s) and/or public supply well(s) on the District property, if the available information evaluated during this AGS study and any subsequent test hole drilling and logging and temporary test well water sampling indicate that the subsurface hydrogeologic and aquifer conditions are favorable for future construction of a new District public well or wells.

(3) This District property is located in the central District service area.

(4) Existing Nuwana Lane and Honolulu Lane (gravel and dirt road) provide access to this area.

**Area A - Preliminary Assessment of the Negative(s) / Disadvantage(s):**

(1) Area A near the District maintenance facility has irregular topography and existing trees and vegetation that would require land clearing, dirt moving and site preparation for test hole drilling and move extensive land clearing and site preparation work, if a future District water plant and public supply well(s) were constructed on the District property.

(2) As shown on Figures 1, 2 and 4, the District 1986 Test Hole #1 location was in close proximity to the District maintenance facility and poor groundwater quality was present at two test hole water sampling depths greater than 740 feet. As described in detail in the previous 1986 Test Hole Drilling and Water Sampling for District Well 3 section of this report and the William F. Guyton Associates November 1986 report to the District that is included in Appendix B: (A) The 1986 Test Hole #1 was drilled through the Calvert Bluff and Simsboro Formations to a depth of 1,156 feet; (B) A total sand thickness of almost 200 feet was encountered between the depths of 670 and 1,020 feet; and (C) Test Hole #1 water sampling was completed at two deeper depth intervals, 980 to 1,010 feet, and 740 to 770 feet, and the laboratory analyses indicated that the water quality at these depths was not acceptable for a public water supply system (elevated TDS concentrations).

However, the 1986 report does not indicate that any Test Hole #1 water sampling was completed for depths shallower than 740 feet in 1986. Thus, the AGS opinion is that the water quality for the shallower sand(s) or formation(s) that are shallower than 740 feet at or near the 1986 Test Hole #1 location was not investigated in 1986.

### **Area B - Gateway D.A.E.P. School / Lovers Lane Area**

**Area B – Location and Estimated Elevation:** As shown on Figure 4, the Gateway D.A. E. P. School / Lovers Lane (County Road 111) Area, Area B, is located in the northwest area of the District, east of the Colorado River in the large open land generally north of the Gateway D. A. E. P. School and GoldStar Transit school transportation facility.

Based on AGS review of the 1982 topographic map for the Bastrop quadrangle, the preliminary estimated elevation is about 360 to 365 feet for the large Area B tracts, which is generally comparable to the reported elevation of District Well 5 (365 feet).

**Area B - General Area Site Conditions** (see Photos 17 - 20): Area B is a very large, flat area or areas with two rectangular open areas or tracts, generally located as follow:

- (1) A large undeveloped tract that is north of the Gateway D.A.E.P. and the GoldStar Transit facility and west of the north – south access road from Lovers Lane to the GoldStar Transit facility (area is approximately 550 feet N-S x 775 feet or more E-W = approx. 9.7 to 9.9 acres or more); and
- (2) A smaller undeveloped tract that is north and north-northeast of the GoldStar Transit facility and east of the north – south access road from Lovers Lane to the GoldStar Transit facility (area is approx. 550 feet N-S x 250 feet E-W = approx. 3 to 3.2 acres).

### **Area B - Preliminary Assessment of the Positive(s) / Advantage(s):**

- (1) Area B is a very large, flat undeveloped area(s) or tract(s) located within the wide Colorado River and the tracts would require limited site preparation for exploratory test hole drilling and temporary test well construction operations.
- (2) Generally favorable sand depths and thicknesses in the Calvert Bluff Aquifer are observed on the OG-2 electric log, which is located an estimated distance of about 0.8 to 0.9 mile west – southwest of this possible Area B test hole drilling area. OG-2 log evaluation information is provided in the previous Oil and Gas Wells and Test Holes and Logs section of this report.
- (3) As shown on Figure 2 and listed in Table 3, the Aqua WSC S public supply wells are located west of the Colorado River, screen sands at variable depths intervals in the Simsboro Aquifer that range from 277 to 600 feet and had reported testing rates that ranged from 450 to 1,200 gpm at the times the wells were constructed. These reported Aqua WSC S well testing rates are substantially to significantly higher than the 2023 pumping rates for District Wells 1, 2 and 4 of 110 to 220 gpm and comparable to or significantly higher than the reported 2023 District Well 3

and Well 5 pumping rate of 525 gpm that were reported in the BEFCO August 2023 Board presentation that is included in Appendix A of this report.

***Area B - Preliminary Assessment of the Negative(s) / Disadvantage(s):***

(1) Area B is located along the northwest boundary of the District in a flat area with a preliminary estimated elevation of 360 to 365 feet. Thus, if test hole drilling and temporary test well water sampling were completed here and indicated favorable conditions for construction of a possible future District public supply well, then considerable construction costs would be needed for possible future District water plant infrastructure including ground storage tanks and booster pumps or possibly an elevated storage tank, public supply well(s) plus water distribution lines, etc. to provide a new well water supply to the lower District pressure plant and the District's customers located to the south and southeast in the District.

(2) If a future District test hole and temporary test well water sampling was completed in Area B and showed favorable subsurface conditions for construction of a new District public supply well, then the sands or formations that would be screened likely would be generally similar to those screened in the Aqua WSC S wells, which are designated as in the Simsboro Aquifer. Relevant information follows in the Lost Pines GCD Regulatory Rules and Requirements section of the report.

**Area C - Mauna Loa Lane Area**

***Area C – Location and Estimated Elevation:*** As shown on Figure 4, Area C / Mauna Loa Lane Area is an undeveloped area that is located in the north - northwest area of the District. District personnel reported that part of the Area C outlined on Figure 4 is designated as Unit 6. Area C is along and near the undeveloped northwest section of Mauna Loa Lane, generally between undeveloped Pin Oak Court on the north and Pine Lodge Drive on the south, where Mauna Loa Lane has a northeast – southwest and south orientation.

Based on AGS review of the 1982 topographic map for the Bastrop quadrangle, the preliminary estimated elevations are variable and range from about 450 to 510 feet for much of large Area C and these elevations are moderately lower than the reported elevation of District Water Plant 1, Well 1 and Well 2 (528 feet) and generally comparable to or lower than the reported elevation of District Water Plant 2, Well 3 and Well 4 (510 feet), which are all located in the upper District pressure plane.

***Area C - General Area and Site Conditions (see Photos 21 - 24):*** Area C is a large undeveloped area that includes irregular changes in topography, hills and small creek drainages, and there are a lot of existing trees, brush and vegetation in the area. In the north and northwest sections of Area C that were observed by AGS, the Mauna Loa Lane ranges from good, level gravel roadway to poorer gravel road with wash-outs and muddy conditions in the low drainage crossings or no roadway or trail for one or more sections that are further from Briar Forest Drive on the northeast.

North of W. Kaanapali Lane and south of the south end of Area C shown on Figure 4, Mauna Loa Lane is a good gravel road near a LCRA substation and powerline corridor on the south end and further north Mauna Loa Lane is a black top road in a small residential area that dead-ends or terminates south of a creek and an LCRA powerline corridor.

***Area C - Preliminary Assessment of the Positive(s) / Advantage(s):***

(1) Area C is a large undeveloped area for a possible future test hole, temporary test well(s) and potential District water plant and production well(s), if favorable subsurface conditions are present.

(2) Area C is in the north – northwest District area and the higher topographic elevations in this area would provide good elevation heads for a possible future District water plant, water storage tank(s) and water distribution system.

***Area C - Preliminary Assessment of the Negative(s) / Disadvantage(s):***

(1) Area C has irregular, hilly topography and considerable existing trees, brush and vegetation that would require land clearing, dirt moving and site preparation for test hole drilling and more extensive land clearing and site preparation work, if a possible District water plant, water storage tank(s) and/or public supply well(s) were constructed in this area.

(2) As shown on Figure 4, the District 1986 Test Hole #2 location was near the northeast boundary of Area C. As described in detail in the previous 1986 Test Hole Drilling and Water Sampling for District Well 3 section of this report and the William F. Guyton Associates November 1986 report to the District that is included in Appendix B: (A) The 1986 Test Hole #2 was drilled through the Calvert Bluff and Simsboro Formations to a depth of 1,097 feet; (B) the 1986 report indicates that the William F. Guyton Associates' interpretation of the electric log was that sands encountered between 400 and 730 feet appeared to contain water of acceptable quality; however, their opinion in 1986 was that the relative shallowness of the uppermost of these sands and the small total thickness of the sands (approximately 80 feet) combined to make the location Test Hole #2 unfavorable for the completion of a production well.

However, AGS notes that no water sampling was completed in Test Hole #2 at any depth in 1986, so there is no available data to assess the groundwater quality for the Calvert Bluff Aquifer at or near the 1986 Test Hole #2 location or in northeast section of Area C.

## **Future District Test Hole Drilling, Logging and Water Sampling**

Based on AGS evaluations of the information, data and logs described in this report, AGS has prepared the test hole drilling and logging and temporary test well water sampling information and recommendations that follow for one or more future District test holes.

## **Test Hole Drilling, Sampling and Geophysical Logging**

Depths for a Test Hole Drilled Within the District:

(A) 0 to minimum 950 to 1,000 feet to investigate the Calvert Bluff Aquifer only.

(B) 0 to minimum 1,350 to 1,400 feet to investigate the Calvert Bluff & upper Simsboro also.  
*The preliminary test hole depth can be revised in the future, based on the drilling site selected.*

Test Hole Diameter: Recommend minimum 7-7/8 to 9-7/8 inches.

Geophysical Logs to Perform in the Test Hole: Induction / resistivity, spontaneous potential (SP), natural gamma ray, spectral gamma ray, density porosity and neutron porosity logs.

- A small-diameter test hole (min. 7-7/8" to 9-7/8" diameter) is drilled and drill cuttings or sand samples are collected by the test hole drilling contractor for sieve analyses to evaluate the grain sizes. The test hole drilling contractor provides the subsurface test hole data and geophysical logs to the District, District Engineer and any consultant(s) for review and evaluations. Then, a decision is made by the District whether to have the test hole contractor perform any test hole water sampling operation at one or more depths.

**Test Hole Water Sampling with a Temporary Test Well(s):** As described in this report, the subsurface conditions in the Carrizo - Wilcox Aquifer (Calvert Bluff and Simsboro Aquifers or formations) are inconsistent in the Bastrop area. It is possible that the test hole drilling and logging and temporary test well water sampling at the first future District test hole location selected may indicate that inadequate aquifer sand thickness and/or unacceptable water quality is present at the first location for a new District public supply well.

As a result, AGS recommends that test hole water sampling be planned and probably completed in multiple depths in each test hole using temporary, small diameter test wells and the preliminary estimated number of water sampling depths in each test hole is a minimum of two to three sampling depths.

If approved, a temporary test well is installed in the test hole for development pumping operations and water sampling and the temporary test well materials are all removed from the test hole when the approved test well water sampling operations are completed.

A temporary test well is constructed with upper well casing with a minimum diameter of 6 to 8 inches plus minimum 4-inch to 5-inch diameter blank liner pipe and well screen with a minimum 20-foot to maximum 40-foot well screen length that is installed at the bottom of the casing, blank liner and screen string and a thin gravel pack is installed around the well screen section.

If approved by the District, one or more temporary test well(s) is (are) installed in the test hole at the deepest approved sampling depth first and the test well is developed and water samples are collected for laboratory analyses, as described in the next section. Then, if approved, the

upper temporary test well casing section(s) can be partially removed or pulled from the test well material string and the temporary test well can be installed in the same test hole at one or more shallower approved sampling depth(s) and test well development pumping is performed and water samples are collected for laboratory analyses, similar as described previously for the deepest sampling depth.

*Possible Example for Multiple Temporary Test Well Sampling Depths in the Same Test Hole:*

Temporary Test Well 3, Sampling Depth 420 to 440 feet (if approved).

Temporary Test Well 2, Sampling Depth 540 to 560 feet (if approved).

Temporary Test Well 1, Sampling Depth 780 to 800 feet (if approved).

**Temporary Test Well Development Pumping, Water Sampling and Lab Analyses:** AGS recommends that each temporary test well be developed using airlift pumping (jetting) operations following by pumping with a submersible well pump and well motor for a minimum total airlift and submersible development pumping time of 24 hours with a minimum pumping rate of minimum 50 gpm with the submersible pump and motor equipment. The airlift and submersible test well pumping operations are completed to reduce the water turbidity and provide representative water samples for detailed laboratory analyses for many inorganic chemicals, and organic chemicals, if desired, metals, radionuclides and other constituents and parameters to evaluate the groundwater quality.

**Test Well Water and Gas Field Sampling:** For each future District test hole and temporary test well, AGS recommends that water and gas field sampling be performed during the temporary test well pumping operations to evaluate whether a test well(s) produces water with any measurable gas. If gas is observed and sufficient gas volume can be collected during the gas field sampling for one or more temporary test wells, then AGS recommends that the gas sample(s) be analyzed by a qualified laboratory for a variety of natural gases (atmospheric gases, methane gas, etc.) and petroleum hydrocarbons.

**Evaluations of the Test Hole and Temporary Test Well Data, Log and Lab Analyses:** The test hole data, geophysical logs and temporary test well water sampling and laboratory analyses for the test hole site(s) will provide sufficient site-specific, subsurface and water quality information to make a much better assessment regarding the prospects and feasibility for construction of one or possibly two public supply wells with acceptable water quality at or near the test hole site and assist in the design for well construction material diameters, depths and lengths and well pumping equipment.

Note that there is relevant Lost Pines Groundwater Conservation District (GCD) information regarding test holes and test wells in the Lost Pines GCD Rules and Requirements section that follows later in the report.

### **Preliminary Estimated District Test Hole and Temporary Test Well Costs:**

Test Hole Drilling, Logging and Plugging Only: \$145,000 to \$175,000 (2024 dollars) per each test hole (includes mobilization and demobilization, drilling, logging and plugging only).

Temporary Test Well Water Sampling: Add \$35,000 to \$50,000 (2024 dollars) per each temporary test well sample and analyses.

Preliminary Cost Estimate, Example: \$215,000 to \$275,000 for 1 test hole with 2 temporary test well water samples; see the notes that follow for related details.

#### *Notes Regarding the Preliminary Test Hole and Temporary Test Well Cost Estimates:*

- 1) The range in the preliminary cost estimates are in year 2024 dollars if a minimum of two to four bids are received from qualified and experienced, mid-sized water well drilling companies that meet the contractor qualification, experience and equipment requirements that will be included in the test hole and test well technical specifications.
- 2) If no mid-sized water well drilling companies bid and a minimum of two large water well drilling companies bid the test hole and temporary test well project, then the preliminary estimated cost estimate is minimum \$275,000 to possibly \$375,000 or more.
- 3) The preliminary cost estimates do not include any engineering costs or site clearing or preparation costs, as one or more possible future District test hole sites have not been selected to evaluate the site clearing and preparation costs for a specific site location.
- 4) The preliminary estimated range in costs is in year 2024 dollars and is based on the approximate range of costs for the drilling, logging and water sampling for generally similar test holes and temporary test wells in southeast Texas in the past two years and are not based on current solicitation of written cost estimates from mid-sized to large prospective water well contractors. If desired in the future, a preliminary list of test hole drilling and logging, temporary test well water sampling and plugging operations, materials and equipment can be prepared and sent to several prospective mid-sized and large water well contractors to obtain better estimated costs for budgeting for one or more future test holes and temporary test wells.

## **Preliminary Future District Well Construction Parameters and Estimates**

### **2-piece, Underreamed Gravel Pack Well Construction –**

#### **Preliminary Design Parameters and Estimates for a Future District Well, Intermediate Well Depths in the Calvert Bluff Aquifer Within the District Boundaries**

20-inch (well casing) x 14-inch (blank liner and well screens) material diameters and Alternate 18-inch (well casing) x 12-inch (blank liner and well screens) material diameters.

Well Casing and Blank Liner Material: New carbon steel.

Well Casing and Blank Liner Wall Thickness: 0.500-inch.

Underream Diameter: min. 24 to 26 inches for 14-inch / 22 to 24 inches for 12-inch screens.  
Well Screen Type: Stainless steel wire-wrapped (SSWW) pipe base screen.

Aquifer: Calvert Bluff Aquifer (intermediate aquifer depths).

Well Screen, Preliminary Estimated Range in Well Screen Depths: >400 to 850 feet.

Total Well Depth: 875 feet or less for all or most areas within the District boundaries.

The AGS well construction parameters and estimates provided in this section are preliminary estimates based on the available subsurface data and logs evaluated by AGS during this study and described in this report. The recommended test hole drilling and geophysical logging and temporary test well water sampling and laboratory analyses will provide detailed hydrogeologic and groundwater quality data to make a much better assessment regarding the feasibility for construction of a public supply well with acceptable water quality at a new District water plant or well site and the depths that the well casing, blank liner and well screen(s) should be installed.

Wireline Logs for Well to Perform: Multishot alignment survey; caliper/section gauge log.

Well Pumping Tests: 4 Step Tests and 36-hour Continuous Pumping Test.

Well Water Sampling and Lab Analyses: Perform water sampling during the latter part of the 36-hour well pumping test and have the private laboratory complete extensive analyses for many inorganic and organic chemicals, metals and many other constituents and parameters that are regulated by the TCEQ for public water systems in Chapter 290, Subchapter F, plus other unregulated constituents.

### **Larger Recommended Future Well Material Diameters**

Note that the proposed well casing and blank liner and well screen diameters for the future District public supply wells are considerably larger than the well material diameters for existing District Wells 1 – 5, which were constructed 22 to 51 years ago.

AGS is recommending that the future District public supply wells be constructed with larger well material diameters for the four reasons that follow:

- 1) The static water levels in the Calvert Bluff Aquifer are moderately deeper than they were when the District's existing public supply wells were originally constructed, which is due to increasing local and regional groundwater pumping in Bastrop County.
- 2) It is likely that the local and regional groundwater pumping in the Calvert Bluff will increase in the future and, as a result, the aquifer heads will decrease and the static water levels in the Calvert Bluff Aquifer wells will decline.
- 3) The larger well casing, blank liner and well screen diameters will allow either a line shaft or submersible well pump bowl and submersible well motor (if installed) to be initially installed at

deeper depths within the well casing or blank liner section than the existing wells, and/or allow the well pumping equipment to be lowered to a deeper depth(s) in the future, as needed, to help maintain adequate well pump submergence below the pumping water levels in the well(s).

4) If / when the well casing, blank liner or well screen section needs repair due to metal corrosion and/or a structural failure in the future to extend the well life and use, then an internal liner with a larger diameter can be installed inside the existing well casing and/or liner, which could result in less reduction in both the well specific capacity and well pumping rate and might allow the well pump bowl to be installed at a deeper depth than an internal liner with a smaller diameter.

### **Additional Future District Well, Well Pump and Well Motor Design Work**

During the design phase for a future District public supply well, additional consulting work should be performed and the available aquifer, hydrogeology and water well data and logs should be reviewed. In addition, any future District test hole and temporary test well water sampling data and any District well and aquifer testing and monitoring data should be evaluated to make better assessments and estimates and prepare detailed production well, well pump and well motor equipment design parameters and estimates, including well motor horsepower estimates, for a public supply well(s) completed in intermediate depths in the Calvert Bluff Aquifer.

It is possible that one or more future District public supply wells might be designed and constructed in the deeper Simsboro Aquifer, if evaluations of the existing and future hydrogeology, test hole, temporary test well and water quality data and logs indicate favorable conditions and acceptable or usable water quality for construction of one or more Simsboro Aquifer well(s). See relevant information in the Preliminary Estimated Well Water Quality and Water Treatment and Lost Pines GCD regulatory information that follow in this report.

AGS has performed this desktop study for the project but AGS cannot guarantee either the production or short-term or long-term water quality for any of the future District public supply wells. The actual well performance, well production capabilities, final well pump design rates and water quality for each public supply well will not be known until each water well is constructed and the multi-day well pumping tests are conducted using the well contractor's temporary test pump equipment and the well testing and water quality data are evaluated.

### **Possible Future Replacement Wells for Existing District Wells**

As shown on Figures 1 and 4 and Table 1 in this report, District Well 1 (1973, 6 x 4 inches, screen depth 465 to 515 feet) and Well 2 (1979, 8 x 4 inches, screen 613 to 720 feet) are 51 and 45 years old, respectively, and have small diameter well casing, blank liner and well screen materials. In addition, District Well 3 (1986, 12 x 8 x 6 inches, screen 940 to 1,004 feet) and Well 4 (1990, 10 x 6 inches, screen 380 to 450 feet) are 38 and 34 years old, respectively, and have mid-sized well casing, blank liner and well screen diameters.

These small and mid-sized District well material diameters: (1) limit the submersible well pump and well motor diameters that can be installed in these wells and (2) also limit the depths that the submersible well pump and motor equipment can be installed. Together, the small and mid-sized District Well material diameters limit or may limit the possible current and/or future well pumping rates to maintain adequate pump submergence below the well pumping levels and may reduce the future longevity of one or more of these District wells.

AGS recommends that the District plan to replace District Well 1 and Well 2 within the next five to ten years with new District public supply wells with larger well casing, blank liner and well screen materials as described for the new District wells in the previous Preliminary Future District Well Construction Parameters and Estimates section of this report. The current AGS estimate is that any future District replacement well(s) would be constructed at or adjoining the existing District water plant site, have larger well material diameters, as recommended, and likely would screen sands and formations at the same or generally similar depths as the sands currently screened in the existing District wells.

Information included in the BEFCO August 2023 Board presentation (Appendix A) indicates that the District well pumps were lowered to deeper depths and the District well pumping rates were increased in 2023.

The existing and additional future District well monitoring and testing data can be evaluated to assess if the current District well pumping rates can or cannot be increased any further, which may not be feasible.

At this time, AGS has not evaluated sufficient information to assess whether the well pumping rates can or cannot be increased for an existing District well or wells, if a well pump is lowered to a deeper depth, if feasible, and/or the well motor horsepower is increased.

In addition, at this time AGS has not evaluated sufficient information to assess whether the well pumping rates can or cannot be increased, if one or more larger diameter, District replacement well is constructed in the future. It may be that constructing a larger diameter replacement well(s) in the same aquifer at generally similar depths with a larger well pump installed at a deeper depth, if feasible, with a well motor with more horsepower allows the well pumping rate to be increased or doing so may only allow the District to maintain the well pumping rate(s) for the same water plant further into the future.

## **Preliminary Estimated Future Well Water Quality and Water Treatment**

Although AGS has performed this desktop study for the project and provided these preliminary estimates regarding the preliminary well water quality and possible water treatments, AGS cannot guarantee the short-term or long-term water quality for any of the future District public supply well.

**Calvert Bluff Aquifer Wells:** Based on evaluation of the information described in this report, included in Table 2 and information provided by District personnel regarding the water quality and water treatment for the District’s existing public supply wells and water plants, the current AGS opinion is that a public supply well completed in the Calvert Bluff Aquifer within the District boundaries should have acceptable groundwater quality with water treatment(s). The groundwater produced from a Calvert Bluff Aquifer public supply well(s) will require disinfection plus preliminary estimated water treatment(s) that could include adding a chemical sequestering agent (ex. polyphosphate or orthophosphate) for iron and/or manganese and possible treatment for slightly corrosive or corrosive water.

**Possible Future District Simsboro Aquifer Well:** If a future District Simsboro Aquifer public supply well is planned or constructed, then the District should plan that more extensive water treatment(s) and/or blending with sufficient water from another District well with better water quality might be required and gas aeration equipment also might be required for the well water supply to meet TCEQ public water supply requirements and be acceptable to water customers.

Currently, the District has additional water treatment equipment installed at District Water Plant 2 that is provided water from District Well 3 and Well 4 and Well 3 (screen 940 to 1,004 feet) is the deepest District public supply well and has poorer water quality. Well 3 produces water with higher TDS and chloride concentrations and natural gas and the Well 3 water is disinfected with chlorine gas and the well water is treated with a phosphate plus activated carbon and the ground storage tank has air vents and a forced air fan.

District Well 3 (well screen depth interval 940 to 1,004 feet) produced natural gas (methane) when it was initially constructed and District personnel reported that Well 3 continues to produce groundwater that contains gas. As a result, AGS recommends that the District not construct a deep public supply well, unless test hole logging and test well water sampling indicates that hydrogeologic conditions are satisfactory and water quality is acceptable for public supply and/or the District plans water treatments that are generally similar to those for the Well 3 water plus gas aeration, blending with water from one or more other District public supply wells and/or a possible additional water treatment(s), if necessary, prior to water distribution.

The recommended test hole drilling and geophysical logging and temporary test well water sampling and laboratory analyses will provide detailed hydrogeologic and groundwater quality data to make a much better assessment regarding the feasibility for construction of a public supply well with acceptable water quality at a new District water plant or well site and evaluate the water treatment(s) needed for the public water supply.

## Preliminary Estimated Future District Water Demand

A copy of the August 2023 presentation and District water system information that BEFCO Engineering, Inc. made at a District Board meeting is included in Appendix A of this report. In August 2023, the BEFCO estimates included the following:

BEFCO, Estimated Number of Water Connections at Ultimate Buildout: 6,850 connections. Note that the BEFCO presentation lists Ultimate buildout estimates of 4,680 connections in the Upper pressure plane (Water Plants 1 and 2) and 2,275 connections in the Lower pressure plane (Water Plant 3), which equal 6,955 connections (4,680 + 2,275 connections).

BEFCO, Estimated Minimum District Well Capacity at Ultimate Buildout: 4,110 gpm.

The TCEQ requires a minimum public supply well supply of 0.6 gpm per equivalent single family connection (ESFC) and  $6,850 \text{ ESFCs} \times 0.6 \text{ gpm/ESFC} = 4,110 \text{ gpm}$ . If the estimated water connections at ultimate buildout is 6,955 connections, then the TCEQ minimum public supply well supply is  $6,955 \text{ ESFCs} \times 0.6 \text{ gpm} = 4,173 \text{ gpm}$ .

## Preliminary Estimated Number of Wells to Meet District Water Demands

The BEFCO August 2023 Board presentation in Appendix A of this report includes the following District well supply and estimate for the number of District wells required to meet the ultimate buildout water demand.

### **District Wells Capacity (BEFCO August 2023 estimates):**

Total District Well Capacity for 4 Upper and 1 Lower Pressure Plane Wells: 1,545 gpm.

Average District Well Capacity =  $1,545 \text{ gpm} / 5 \text{ wells} =$  approximately 310 gpm per well.

Ultimate Buildout Water Demand (BEFCO): 4,110 gpm.

### **Estimated Number of Wells Required to Meet Ultimate Water Demand (BEFCO):**

15 wells (BEFCO August 2023 presentation).

$4,110 \text{ gpm} / \text{average capacity of } 310 \text{ gpm per District Well} = 13.3 \text{ wells required}$ .

AGS assumes that BEFCO may have made an allowance that one of the District's production wells might be out of service at any time to be conservative for the estimated number of District wells to meet the estimated ultimate buildout water demand.

The current AGS estimate is that this initial preliminary BEFCO estimate of the number of District wells to meet a possible ultimate District water demand of approximately 4,110 gpm is reasonable for current planning. However, AGS recommends that this preliminary estimate be reevaluated periodically and adjusted, if needed, by District and SPI based on assessments of relevant historical and future District water usage and estimated water demands and District public supply well, aquifer water level, test hole and test well records, reports, data and logs.

If the local and regional groundwater pumping from the Calvert Bluff Aquifer increases and the static water levels in the Calvert Bluff Aquifer decline, then the pumping rates of the District's wells will decline, unless new well pumps designed for the higher heads are installed at deeper depths and the well motor horsepower is increased, if possible and as needed, to maintain the

well pumping rates. More relevant information follows in the Existing District Wells and Possible Future Replacement Wells section in this report.

## Water Plant Site Layout, Access and Spacing Information and Recommendations

For a new District water plant site, it is important that the water plant and well site location(s) that is (are) selected and the water plant site layout for the water plant infrastructure and construction of one or possibly two future District public supply wells provide sufficient room and adequate access for the water well contractor and subcontractors for the well construction phase for each public supply well at the site. The water plant site layout should have sufficient area and adequate access for the water well drilling rig and equipment, drill pipe, mud tanks, well casing, blank liner and screen materials, and the subcontractor drilling mud vacuum trucks and cement trucks during the well construction phases for possibly two wells.

AGS recommends that the District design the future District water plant or remote well site for the possible construction of two District public supply wells that screen different depth intervals, if feasible, such as at District Water Plant 1 (Wells 1 and 2) and Water Plant 2 (Wells 3 and 4).

If the test hole geophysical logging and temporary test well water sampling at a future District water plant or remote well site indicate that the subsurface hydrogeologic conditions and groundwater quality are acceptable for the construction of two public supply wells with well screens in different depth intervals, then:

- 1) It is important that there is sufficient horizontal spacing between the two wells and adequate area remains for the construction phase for the second public supply well at the site.
- 2) Adequate access should be provided for the well drilling and construction equipment and materials to be delivered to the location of the second water well on the water plant site or remote site and the site access should not be restricted by the water plant infrastructure plus any site perimeter fencing and/or residential homes or commercial property that is (are) constructed prior to the second well. In other words, adequate construction access to the second well location should not be trapped by previous water plant or site infrastructure or existing residential, commercial or another type of structure(s) on an adjoining property or properties.

### Public Supply Well Spacing Recommendations and Requirements

District Wells Completed with Well Screens at Different Depth Intervals: If the site-specific data indicate that two District public supply wells completed with well screens installed at different depths are feasible at one or more of the future District water plant or public supply well sites, then AGS recommends a horizontal well spacing of minimum 75 to 100 feet for the locations of the two wellheads selected on the water plant or remote well site.

District Wells Completed with Well Screens at Generally Similar Depth Intervals: If two District public supply wells completed with well screens installed at generally similar depth intervals are planned for or constructed for one or more District water plant or public supply sites, then AGS recommends a horizontal well spacing of minimum 2,000 feet for the locations of the wellheads of the two District wells to reduce the interference water level drawdown between the two wells when one or both of the wells are pumping.

The TCEQ rules have minimum public supply well spacing or setback distances from multiple pollution hazards and a subsequent section that follows on Pages 15 and 16 in the report and Appendix A provides related information.

Note that there is relevant Lost Pines GCD information regarding the GCD's well spacing requirements in the Lost Pines GCD Rules and Requirements section that follows on Pages 36 and 37 in the report.

### **New Well Casing and Other Water Plant and Site Infrastructure Elevation Information**

AGS recommends that the elevations of the top of the new public supply well casing, well vent pipe and above-ground well discharge piping for each future District public supply well be extended to a minimum of two (2) feet above the highest estimated flood elevation that occurred in the planned water plant and/or remote well site area(s) during any significant flood event in the past and/or a minimum of two (2) feet above the current estimated 500-year flood elevation, whichever is higher.

If possible, AGS also recommends that other critical water plant and water well infrastructure, including the operations building, electrical and chemical equipment and materials, water treatment and gas aeration equipment, etc. also be designed and constructed so they are elevated sufficiently above minimum standards to reduce the risk of flooding during major rain and flood events and storms.

### **TCEQ Rules and Requirements for Water Plants and Public Supply Wells**

Public water systems, water plants and public supply wells must meet many TCEQ rules and requirements for the related plans, technical specifications and document submittals that include but are not limited to public supply well siting, material, drilling, construction, testing, water sampling and water quality rules and requirements. Many of the related TCEQ rules and requirements are in Chapter 290, Subchapter D, Rules and Regulations for Public Water Systems and Chapter 290, Subchapter F, Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for Public Water Systems.

### **Submittals for TCEQ Plan Review**

Water plant infrastructure and public supply well construction plans, drawing and specifications, the pollution hazards study report or evaluation information and the sanitary control easement documents will need to be prepared and submitted to the TCEQ for review and approval prior to the start of any new District water plant construction and/or public supply well drilling and construction.

### **Minimum Public Supply Well Spacing Requirements**

Appendix D includes the minimum public supply well spacing or well setback requirements and sanitary control easement requirements in TCEQ Chapter 290, Subchapter D, 290.41(c)(1)(A)-(F) that are included in the 290.41 Water Sources section in the TCEQ R-195 document. The TCEQ Chapter 290, Subchapter D, Section 290.41(c)(1)(A)-(E) rules and the TCEQ Well Pollution Hazard Survey Checklist included in Appendix D list many minimum public supply well spacing or well setback requirements from multiple pollution hazards and environmental sites that range from a minimum horizontal well spacing of 50 feet to 1/4 (0.25) mile.

### **Pollution Hazards Study**

A pollution hazards study report and/or the TCEQ well pollution hazard survey checklist must be completed and related documents must be submitted to the TCEQ for plan review and approval(s) prior to the start of any future water plant and public supply well construction phase. If desired for a future District public supply well site, AGS can perform a pollution hazard study and prepare a written report to address the TCEQ Chapter 290, Subchapter D, Section 290.41(c)(1)(A)-(E) rules during the public supply well design phase.

### **Liquid Petroleum or Chemical Pipelines**

For site evaluation and selection of a District water plant and public supply well site, the District and Engineer should be aware that TCEQ Chapter 290, Subchapter D, Section 290.41(c)(1)(A) includes a minimum public supply well spacing or well setback requirement of 150 feet from a liquid petroleum or chemical transmission pipeline.

### **Sanitary Control Easement**

Appendix D also includes the TCEQ sanitary control easement rules and requirements in TCEQ Chapter 290, Subchapter D, Section 290.41(c)(1)(F) and the District and Engineer should address these requirements and obtain TCEQ approval prior to the start of a District water plant and/or public supply well construction operations.

## Lost Pines GCD Regulatory Rules and Requirements

The District boundaries are located in central Bastrop County and the Lost Pines Groundwater Conservation District (GCD) regulates groundwater and water well permitting and use in Bastrop County and Lee County.

### Lost Pines GCD Application for a District Test Hole and Test Well

Based on the Lost Pines GCD rules (Rule 3.1, F., Test or monitoring well), a well application is required to be submitted to the Lost Pines GCD for the test hole and test well for review and approval prior to the start of the test hole drilling.

After a test hole location has been selected and prior to the start of a District test hole drilling and test well water sampling project, the District will need to complete and submit a Form 100, Well Drilling Application, to the Lost Pines GCD for their review and approval. A copy of Lost Pines GCD Form 100, Well Drilling Application, is in Appendix E of this report.

AGS recommends that the District contact the Lost Pines GCD staff prior to submitting the Form 100 document to confirm the GCD requirements for a test hole(s) and test well(s) and answer any related questions. AGS can assist the District in answering the questions and providing the information listed in Section V – Well Information of Form 100.

### Lost Pines GCD Well Spacing Rules and Requirements

Lost Pines GCD Rule 8.2, Minimum Well Spacing Requirements, 8.2 B., From other wells, require: A) a minimum well spacing of 1,500 feet for a new non-exempt well (ex. public supply well) with a maximum pump capacity of 500 gpm; or B) a minimum well spacing of 2,500 feet for a new non-exempt well with a maximum pump capacity of 500 to 1,000 gpm from another water well(s): (1) that is (are) registered or permitted on the date that the well registration is filed; (2) that is (are) completed in the same aquifer unit; and (3) owned by a different well owner.

### Lost Pines GCD Operating Permits for the District and Production Limits

The District has existing Lost Pines GCD operating permits for the District's five public supply wells, which are completed in the Calvert Bluff Aquifer. Information reviewed by AGS indicate that the cumulative authorized annual withdrawal amount for the five District well operating permits is 1,721 acre-feet per year (acre-feet/yr).

Lost Pines GCD has enacted production limits for the aquifers relatively recently, which are based on which aquifer is planned for well production (ex. Calvert Bluff Aquifer or Simsboro Aquifer) and the contiguous acreage owned or controlled by a District or water supplier.

If not done so already, AGS recommends that the District or the District and AGS contact Lost Pines GCD relatively soon and prior to the planned drilling and construction of a new District public supply well and:

(1) Discuss the current District operating permits for the existing District wells and the possible options for permitting a new District public supply. The Lost Pines GCD permit options may include a “no-increase” permit, if no additional new District well permit capacity is needed from the Calvert Bluff Aquifer, or a permit for additional District well permit capacity, if or when additional well permit capacity is needed in the foreseeable future.

(2) The Lost Pines GCD rules, requirements and production limits, if the District were planning to construct one or more future District wells in the Calvert Bluff Aquifer and/or the Simsboro Aquifer.

## **Bastrop County and City of Bastrop Regulatory Rules and Requirements**

AGS is not aware of any Bastrop County or City of Bastrop rules or requirements that apply to initial District test hole drilling or temporary test well water sampling operations.

There probably are Bastrop County and possibly City of Bastrop rules and requirements that are applicable and must be met for related District water plant, new public supply well, drainage and/or other project siting, design and construction.

Prior to the start of construction of a new District water plant and/or public supply well, the District and SPI should prepare and submit the necessary engineering specifications, plans and drawings to meet the relevant county or city water plant, public supply well, drainage and any other project requirements and obtain any necessary county, city or other local regulatory permit(s) and/or approval(s).

## References

Bastrop County Water Control and Improvement District No. 2, District water well records, reports, data and logs and water quality analyses provided by Bastrop County WCID 2 for review to Advanced Groundwater Solutions, LLC.

J. L. Myers Company, 1986, Record of Deep Well for Bastrop WCID No. 2 Well No. 3, Test Hole No. 1, Test Hole No. 2 and Test Hole No. 3 for Well No. 3.

Texas Commission on Environmental Quality (TCEQ), Drinking Water Watch Website, <https://dww2.tceq.texas.gov/DWW/>

Texas Commission on Environmental Quality (TCEQ), Rules and Regulations for Public Water Systems, Publication RG-195, revised December 2019.

Texas Water Development Board (TWDB), Groundwater Data Viewer Website, <https://www3.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer>

William F. Guyton Associates, Inc., 1986, Completion Report of Production Well 3, prepared for Bastrop County Water Control and Improvement District #2, Bastrop County, Texas, 16 pages, 7 figures, 1 appendix.

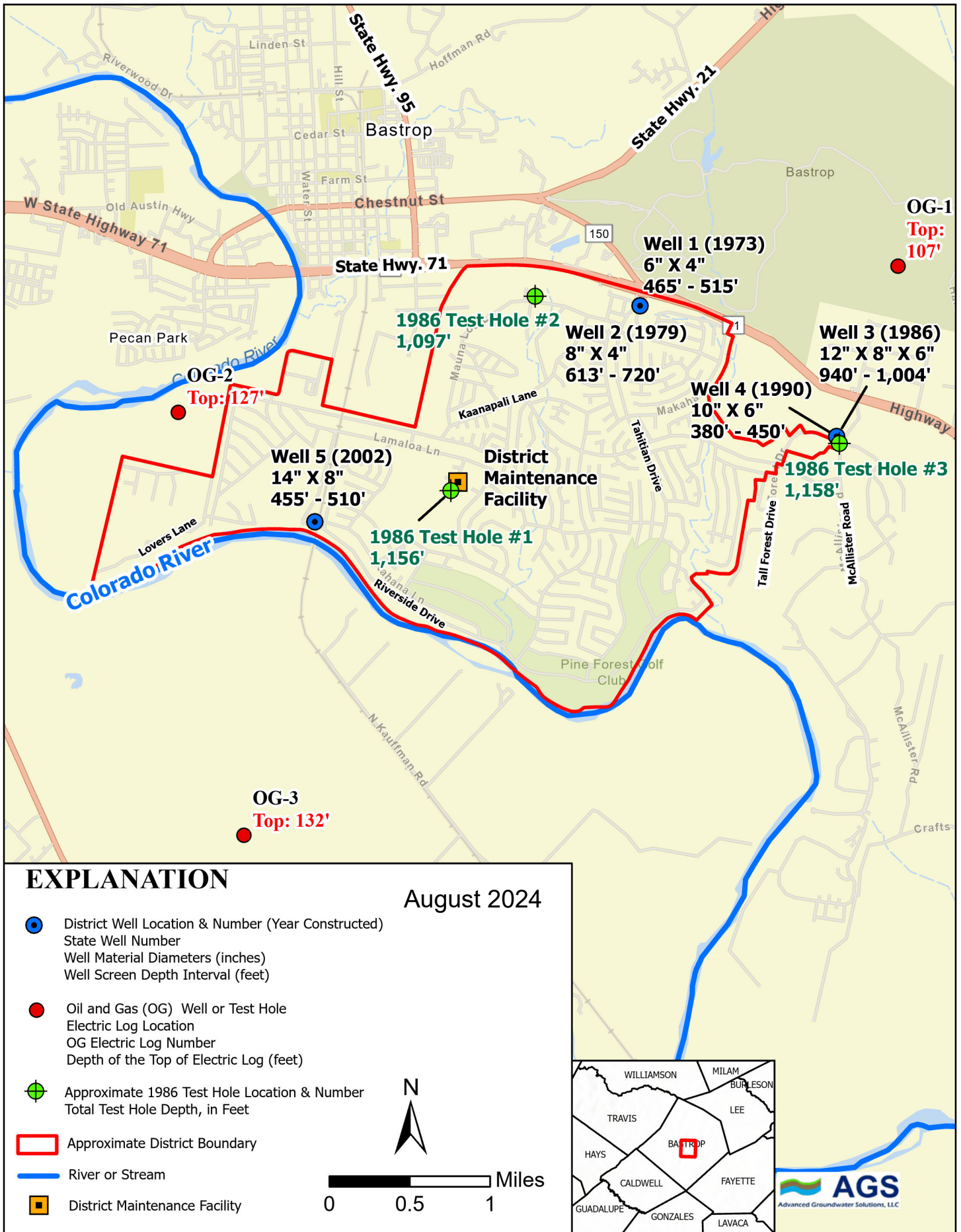


Figure 1 - District Water Wells and 1986 Test Holes and Oil and Gas Wells with Logs

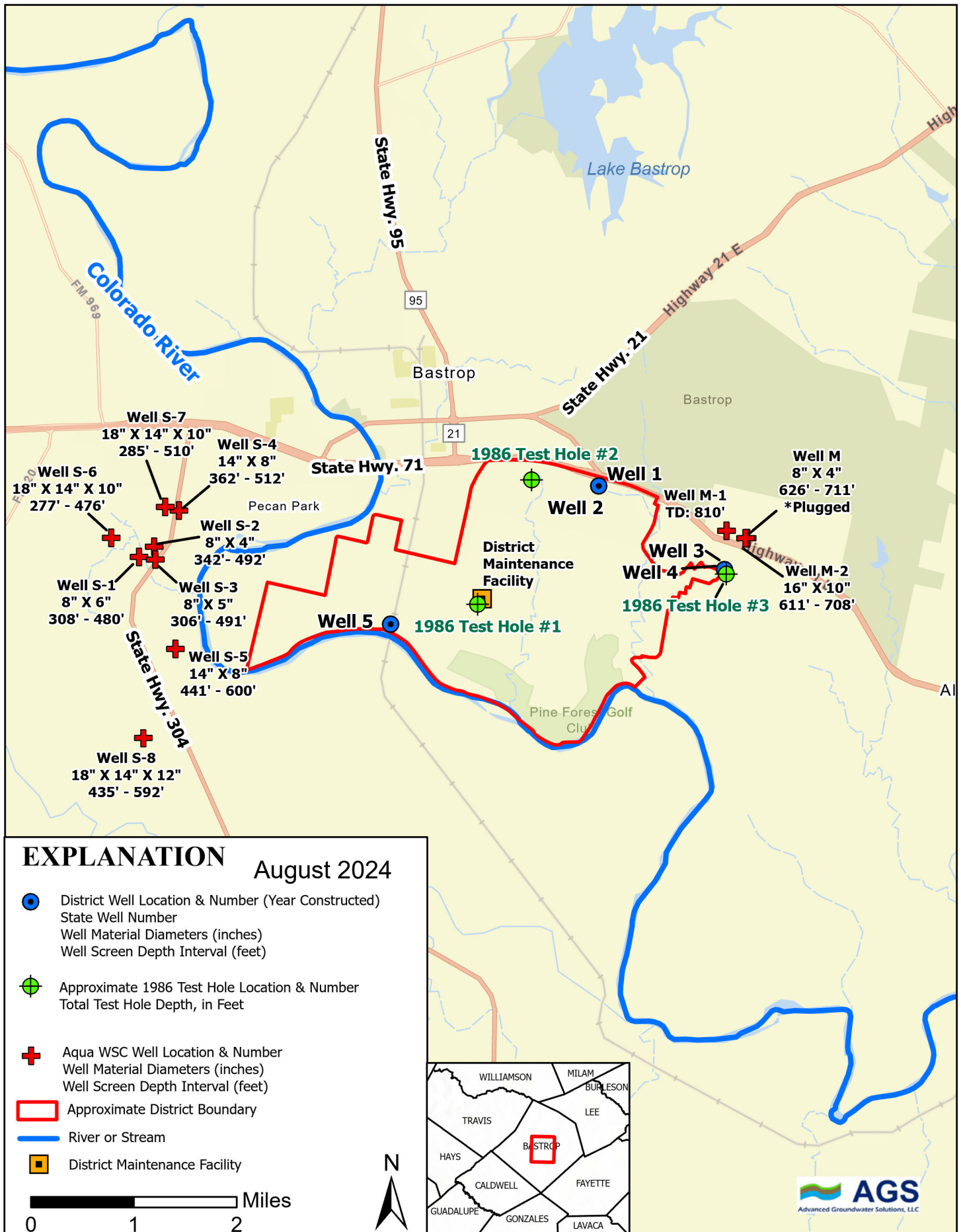


Figure 2 - Aqua WSC Water Wells and District Well and 1986 Test Hole Locations



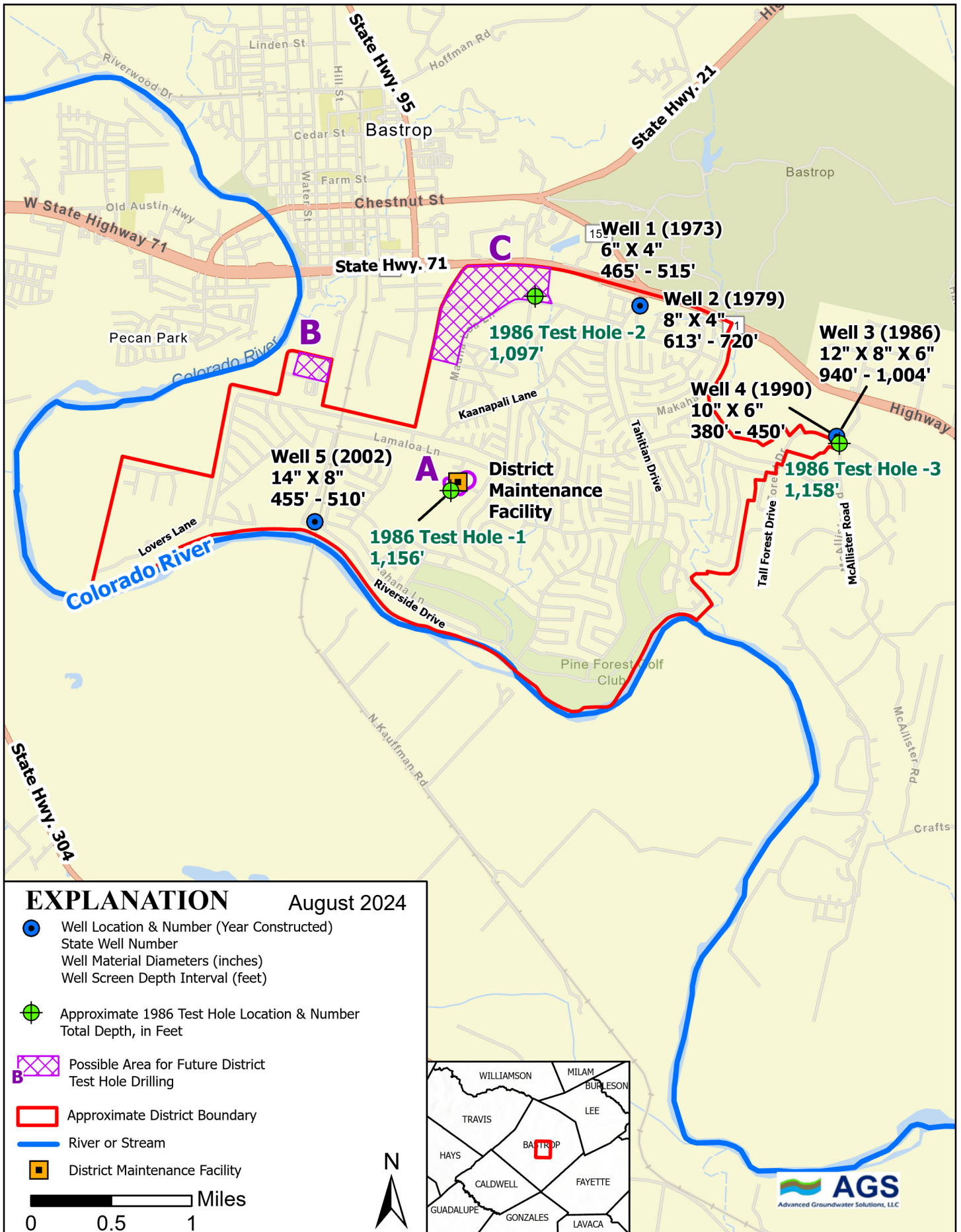


Figure 4 - District Water Wells and 1986 Test Holes and Possible Future District Test Hole Areas

**Table 1. Bastrop County WCID #2 - Water Wells and Test Holes, Construction and Testing Data**

State	Water District and Well Number and (Water Plant / Pump Station)	Year of Construction	Well Drilling Company	Aquifer(s)	Well Elevation (feet)	Total Depth of Well (feet)	Well Screen Depth Interval & [Total Screen Length] (feet)	Well Casing & [Screen] Diameter/s (inches)	Pumping Rate (gpm) & (Specific Capacity) (gpm/ft)	Static Water Level Depth (feet)	Date	Use of Water (4) and [Type of Well Pumping Equipment, Pump Setting and Well Motor Horsepower]
58-62-302	Bastrop County WCID #2 Well 1 (Water Plant & Pump Station 1)	1973	Richter Well Drilling	Calvert Bluff	528	515	465 - 515 [50]	6, 4 [4]	- 78.5 1.0 gpm/ft	197 261 278.5 251.8	5/16/1973 1/24/1988 2/20/1998 2/05/2007	Public Supply [Submersible Pump & Motor, Pump Set at 357 feet, & 15 Hp Well Motor]
58-62-304	Bastrop County WCID #2 Well 2 (Water Plant & Pump Station 1)	1979	Richter Well Drilling	Calvert Bluff	528	735	613 - 720 [107]	8, 4 [4]	- 181 1.1 gpm/ft	198 260 293.4 248,9	6/16/1979 1/24/1988 2/20/1998 2/25/2000	Public Supply [Submersible Pump & Motor, Pump Set at 440 feet, & 30 Hp Well Motor]
58-62-305	Bastrop County WCID #2 Well 3 (Water Plant & Pump Station 2)	1986	J. L. Myers Company	Calvert Bluff (deep) or Simsboro (upper)	510	1,020 Test Hole Depth of 1,190 feet	940 - 1,004 [64]	12, 8, 6 [6]	300 gpm (1.7 gpm/ft) 352 {1.9 gpm/ft}	192.4 230 201.6 239.8	9/30/1986 1/28/1988 2/19/1999 2/05/2007	Public Supply [Submersible Pump & Motor, Pump Set at 680 feet, Unknown Well Motor Sizing]
58-62-307	Bastrop County WCID #2 Well 4 (Water Plant & Pump Station 2)	1990	Watts Drilling Company	Calvert Bluff	510	450	380 - 450 [70]	10, 6 [6]	150 gpm (1.3 gpm/ft)	204 192.1 234.2 219.2	##### 2/20/1998 2/05/2007 #####	Public Supply [Submersible Pump & Motor, Pump Set at 390 / 399 feet, & 20 Hp Well Motor]
58-62-508	Bastrop County WCID #2 Well 5 (Water Plant & Pump Station 3)	2002	Brien Water Wells	Calvert Bluff	365	524	455 - 510 [55]	14, 8 [8]	350 gpm (2.6 gpm/ft) 505 gpm (3.2 gpm/ft)	56.5 134.4	8/21/2002 11/2/2023	Public Supply [Submersible Pump & Motor, Pump Set at 380 feet, & 75 Hp Well Motor]

**Table 1. Bastrop County WCID #2 - Water Wells and Test Holes, Construction and Testing Data**

State	Water District and 1986 Test Hole Number and General Location	Year Test Hole Drilling	Well Drilling Company	Aquifer(s) (1)	Elev- ation (feet) (2)	Total Depth of Test Hole (feet) (3)	Water Sampling	Well	Pumping	Static	Date	Test Hole and Water Sampling Notes
							Depth Interval & [Total Screen Length] (feet) (4)	Casing & [Screen] Diameter/s (inches) (5)	Rate (gpm) & (Specific Capacity) (gpm/ft) (6)	Water Level Depth (feet) (7)		
-	Bastrop County WCID #2 Test Hole #1 Near District Maintenance Facility	1986	J. L. Myers Company	Calvert Bluff - Simsboro	-	1,156	740 - 770 [30] 980 - 1,010 [30]	- - -	25 - 25 -	- - -	5/01/1986 - 4/23/1986 -	Test Hole #1, Plugged  Test Hole Water Sampling  Completed at 2 Depths, Table 2, Water Quality Data
-	Bastrop County WCID #2 Test Hole #2 West of District Wells 1 & 2	1986	J. L. Myers Company	Calvert Bluff - Simsboro	-	1,097	- - -	- - -	- - -	- - -	- - -	Test Hole #2, Plugged  No Test Hole  Water Sampling Completed
-	Bastrop County WCID #2 Test Hole #3 At / Near District Wells 3 & 4	1986	J. L. Myers Company	Calvert Bluff - Simsboro	-	1,158	380 - 410 [30] 970 - 1,000 per report text [30]	- - -	29 - 18 -	- - -	7/28/1986 - 7/14/1986 -	Test Hole #3, Plugged  Test Hole Water Sampling  Completed at 2 Depths, Table 2, Water Quality Data

**Table 1. Bastrop County WCID #2 - Water Wells and Test Holes,  
Construction and Testing Data**

**EXPLANATION:**

- (1) Aquifer: Calvert Bluff = Calvert Bluff Aquifer unit of the Wilcox Group of the Carrizo - Wilcox Aquifer.  
Simsboro = Simsboro Aquifer or Sand of the Wilcox Group of the Carrizo - Wilcox Aquifer.
- (2) Well Elevation: Approximate well elevations from U.S. Geological Survey (USGS), Texas Water Development Board (TWDB) and/or water well company data, reports and/or maps.  
USGS, TWDB and water well company reported well elevations may not be the same for some wells.
- (3) Static Water Level: Static water level depths shown are reported depths to water below the measuring point datums for the wells on the date listed, which are generally about 1 to 3 feet above the land surface elevation. USGS, TWDB, well drilling company and other reported water-level data may be slightly different than shown if the water-level datums are different.
- (4) Use of Water:  
Public Supply = Public or municipal water supply.                      Plugged = Plugged and abandoned.

Units: Pumping Rate: gpm = gallons per minute    Specific Capacity: gpm/ft = gallons per minute per foot of drawdown

**Table 2. Bastrop County WCID #2 Wells, Test Holes and Water Plants - Water Quality Data for Select Constituents**

District												Total	Specific				
State Well Number, Water Plant, TCEQ Entry Point or 1986 Test Hole	Screen Depth Interval (feet)	Sample Type 1/	Labo- ratory 2/	Sample Collection Date	Arsenic (As) (mg/L)	Iron (Fe) (mg/L)	Manga- nese (Mn) (mg/L)	Fluo- ride (F) (mg/L)	Sodium (Na) (mg/L)	Sulfate (SO <sub>4</sub> ) (mg/L)	Chlo- ride (Cl) (mg/L)	Dissolved Solids (mg/L)	Conductance or Conductivity (micromhos/ cm at 25°C)	Total Hardness (as CaCO <sub>3</sub> ) (mg/L)	pH	Gross Alpha (pCi/L)	Radium-228 (pCi/L)
<b>58-62-302</b>																	
Well 1	465 - 515	Well	TDH	9/15/1974	-	0.36	<0.05	0.3	125	160	38	509	906	162	7.7	-	-
Well 1	465 - 515	Well	TDH	8/25/1980	-	0.85	-	<0.1	120	145	36	490	900	134	8.0	-	-
<b>58-62-304</b>																	
Well 2	613 - 720	<i>No Well 2 water quality records found.</i>															
<b>58-62-305</b>																	
Well 3	940 - 1,004	Well	POPE	10/02/1986	<0.02	0.06	0.0	2.3	431.	4	279	1,383.3 (d)	1,800	13.7	8.3	<2	-
<i>Well 3 water quality testing indicates that the water contains methane gas, iron related bacteria and sulfate reducing bacteria.</i>																	
<b>58-62-307</b>																	
Well 4	380 -450	Well	TDH	11/09/1990	-	0.20	0.05	0.1	58	64	37	331	636	160	7.8	-	-
Well 4	380 -450	Well	FWHD	11/??/1990	-	0.16	-	0.22	68.2	53.4	48	-	580	162	8.1	-	-
<b>58-62-508</b>																	
Well 5	455 - 510	Well	AQUA	8/22/2002	<0.005	0.06	<0.02	2.35	-	18.7	17.2	556	-	94	6.58	-	-
<b>1986 Test Holes for Well 3</b>																	
Test Hole #1 - Sample 2	740 - 770	Test	POPE	5/01/1986	-	0.38	0.01	0.5	686.3	8.0	448	2,249.7 (d)	2,900	47	8.0	-	-
Test Hole #1 - Sample 1	980 - 1,010	Test	POPE	4/24/1986	-	0.85	0.0	1.5	839	8.0	640	2,667 (d)	3,300	46	7.9	-	-
Test Hole #3 - Sample 2	380 - 410	Test	POPE	7/28/1986	-	0.02	0.04	0.1	53.7	63.0	24	418.9 (d)	600	162.6	7.7	-	-
Test Hole #3 - Sample 1	970 - 1,000	Test	POPE	7/14/1986	-	0.03	0.0	1.5	428.8	12.0	285	1,377.6 (d)	1,800	17.5	8.3	-	-
TCEQ Maximum Contaminant Level (MCL) or Secondary Constituent Level (SCL) and Units					0.010 mg/L (MCL)	0.3 mg/L (SCL)	0.05 mg/L (SCL)	4 (MCL) 2 (SCL)	--	300 mg/L (SCL)	300 mg/L (SCL)	1,000 mg/L (SCL)	--	--	>7.0 no units (SCL)	15 pCi/L (MCL)	--

**Table 2. Bastrop County WCID #2 Wells, Test Holes and Water Plants -  
Water Quality Data for Select Constituents**

District												Total	Specific					
State Well Number, Water Plant, TCEQ Entry Point or 1986 Test Hole	Screen Depth Interval (feet)	Sample Type 1/	Labo- ratory 2/	Sample Collection Date	Arsenic (As) (mg/L)	Iron (Fe) (mg/L)	Manga- nese (Mn) (mg/L)	Fluo- ride (F) (mg/L)	Sodium (Na) (mg/L)	Sulfate (SO <sub>4</sub> ) (mg/L)	Chlo- ride (Cl) (mg/L)	Dissolved Solids (mg/L)	Conductance or Conductivity (micromhos/ cm at 25°C)	Total Hardness (as CaCO <sub>3</sub> ) (mg/L)	pH	Gross Alpha (pCi/L)	Radium-228 (pCi/L)	
<b>Bastrop County WCID #2</b>																		
<b>TCEQ PWS # 0110020</b>		EP001	TCEQ	6/22/2005	<0.002	0.051	0.0115	-	176	-	-	-	-	49.9	-	-	-	
<b>Water Plant 1 / EP001</b>		EP001	TCEQ	6/09/2011	<0.002	0.049	0.0133	0.17	182	153	55	580	972	52.9	7.9	-	-	
Well 1, 58-62-302	465 - 515	EP001	TCEQ	2/02/2015	-	-	-	-	-	-	-	-	-	-	-	<3 (e)	<1	
Well 2, 58-62-304	613 - 720	EP001	TCEQ	2/04/2016	<0.002	0.052	0.0118	-	183	-	-	-	-	48.1	-	-	-	
		EP001	TCEQ	1/10/2017	<0.002	0.073	0.0124	0.15	181	151	57	560	1,020	49.6	-	-	-	
		EP001	TCEQ	1/16/2019	<0.002	0.202	0.0141	-	182	-	-	-	-	61.1	-	-	-	
		EP001	TCEQ	4/02/2020	-	-	-	0.14	-	152	56	573	990	-	-	-	-	
		EP001	TCEQ	4/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	<3 (e)	<1
		EP001	TCEQ	1/19/2022	<0.002	0.071	0.0124	-	180	-	-	-	-	-	62.6	-	-	-
EP001	TCEQ	1/17/2023	-	-	-	0.14	177	151	58	571	1,020	-	9.12	-	-	-		
<b>Water Plant 2 / EP002</b>																		
Well 3, 58-62-305	940 - 1,004	EP002	TCEQ	5/19/2010	<0.002	0.088	0.014	-	287	-	-	810	-	-	-	-	-	
Well 4, 58-62-307	380 -450	EP002	TCEQ	6/09/2011	-	-	-	1.75	-	15	139	-	1,430	-	8.1	-	-	
		EP002	TCEQ	2/02/2015	-	-	-	-	-	-	-	-	-	-	-	<3 (e)	<1	
		EP002	TCEQ	2/04/2016	<0.002	0.052	0.0256	-	162	-	-	-	-	103	-	-	-	
		EP002	TCEQ	1/10/2017	-	-	-	1.62	-	16	122	771	1,400	-	-	-	-	
		EP002	TCEQ	1/16/2019	<0.002	<b>1.03</b>	0.0498	-	57.8	-	-	-	-	155	-	-	-	
		EP002	TCEQ	4/02/2020	-	-	-	1.75	-	59	43	356	620	-	-	-	-	
		EP002	TCEQ	4/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	<3 (e)	<1
		EP002	TCEQ	1/19/2022	<0.002	0.084	0.0228	-	58.8	-	-	-	-	-	160	-	-	-
EP002	TDH	1/17/2023	-	-	-	1.54	-	17	112	746	1,340	-	8.3	-	-	-		
TCEQ Maximum Contaminant Level (MCL) or Secondary Constituent Level (SCL) and Units					0.010 mg/L (MCL)	0.3 mg/L (SCL)	0.05 mg/L (SCL)	4 (MCL) 2 (SCL)	--	300 mg/L (SCL)	300 mg/L (SCL)	1,000 mg/L (SCL)	--	--	>7.0 no units (SCL)	15 pCi/L (MCL)	--	

**Table 2. Bastrop County WCID #2 Wells, Test Holes and Water Plants - Water Quality Data for Select Constituents**

District												Total	Specific				
State Well Number, Water Plant, TCEQ Entry Point or 1986 Test Hole	Screen Depth Interval (feet)	Sample Type 1/	Labo- ratory 2/	Sample Collection Date	Arsenic (As) (mg/L)	Iron (Fe) (mg/L)	Manga- nese (Mn) (mg/L)	Fluo- ride (F) (mg/L)	Sodium (Na) (mg/L)	Sulfate (SO <sub>4</sub> ) (mg/L)	Chlo- ride (Cl) (mg/L)	Dissolved Solids (mg/L)	Conductance or Conductivity (micromhos/ cm at 25°C)	Total Hardness (as CaCO <sub>3</sub> ) (mg/L)	pH	Gross Alpha (pCi/L)	Radium-228 (pCi/L)
<b>Bastrop County WCID #2</b>																	
<b>TCEQ PWS # 0110020</b>																	
<b>Water Plant 3 / EP004</b>																	
Well 5, 58-62-508	455 - 510	EP004	TCEQ	6/09/2011	<0.002	<0.01	0.0042	<b>2.11</b>	232	>1	21	582	994	3.55	8.4	-	-
		EP004	TCEQ	2/02/2015	-	-	-	-	-	-	-	-	-	-	-	<3 (e)	<1
		EP004	TCEQ	2/04/2016	<0.002	<0.01	0.0039	-	229	-	-	-	-	3.62	-	-	-
		EP004	TCEQ	1/10/2017	<0.002	<0.01	0.004	<b>2.06</b>	227	<1	21	580	1,000	3.52	-	-	-
		EP004	TCEQ	1/16/2019	<0.002	<0.01	0.0042	-	240	-	-	-	-	3.52	-	-	-
		EP002	TCEQ	4/02/2020	-	-	-	<b>2.07</b>	-	<1	22	598	1,000	-	-	-	-
		EP004	TCEQ	4/01/2021	-	-	-	-	-	-	-	-	-	-	-	<3 (e)	<1
		EP004	TCEQ	1/19/2022	<0.002	<0.01	0.0038	-	238	-	-	-	-	3.5	-	-	-
		EP004	TDH	7/12/2023	-	-	-	<b>2.11</b>	-	>1	23	597	963	-	8.4	-	-
TCEQ Maximum Contaminant Level (MCL) or					0.010	0.3	0.05	4 (MCL)	--	300	300	1,000	--	--	>7.0	15	--
Secondary Constituent Level (SCL) and Units					mg/L	mg/L	mg/L	2 (SCL)		mg/L	mg/L	mg/L			no units	pCi/L	
					(MCL)	(SCL)	(SCL)			(SCL)	(SCL)	(SCL)			(SCL)	(MCL)	

**EXPLANATION:**

**1/ Sample Type:**

EP001 = TCEQ  
Entry Point & Number  
Well = Water Well

**2/ Laboratory** and/or its subcontractor laboratory (laboratories):

AQUA = Aqua-Tech Laboratories, Inc., Bryan, Texas.  
FWHD = Fort Worth City Health Department Laboratory, Fort Worth, Texas.  
POPE = Pope Testing Laboratories, Inc., Dallas, Texas.  
TCEQ = Texas Commission on Environmental Quality, Austin, Texas.  
TDH = Texas Department of Health Laboratories or Texas Department of State Health Services, Austin, Texas.

**3/ Total Dissolved Solids**, (d) = dissolved residue.

**4/ Gross Alpha**, (e) = excluding Radon & Uranium.

Units mg/L = milligrams per liter = parts per million (ppm).  
pCi/L = picoCuries per liter.

**Yellow Highlighted / Bold** = concentration is equal to, exceeds or does not meet the TCEQ maximum contaminant level (MCL) or secondary constituent level (SCL) for public water supply.

**Table 3. Aqua WSC Water Wells,  
Construction and Testing Data**

State	Water District and Well Number	Year of Construction	Drilling Company	Aquifer(s) (1)	Well Elevation (feet) (2)	Total Depth of Well (feet)	Well Screen Depth & [Total Screen Length] (feet)	Well Casing & [Screen] Diameter/s (inches)	Pumping Rate (gpm) & (Specific Capacity) (gpm/ft)	Static Water Level Depth (feet) (3)	Date	Use of Water (4)
58-62-113	Aqua Water Supply Corporation (WSC) Well S-1	1977	Ray Williams	Simsboro	362	490	308 - 480 [120]	8, 6 [6]	450 4.3 gpm/ft	26 28.3	8/17/1977 10/11/1979	Public Supply (Capped?)
58-62-114	Aqua WSC Well S-2	1978	Lanford Drilling Co.	Simsboro	352	497	342 - 492 [120]	8, 4 [4]	457 9.1 gpm/ft 540 9.6 gpm/ft	43 34.8 31.7	6/22/1978 10/11/1979 4/07/1981	Public Supply
58-62-115	Aqua WSC Well S-3	1982	Pomykal Drilling Co.	Simsboro	370	496	306 - 491 [117]	8, 5 [5]	703 4.0 gpm/ft	45 77.1	9/07/1982 5/19/1998	Public Supply
58-62-116	Aqua WSC Well S-4	1985	Layne Texas Company	Simsboro	372	529	362 - 512 [126]	14, 8 [8]	807 14.4 gpm/ft	39	11/25/1985	Public Supply
58-62-409	Aqua WSC Well S-5	1986	Layne Texas Company	Simsboro	401	615	441 - 600 [118]	14, 8 [8]	1,200 11.4 gpm/ft	71	1/16/1986	Public Supply
58-62-118	Aqua WSC Well S-6	1998	Russell Drilling Co.	Simsboro	392	485	277 - 476 [169]	18, 14, 10 [10]	600 4.1 gpm/ft	89 112.9	8/26/1998 4/19/2000	Public Supply

**Table 3. Aqua WSC Water Wells,  
Construction and Testing Data**

State	Water District and	Year of	Well	Aquifer(s)	Well	Well	Well Screen	Well	Pumping	Static		
Well	Well Number	Construc-	Drilling	(1)	Elev-	Total	Depth Interval	Casing &	Rate (gpm)	Water Level	Date	Use of Water (4)
Number		tion	Company	(1)	ation	Depth	& [Total Screen	[Screen]	& (Specific	Depth		
				(1)	(2)	(feet)	Length]	Diameter/s	Capacity)	(feet)		
				(1)	(2)	(feet)	(feet)	(inches)	(gpm/ft)	(3)		
58-62-119	Aqua WSC Well S-7	1999	Russell Drilling Co.	Simsboro	385	518	285 - 510 [150]	18, 14, 10 [10]	1,200 9.4 gpm/ft	82	4/02/1999	Public Supply
58-62-410	Aqua WSC Well S-8	2005	Russell Drilling Co.	Simsboro	417	602	435 - 592 [96]	18, 14, 12 [12]	1,100 9.3 gpm/ft	115	10/05/2005	Public Supply
58-62-306	Aqua WSC Well M	1978	Lanford Drilling Co.	Wilcox Group / Calvert Bluff	530	716	626 - 711 [85]	8, 4 [4]	201 2.8 gpm/ft	205 257.4	8/24/1978 5/20/2006	Public Supply / Plugged
58-62-308	Aqua WSC Well M-1	1999	--	Wilcox Group	557	810?	--	--	530 1.7 gpm/ft	--	2/18/1999	Public Supply
58-62-309	Aqua WSC Well M-2	2002	Russell Drilling Co.	Wilcox Group	531	718	611 - 708 [97]	16, 10 [10]	375 1.3 gpm/ft	205	4/10/2002	Public Supply

**Table 3. Aqua WSC Water Wells,  
Construction and Testing Data**

**EXPLANATION:**

- (1) Aquifer: Calvert Bluff = Calvert Bluff Aquifer unit of the Wilcox Group of the Carrizo - Wilcox Aquifer.  
Simsboro = Simsboro Aquifer or Sand of the Wilcox Group of the Carrizo - Wilcox Aquifer.
- (2) Well Elevation: Approximate well elevations from U.S. Geological Survey (USGS), Texas Water Development Board (TWDB) and/or water well company data, reports and/or maps.  
USGS, TWDB and water well company reported well elevations may not be the same for some wells.
- (3) Static Water Level: Static water level depths shown are reported depths to water below the measuring point datums for the wells on the date listed, which are generally about 1 to 3 feet above the land surface elevation. USGS, TWDB, well drilling company and other reported water-level data may be slightly different than shown if the water-level datums are different.
- (4) Use of Water: Reported use of the well water. AGS does not know the current status of the Aqua WSC wells.  
Public Supply = Public or municipal water supply. Plugged = Plugged and abandoned.

Units: Pumping Rate: gpm = gallons per minute Specific Capacity: gpm/ft = gallons per minute per foot of drawdown



**Photo 1**

**Bastrop County WCID 2 – Water Plant 1 Sign Near Entrance Gate**  
August 18, 2024



**Photo 2**

**Bastrop County WCID 2 – Water Plant 1 Site**  
August 18, 2024



**Photo 3**  
**Bastrop County WCID 2 – Water Plant 1, Well 1 and Well 2 Site**  
August 18, 2024



**Photo 4**  
**Bastrop County WCID 2 – Water Plant 1, Well 1 and Well 2 Site**  
August 18, 2024



**Photo 5**

**Bastrop County WCID 2 – Water Plant 2 Sign on Chemical / Operations Building**  
August 18, 2024



**Photo 6**

**Bastrop County WCID 2 – Water Plant 2, Well 3 and Well 4 Site**  
August 18, 2024



**Photo 7**  
**Bastrop County WCID 2 – Water Plant 2, Well 3 and Well 4 Site**  
August 18, 2024



**Photo 8**  
**Bastrop County WCID 2 – Water Plant 2, Well 3 and Well 4 Site**  
August 18, 2024



**Photo 9**

**Bastrop County WCID 2 – Water Plant 3 Site, Ground Storage Tank and Building**  
June 13, 2024



**Photo 10**

**Bastrop County WCID 2 – Water Plant 3 and Well 5 Site**  
June 13, 2024



**Photo 11**

**Bastrop County WCID 2 – Water Plant 3 Site, Well 5 and Discharge Piping**  
June 13, 2024



**Photo 12**

**Bastrop County WCID 2 – Water Plant 3 and Well 5 Site**  
June 13, 2024



**Photo 13**

**Possible Future District Test Hole Area  
Area A, District Maintenance Facility Area -  
District Maintenance Facility Fence, Sign, Yard and Building  
August 21, 2024**



**Photo 14**

**Possible Future District Test Hole Area  
Area A, District Maintenance Facility Area -  
Nuwana Lane and Trees Located West of District Maintenance Facility  
August 21, 2024**



**Photo 15**

**Possible Future District Test Hole Area  
Area A, District Maintenance Facility Area -  
Honolulu Lane (Gravel and Dirt Road), Trees and Brush  
Located Southwest of the District Maintenance Facility  
August 21, 2024**



**Photo 16**

**Possible Future District Test Hole Area  
Area A, District Maintenance Facility Area -  
Trees, Brush and Entrance Gate Area Located South of the District Maintenance Facility  
August 21, 2024**



**Photo 17**

**Possible Future District Test Hole Area**  
**Area B, Gateway D.A.E.P. School / Lovers Lane Area - West Tract,**  
View to Southwest Toward the Gateway D.A.E.P. School Buildings  
August 18, 2024



**Photo 18**

**Possible Future District Test Hole Area**  
**Area B, Gateway D.A.E.P. School / Lovers Lane Area – West Tract,**  
View to the Northwest of the Tract Toward the Bastrop ISD Grounds Facility Building  
August 18, 2024



**Photo 19**

**Possible Future District Test Hole Area**  
**Area B, Gateway D.A.E.P. School / Lovers Lane Area – East Tract,**  
View to the North Toward the Lovers Lane Access Road Entrance  
August 18, 2024



**Photo 20**

**Possible Future District Test Hole Area**  
**Area B, Gateway D.A.E.P. School / Lovers Lane Area - East Tract,**  
View to the South of the Access Road and the GoldStar Transit Bus Facility  
August 18, 2024



**Photo 21**

**Possible Future District Test Hole Area**  
**Area C, Mauna Loa Lane Area - North Section,**  
View to the East of the Unimproved Road West of Briar Forest Drive  
August 21, 2024



**Photo 22**

**Possible Future District Test Hole Area**  
**Area C, Mauna Loa Lane Area - North Section**  
View to the West of the Unimproved Road West of Briar Forest Drive  
August 21, 2024



**Photo 23**

**Possible Future District Test Hole Area  
Area C, Mauna Loa Lane Area – South Section,  
View to the West of the LCRA Substation  
August 21, 2024**



**Photo 24**

**Possible Future District Test Hole Area  
Area C, Mauna Loa Lane Area – South Section,  
View to the North of the Dead End Lane and Undeveloped Area to the North  
August 21, 2024**

## **Appendix A**

**BEFCO Engineering, Inc., August 2023,  
Bastrop County Water Control & Improvement District No. 2  
Water System Presentation (August 2023 Board Meeting)**

## BASTROP COUNTY WATER CONTROL & IMPROVEMENT DISTRICT NO. 2 WATER SYSTEM PRESENTATION (AUGUST 2023 BOARD MEETING)

### WATER DISTRIBUTION PRESSURE PLANES

#### Plants 1 & 2 [Pressure Setting - 50 psi (636' MSL)]

- Well 1 – 110 GPM (+45 GPM), Well 2 – 220 GPM (+85 GPM), Well 3 – 525 GPM (+205 GPM) and Well 4 – 165 GPM (1,020 GPM Total). *Note: Water well pumps were lowered in 2023 to achieve more GPM*
- Three (3) – 100,000 Gallon Ground Storage Tanks (300,000 Gallons Total)
- Four (4) – 500 GPM Booster Pumps, Two each at Water Plants 1 & 2 (2,000 Gallons Total)
- Two (2) – 5,000 Gallon Pressure Tanks at WP1 and One (1) – 10,000 Gallon Pressure Tank at WP2 (20,000 Gallons Total)
- Permanent Generator Set at WP2

TABLE 1 - Water System Capacity Table (Water Plants 1 & 2)

	Existing System	TCEQ Capacity Requirements	Percent Capacity	Total Connection Capacity	Remaining Connection Capacity
Number of Meter Equivalents	1,427	1,427			
Well Capacity (GPM)	1,020	856	84%	1,700	273
Booster Pump Capacity (GPM)	2,000	2,854	143%	1,000	(427)
Pressure Tank Capacity (Gallons)	20,000	28,540	143%	1,000	(427)
Storage Capacity (Gallons)	320,000	285,400	89%	1,600	173
Elevated Storage Capacity (Gallons)	0	N/A			
Emergency Power	Gen at WP2	-			

#### Plant 3 (Pressure Setting – 75-80 psi (547' MSL))

- Well 5 – 525 GPM (+145 GPM). *Note: Water well pump was lowered in 2023 to achieve more GPM*
- One (1) – 125,200 Gallon Ground Storage Tank
- Two (2) – 500 GPM Booster Pumps
- One (1) – 10,000 Gallon Pressure Tank

TABLE 2 - Water System Capacity Table (Water Plant 3)

	Existing System	TCEQ Capacity Requirements	Percent Capacity	Total Connection Capacity	Remaining Connection Capacity
Number of Meter Equivalents	746	746			
Well Capacity (GPM)	525	448	85%	875	129
Booster Pump Capacity (GPM)	1,000	1,492	149%	500	(246)
Pressure Tank Capacity (Gallons)	10,000	14,920	149%	500	(246)
Storage Capacity (Gallons)	135,200	149,200	110%	676	(70)
Elevated Storage Capacity (Gallons)	0	N/A			
Emergency Power	-	-			

- Currently, there is sufficient well capacity after pumps were lowered in Wells 1-3 and Well 5. Keep in mind this is most likely a short-term solution;
- **Insufficient booster pump & pressure tank capacities in both systems/pressure planes;**
- TCEQ Letter dated May 13, 2019 cited District for insufficient booster pump capacity, but ultimately proven that District had 1,000 GPM booster pump capacity in each pressure plane and ability to meet peak hourly demands with largest pump out of service. This only buys time until booster pumps no longer meet peak capacity;
- **Insufficient storage capacity in Lower System, only marginally acceptable storage capacity in Upper System.** TCEQ Letter dated August 31, 2022 stated overall capacity is at 99.8% capacity;
- As shown, insufficient pressure tank capacities, but technically TCEQ has not cited the District to date because of an overall capacity of 30,000 gallons is sufficient for up to 2,500 connections;
- With most recent line improvements along Tahitian Drive, all areas greater than 35 psi pressure;

- **ULTIMATE REASON FOR BOND APPLICATION WAS TO IMPLEMENT WELL AND ELEVATED STORAGE TANK CAPACITY, WHICH IN TURN WILL ALLEVIATE ALL CAPACITY CONCERNS.**

#### ULTIMATE BUILDOUT

- Right now, estimated at 6,850-meter connections: 4,680 Connections (Upper)/2,275 Connections (Lower);
- Requires 4,110 GPM of Well Capacity, 13,700 GPM of Booster Pump Capacity, 1,370,000 Gallons of Storage Capacity and minimum 685,000 Gallons of Elevated Storage Capacity (1,370,000 Gallons of Elevated Storage Tank Capacity is recommended to reduce the required booster pumps capacity to 4,110 GPM in lieu of 13,700 GPM);
- Larger 12" & 16" Water Lines between all plants for better flow & pressure and allow plants to be taken down for maintenance, repair & replacement projects;
- Kamaiki – Part of high-maintenance water lines. If Maintenance Building EST or Booster Pump Plants are constructed, this line needs to be upgraded to 12" to get water into Upper System. However, if this option is not considered, can remain a 6".

#### OTHER KEY POINTS

Elevated Storage Tanks would be able to provide more pressure and flow & better fire protection than a Standpipe because all water is "up in the air"; however, with generators, pumps & standpipes can be just as effective. Keep in mind, generators and pumps require electricity, maintenance and ultimately replacement.

#### BOND PROJECT - \$8.5 Million Budget

- *OPTION 1 - New Water Well, Upper System Elevated Storage Tank and Lower System Standpipe*
  - a) Water Well - \$1.5 Million includes 1 test well and permanent well;
  - b) 500,000-Gallon Multi-Leg Elevated Storage Tank for the Upper System - \$2 Million which includes yard piping, fencing, road, etc.;
  - c) 500,000-Gallon Standpipe for Lower System at Maintenance Building - \$2 Million which includes \$1,000 allowance for 12" & 16" water lines to tie-in to ex. 6" water line along Nuuanu Lane.
  - d) Compliance Lines on Kaupo, El Camino, Hawea and Keanahalululu is complete - \$754,098.20;
  - e) High-Maintenance Lines on Tahitian is complete - \$904,136.88. 4 other lines engineering is 95% complete – Construction estimates of \$600,000 for Kamaiki 12", \$300,000 for Keanahalululu/El Camino, \$160,000 for Mahalua and \$ 80,000 for Waiee.
  - f) **Cost Estimate for a-e is \$8.9 Million includes Kamaiki 12" but EXCLUDES Keanahalululu/El Camino, Mahalua and Waiee Water Lines and is still above the \$8.5 Million Budget.**
- *OPTION 2 – 3 Test Well for Future Water Well, Upper System Elevated Storage Tank and Lower System Standpipe*
  - g) 3 Test Wells to determine best location for future well, now that more well capacity has been realized through pump lowering - \$750,000;
  - h) 500,000-Gallon Elevated Storage Tank for the Upper System - \$2 Million which includes yard piping, fencing, road, etc.;
  - i) 500,000-Gallon Standpipe for Lower System at Maintenance Building - \$2 Million which includes \$1,000,000 allowance for 12" & 16" water lines to tie-in to ex. 6" water line along Nuuanu Lane.
  - j) Compliance Lines on Kaupo, El Camino, Hawea and Keanahalululu is complete - \$754,098.20;
  - k) High-Maintenance Lines on Tahitian is complete - \$904,136.88. 4 other lines engineering is 95% complete – Construction estimates of \$600,000 for Kamaiki 12", \$300,000 for Keanahalululu/El Camino, \$160,000 for Mahalua and \$ 80,000 for Waiee.
  - l) **Cost Estimate for g-k is \$8.5 Million includes Kamaiki 12" & Keanahalululu/El Camino but EXCLUDES Mahalua and Waiee Water Lines.**
- *OPTION 3 – New Water Well, Upper System Booster Pumps and Lower System Standpipe*
  - m) Water Well - \$1.5 Million includes 1 test well and permanent well;;
  - n) Duplex Booster Pumps with VFDs, Yard Piping, Fencing, Access Road, SCADA Controls, Electrical and Bluebonnet Electric - \$1.0 Million plus \$300,000 to connect Water Plant to Upper System EXCLUDING generator;
  - o) 500,000-Gallon Standpipe for Lower System at Maintenance Building - \$2 Million which includes \$1,000,000 allowance for 12" & 16" water lines to tie-in to ex. 6" water line along Nuuanu Lane.
  - p) Compliance Lines on Kaupo, El Camino, Hawea and Keanahalululu is complete - \$754,098.20;
  - q) High-Maintenance Lines on Tahitian is complete - \$904,136.88. 4 other lines engineering is 95% complete – Construction estimates of \$600,000 for Kamaiki 12", \$300,000 for Keanahalululu/El Camino, \$160,000 for Mahalua and \$ 80,000 for Waiee.
  - r) **Cost Estimate for g-k is \$8.5 Million includes Kamaiki 12" & Keanahalululu/El Camino but EXCLUDES Mahalua and Waiee Water Lines.**

## **TCEQ EXCEPTION PROCESS TO USE PRESSURE TANKS & GENERATORS IN LIEU OF ELEVATED STORAGE (“BACKDOOR”)**

- TCEQ 290.45 (g)(5): Although elevated storage is the preferred method of pressure maintenance for systems of over 2,500 connections, it is recognized that local conditions may dictate the use of alternate methods utilizing hydro-pneumatic tanks and on-site emergency power equipment. Alternative capacity requirements to the elevated storage requirements may be obtained based on request to and approval by the executive director. Special conditions apply to systems qualifying for an elevated storage alternative capacity requirement.
- New 10,000 or 20,000-Gallon Pressure Tank at Water Plant 1 or 2 or relocate Water Plant 3 10,000-gallon pressure tank from Water Plant 3 to either plant if Maintenance Building Standpipe is constructed plus generators at Water Plants 1 & 3 (\$500,000-\$575,000);
- Advantages – Most Cost-Effective Solution to construct & maintain, allow District to consider new well without having to cut out water line projects;
- Disadvantages – Exceptions can be revoked if unable to fulfill TCEQ requirements, Dependent upon mechanical equipment and fuel during grid power outages for supply and fire protection. If future EST is considered, never recover costs associated with pressure tank construction.

## **WATER WELL/WATER SUPPLY**

- Groundwater supply within the District is challenging due to limited supply & potential quality of the Calvert Bluff Aquifer, neighboring system well supply in the Simsboro (Bastrop, LCRA and Aqua WSC) and potential to protest of Simsboro Well;
- District currently has 5 Wells in the with a total capacity of 1,545 GPM (310 GPM average each), 6,850 connection full buildout requires 4,110 GPM;
- Will require 15 wells at current productivity rate and looks like treatment would be required for a Simsboro Well;
- Test well estimates \$200,000-\$250,000 for 800-foot depth with 3 samples;
- Consider wholesale agreements with Aqua WSC or City of Bastrop? Aqua WSC take point at Water Plant 2 would trigger water line upgrades back to main part of system and system development fee payments. City of Bastrop take point in Unit 6 or adjacent to old office area, costs?

## **BEFCO RECOMMENDATIONS**

- Full buildout with line improvements will allow Water Plants 1-2 with Onini or Maintenance Building EST to serve Upper System for full buildout and MB EST can also help Lower System through PRV;
- Elevated Storage Tank provide best, reliable service and fire protection during power outages but are the most expensive option;
- Composite is the best elevated storage tank option based on future maintenance costs, but only Multi-Leg ESTs will be able to fit under current bond budget;
- Standpipes are most cost-effective option to meet TCEQ elevated storage tank capacity requirements, but not getting 100% elevated storage capacity for supply & fire flow during power outages or natural disasters unless you have a generator with pumps to keep up with output to keep it full. Please note that a Standpipe at the Maintenance Building will provide 100% elevated storage capacity to Lower System and can be filled by Water Plant 3 with booster pumps set at 95 psi (580' TDH);
- Maintenance Building is best overall central location to help BOTH the Upper & Lower Systems, but only work to best potential with a well source on site. Abundant fill from Water Plant 3 to Maintenance Building Standpipe can be achieved, but Water Plant 3 can't adequately fill an Elevated Storage Tank at Maintenance Building.

## **Appendix B**

**William F. Guyton Associates, Inc., November 1986,  
Completion Report of Production Well 3, prepared for  
Bastrop County Water Control and Improvement District #2**

COMPLETION REPORT OF  
PRODUCTION WELL 3

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Prepared for

Bastrop County Water Control  
and Improvement District #2,  
Bastrop County, Texas

By

William F. Guyton Associates, Inc.  
Consulting Ground-Water Hydrologists  
Austin - Houston, Texas

November 1986

WILLIAM F. GUYTON ASSOCIATES, INC.

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3355 BEE CAVE ROAD, SUITE 401 • AUSTIN, TEXAS 78746 • (512) 327-9640

November 13, 1986

Mr. Gene Thompson  
Acting Manager  
Bastrop WC&ID#2  
Post Office Box 708  
Bastrop, Texas 78602

Dear Gene:

Transmitted herewith is our report on the drilling, construction, and testing of Production Well 3. As you had requested, the report contains copies of the results of all the chemical analyses performed on water samples collected from the test holes and the production well. The report also contains recommendations for the pump setting and discusses various factors to be considered when selecting the pump.

If you have any questions about the work performed or the information presented in this report, please do not hesitate to contact us.

Sincerely,

WILLIAM F. GUYTON ASSOCIATES, INC.



Ted L. Harriger

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## INTRODUCTION

Bastrop County Water Control and Improvement District #2 Production Well 3 was completed in the lower part of the Calvert Bluff Formation of the Wilcox Group at the site of the third test hole drilled as part of the program to increase the production capacity of the District's water system. The test holes were drilled and the well constructed in accordance with specifications prepared by William F. Guyton Associates, Inc.

The first test hole was drilled at a location where, based on a study of other wells and test holes, screenable fresh-water sands were anticipated to occur between the depths of 750 and 1,000 feet below the surface. This first test hole was drilled through the Calvert Bluff and Simsboro Formations to a depth of 1,156 feet. A total sand thickness of almost 200 feet was encountered between the depths of 670 and 1,020 feet. Subsequent pumping tests and water-sampling operations in this test hole indicated, however, that the quality of water contained in these sands was not acceptable for a public water supply system. The results of the chemical analyses are included in the appendix at the end of this report. The second test hole was drilled north of the first test hole, near the District's and the City of Bastrop's wells which produce fresh water. This second test hole was drilled through the Calvert Bluff and Simsboro Formations to a depth of 1,097 feet. Although sands that appeared to contain water of

acceptable quality were encountered between the depths of 400 and 730 feet, the relative shallowness of the uppermost of these sands and the small total thickness of the sands (approximately 80 feet) combined to make the location of the test hole unfavorable for the completion of a production well. Both of these test holes were plugged in accordance with the Texas Water Commission rules by filling them with heavy mud and cement. Cement plugs were placed between zones of markedly different water quality and in the top 20 to 30 feet of each hole.

The third test hole was drilled near the eastern edge of the property, where geophysical logs of other test holes indicated that the Simsboro contained water of poor quality but the Calvert Bluff contained screenable fresh-water sands. This third test hole was drilled through the Calvert Bluff and into the top of the Simsboro to a depth of 1,158 feet. Since the quality of water in the Simsboro appeared to be poor, two separate sand intervals in the Calvert Bluff were sampled and tested for productivity and water quality. The two intervals tested were at depths of 970 to 1,000 feet and 380 to 410 feet. The results of the chemical analyses of the water samples collected from these intervals are included in the appendix. Although the water from the deep zone contained relatively high concentrations of total dissolved solids and sodium, Mr. Robert Matthews of the Water Hygiene Division of the Texas Department of Health stated that, unless some other

constituent was found to be in excess of allowable concentrations, the water from that zone would be acceptable by the Department for use in a public water supply system. The water quality of the shallow zone was considerably better than that of the deep zone. However, due to the relative shallowness of the zone, which would provide for a limited available drawdown, and the fine-grained character of the sands in the zone, it appeared that only about 100 to 150 gallons per minute of the desired 300 gallons per minute could be expected as the production rate of the shallow zone.

After reviewing the results of the chemical analyses and pumping tests of the third test hole, and after considering the costs of additional test hole drilling and various well construction alternatives, the District's Board of Directors decided to have the production well completed in the deep zone. Since some of the tremie pipe used for testing the sand intervals had been lost in the hole, the test hole was plugged in a manner similar to the first two test holes and the production well was drilled and constructed approximately 30 feet from the test hole. The locations of the three test holes, the District's Wells 1 and 2, and the new Well 3 are shown on Figure 1.

The drilling of the test holes was begun on April 3, 1986 and the final water sampling of the well was conducted on October 15, 1986. The drilling, construction, and testing activities were performed by J. L. Myers Company of Dallas, Texas.

## CONSTRUCTION

A 12-1/4-inch diameter pilot hole for the well was drilled to a depth of 930 feet and then reamed to a diameter of 17 inches. Alignment measurements taken at 30-foot depth intervals during the drilling of the pilot hole indicated that the hole was within 1 degree of vertical. After the hole had been circulated clean of cuttings, 936 feet of 12-3/4-inch O.D. steel casing with a 0.375-inch wall thickness was set in the hole, with 6 feet extending above ground level. A 1-inch I.D. steel measuring pipe was attached to the casing so that it extended from 130 feet above the bottom of the casing to above ground level. A 40-foot long dummy having an outside diameter of 11 inches was run through the total length of the casing to check the roundness and straightness of the casing. The casing was pressure-cemented in place by circulating a cement slurry through the bottom of the casing and up the annulus between the wall of the hole and the casing to land surface. The slurry consisted of 450 sacks of Portland cement with 8 percent gel additive, followed by 50 sacks of neat cement before good cement returns were received at the surface.

After the cement had set for 2-1/2 days, and the casing was cut off at a height of about 2 feet above ground level, the hole was reentered and drilled, reamed, and underreamed to a diameter of 18 inches to a total depth of 1,020 feet. A 6-5/8-inch O.D.

blank steel tailpipe, 6-5/8-inch O.D. steel screen, and 8-5/8-inch O.D. blank steel liner were lowered through the casing and set in the bottom of the hole. The screen was stainless steel wire wrapped on stainless steel bars over perforated pipe and had a slot opening of 0.020 inch. The underreamed hole and the lap between the liner and the casing were gravel packed by pumping the gravel through a gravel line. The gravel line extended initially to just above the bottom of the hole, and it was raised periodically as the level of gravel rose in the hole. The gravel used was type 12-20 produced by the Texas Mining Company, Brady Division, and was sterilized with calcium hypochlorite as it was pumped. The final construction of the well is illustrated on Figure 2.

#### DEVELOPMENT AND TESTING

The well was developed by surging it with an agitator and pumping it with a test pump to remove the mud and fines from the gravel pack and the wall of the underreamed hole. The well was sterilized during the later stages of development by adding calcium hypochlorite to the well and surging it with the agitator and the pump.

After the well was developed so that it produced water that was clear and free of mud and fines, a series of pumping tests were conducted to check the well's performance. The tests

consisted of a series of three 3-hour step tests followed by 12 hours of water-level recovery, a 24-hour continuous test, and a final 12-hour recovery period. The test was originally started on September 25, 1986, but it was discontinued after the first two step tests because the production of gas with the water prevented accurate measurement of the pumping rate. Attempts to measure the pumping rate directly through an open-end pipe orifice and a turbine-type flow meter were unsuccessful. The tests were restarted on September 30, 1986 after the discharge piping was altered to pump the water into a vented steel tank to release the gas and then allow the water to flow out of the tank and through the orifice. The well discharge was piped through the flow meter upstream of the tank to obtain an estimate of the error in water-flow measurement being created by the gas. A comparison of the pumping rate measurements obtained from the flow meter and orifice is shown on Figure 3. A graph of the final pumping tests showing the pumping rates measured through the orifice and water-level measurements is presented on Figure 4.

During the three step tests, the well was pumped at rates of 250, 302, and 401 gallons per minute (gpm). The well was pumped at a rate of 302 gpm during the 24-hour test. Data obtained during the pumping tests were analyzed to determine values for specific capacity (a measure of the well's performance) and

transmissivity (the ability of the formation to transmit water). The calculated values are presented in the following table.

#### Pumping Test Results

<u>Pumping Rate (gpm)</u>	<u>3-hour Drawdown (feet)</u>	<u>3-hour Specific Capacity (gpm/ft)</u>	<u>Transmissivity (gpd/ft)</u>
250	159.84	1.56	2,800
302	195.71	1.54	2,660
401	267.56	1.49	2,500

Notes: Values shown are averaged from drawdown and recovery calculations. Values for 302 gpm include calculations from 3-hour step test and 24-hour continuous test.

As shown by the values above, the specific capacity of the well decreased slightly with increased pumping rates. Part of the decrease in specific capacity (increased drawdown) is due to inefficiencies in the well caused by increases in friction losses as water moves into the well with higher velocities at increased pumping rates. This relationship is shown graphically by the plot of pumping rate versus drawdown on Figure 5. The transmissivity values shown in the table above also indicate a decrease in the ability of the formation to transmit water to the well with increases in pumping rate. Part of this apparent change, which also would cause an increase in drawdown, is believed to be caused by the production of gas with the water.

## WATER QUALITY

The results of the chemical analyses of water samples collected at the end of the long pumping test are included in the appendix to this report. With the exception of total dissolved solids (TDS) none of the constituent concentrations reported in the analyses exceed the allowable or recommended concentration limits set by the Texas Department of Health. Even the actual TDS concentration would not be as high as the analysis report indicates. The reported value is the simple sum of all of the individual mineral constituents. A more accurate approximation of the TDS value that would be obtained from an evaporative analysis would be the reported sum minus about one-half of the bicarbonate concentration (i.e.  $1,383.3 - 0.508(647.2) = 1,054.5$ ). This calculated value of 1,054 milligrams per liter is only slightly more than the Texas Department of Health recommended limit of 1,000 milligrams per liter. As stated in an earlier section of this report, Mr. Robert Matthews said that the Texas Department of Health would accept water with this concentration for public water supplies.

Water samples were also collected for analysis of radiological constituents. These samples were submitted to the Texas Department of Health for analysis. The results of these analyses will be forwarded to the District when they are received.

Water samples were collected for bacteriological analysis at the end of the long pumping test on October 2, 1986. Since the discharge piping had been altered after the calcium hypochlorite placed in the well had been completely pumped out, the presence of coliform bacteria in the samples was anticipated. Because of this, the well was rechlorinated after the final water-level recovery test and a second set of samples was collected the next day.

The results of the analysis of the first sample indicated that coliform bacteria were found to be present. The report of the second sample analysis indicated that no coliform bacteria were found, but that the presence of non-coliform bacteria may have compromised the analysis. Therefore, J. L. Myers Company resterilized the pump and well and resampled the well on October 15, 1986. A copy of the results of the analysis of this set of samples, which indicates that no coliform bacteria were found, is included in the appendix.

#### PUMP SETTING RECOMMENDATIONS

In order to select a depth at which to set the pump in the well, estimates of the depths to pumping water levels at selected times in the future were made. The estimates were made by calculating the drawdown produced at different pumping rates for

progressively longer periods of time, based on the transmissivity determined from the pumping tests at 302 gpm. These calculated drawdowns were then added to the present static water level of about 190 feet below ground level. Graphs showing the results of these calculations are presented on Figures 6 and 7.

Figure 6 shows the pumping levels that would be expected if the drawdown influence of the well, or cone of depression, extended to the outcrop of the producing sand section (approximately 3-1/2 miles northwest of the well). Once the cone reaches the outcrop and begins to draw in water from storage, the rate of water-level decline in the well will be slowed and could eventually level out at a constant depth. The graph shows the estimated pumping levels at continuous pumping rates of 150 gpm and 300 gpm, and a combination of the two. The combination represents the situation of pumping 300 gpm for 12 hours per day (300 gpm x 1/2 day = 150 gpm ave.) through a fall, winter, and spring, and then pumping 300 gpm for 24 hours per day for about 3 months during the summer.

As shown on Figure 6, the pumping water level at the end of 1 year of this type of combined operation would be about 472 feet below ground level. At the end of about 11 years (4,000 days), the pumping water level would be only about 475 feet below ground level. This small water-level decline over a 10-year period is partially due to the effects of the cone of depression reaching

the outcrop, as discussed above. Even without the outcrop effects, if the sand zone screened in the well has sufficient areal extent, the rate of water-level decline would become less through time as the cone of depression expanded and drew in water from a much larger area.

Figure 7 shows the projected pumping water levels for the same set of pumping rates and times as shown on Figure 6, but does not include the effects of the outcrop. This second set of calculations was made to show what is hopefully the "worst case" situation. Under the same half-time/full-time pumping schedule discussed above, but without recharge, the pumping water level at the end of 1 year and 11 years would be about 480 feet and 495 feet, respectively.

Although deeper pumping levels could be encountered if other wells were pumping from the same sand formation screened in this well, the levels shown on Figure 7 are thought to be conservative and are our best estimates at this time. In order to maintain submergence of the pump below the pumping water level to prevent cavitation and breaking suction, it would be recommended to set the pump at least 40 feet below the deepest anticipated pumping level. Based on the calculated pumping levels shown on Figure 7, this results in a pump setting of about 540 feet.

## PUMP SELECTION CONSIDERATIONS

If it is assumed that the well will be pumped into the top of a ground storage tank with a height of 30 feet above ground and the pumping water level is about 500 feet, the total vertical lift or head against which the pump must work will be 530 feet. In addition to the vertical lift, the pump must overcome the friction losses encountered in the pump column, discharge head, shutoff valve, and backflow valve, if installed. Depending on the diameter and type of pump column and the diameters and design of the above-ground valves and piping, the friction loss could vary from about 6 feet to 33 feet. Therefore, the total dynamic head to be overcome will be on the order of 540 to 565 feet.

Numerous pumps capable of producing 300 gpm against this head are available from various manufacturers. The least expensive pumps, based on initial purchase and installation, would be electric submersibles. A 6-inch diameter pump designed to operate at 3,500 revolutions per minute (RPM) could meet these operating requirements. Many of these pumps require a 60 horsepower motor to meet the pumping rate and head conditions presented above. This size of pump could be lowered into the 8-inch diameter liner, if necessary, but if designed to meet the above operating conditions, the same pump would not produce 300 gpm if it had to be set inside the liner.

Other pumps having bowl diameters of 8 and 10 inches are designed to meet these pumping requirements at an operating speed of 1,750 RPM. These pumps also require a 60 horsepower motor. Therefore, the power consumed by the larger pumps would be no more than the 6-inch pump. Because these pumps have larger diameters, fewer bowls or stages are necessary. Also, because of the lower operating speed, the larger pumps should wear longer and require less maintenance. The 1,750 RPM motors are, however, somewhat more expensive than the 3,500 RPM motors in this horsepower range.

This comparison of submersible pump bowls would also extend to line shaft turbine pumps. Although the initial purchase price of the line shaft turbines is considerably higher than the submersibles, the turbine pumps generally have an operating efficiency that is some 5 to 10 percent higher than the submersibles. Depending on the pump design, however, this greater efficiency can be partially offset by the larger horsepower motor required to drive the line shaft turbine. The other factor favoring the turbine pumps is that, in a properly constructed well, they tend to run for much longer periods of time before repair work is required.

#### GAS PRODUCTION

As mentioned in an earlier section of this report, the sand formation screened in this well produces gas along with water when

it is pumped. Although probably not completely accurate, a comparison of the flow rates measured through the flow meter and the orifice provides some indication of the volume of gas produced. Such a comparison indicates that the volume of gas produced at water production rates of 250, 302, and 401 gpm was about 45, 60, and 85 gpm, respectively.

During the pumping tests of the well with a submersible pump, this production of gas did not appear to cause problems with the operation of the pump. No surging, breaking of suction, or gas locking of the pump was discernable. The gas production did, as noted earlier, prevent the accurate measurement of the water pumping rate through the flow meter. As a result, it is recommended that a flow meter not be installed in line with the well discharge piping, as required by the Texas Department of Health. For determining the daily quantity of water supplied to the system, the flow meter could be installed on the discharge line of the booster pump drawing water from the ground storage tank, if one is constructed at the well site. This type of flow meter placement has the disadvantage of not allowing for the measurement of the well's instantaneous production rate during future checks of well and pump performance. Relatively accurate calculations of the pumping rate during the performance tests could be made, however, by measuring the change in volume of water in the storage tank.

A sample of the gas being produced was collected for analysis from the manometer tube on the side of the discharge pipe on October 3, 1986. The composition of the gas, as transmitted verbally by the laboratory, is presented below. A written report of the analysis will be forwarded to the District as soon as it is received.

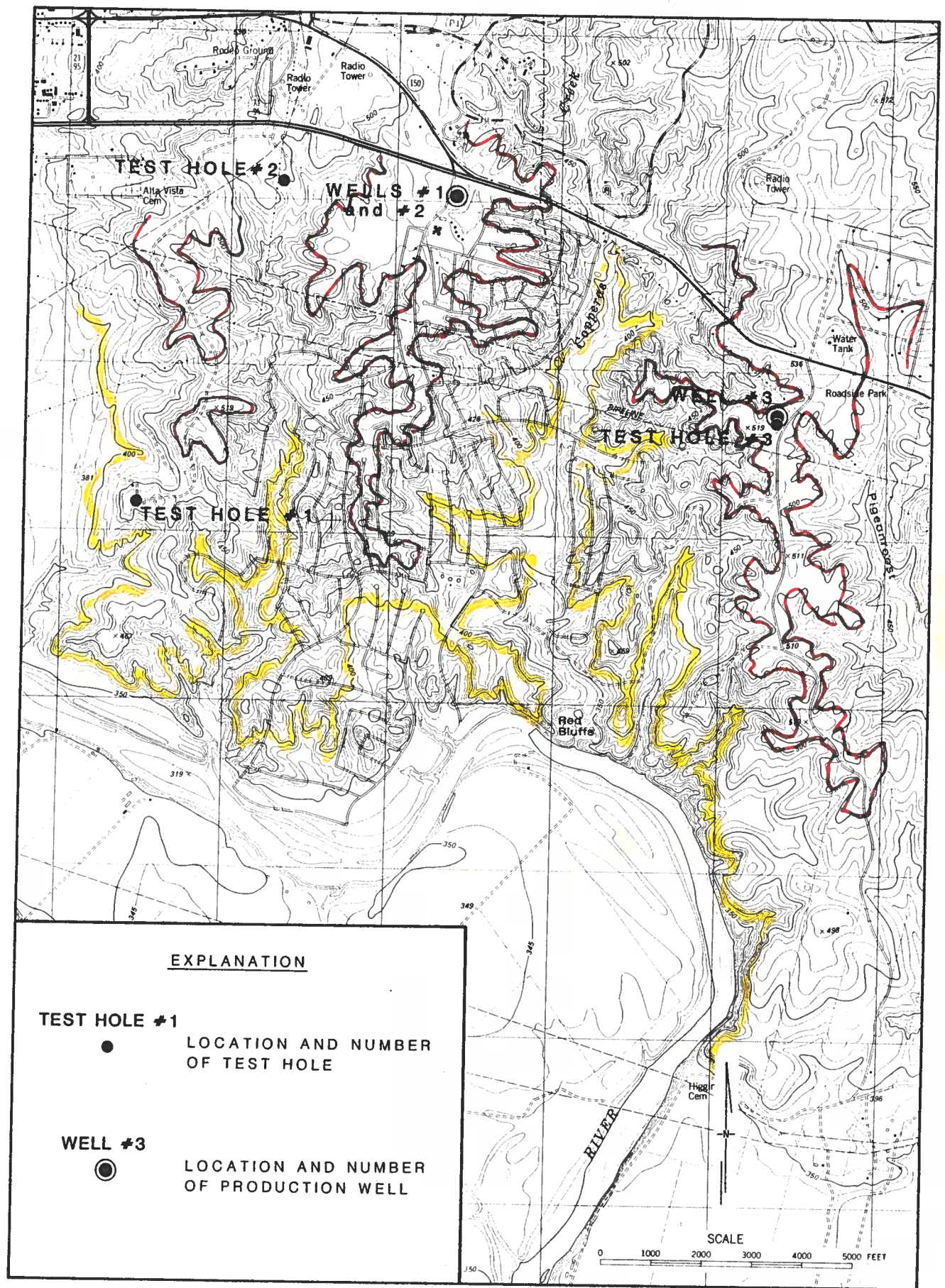
#### Gas Composition

<u>Gas</u>	<u>Percent Content</u>
Nitrogen	33.1
Oxygen	6.05
Carbon Dioxide	0.09
Methane	60.75

Some or all of the carbon dioxide, oxygen, and nitrogen found in the sample may have been introduced into the collection bottle by the method of collection or it may have leaked into the sample through the seal on the lid after collection.

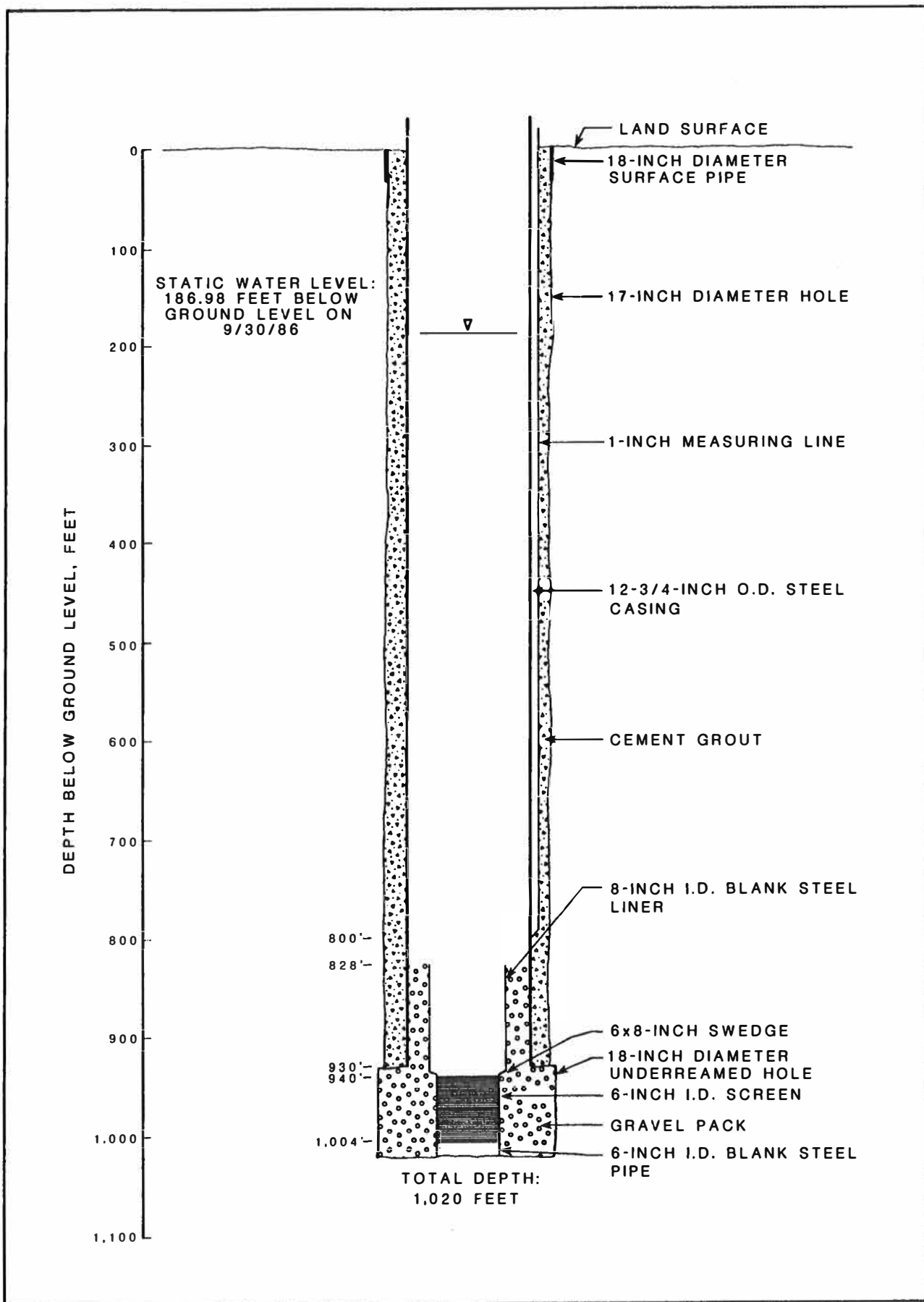
Because the gas is extremely flammable, precautions to prevent injury or damage will have to be taken. The well casing should be vented with a pipe extending 8 to 10 feet above ground level. The top end of the pipe should be equipped with a fitting facing downward and its open end covered with a fine brass screen. Unless a special gas separator is used to remove the gas from the water, the water should not be pumped directly into a service or transport pipeline. An alternative procedure would be to pump the

water through an aeration column or spray it across baffles and into a vented storage tank. Whatever system is used, the area around the well and any treatment equipment should be protected with an intruder-resistant fence and be clearly marked with signs indicating the presence and danger of an explosive gas.



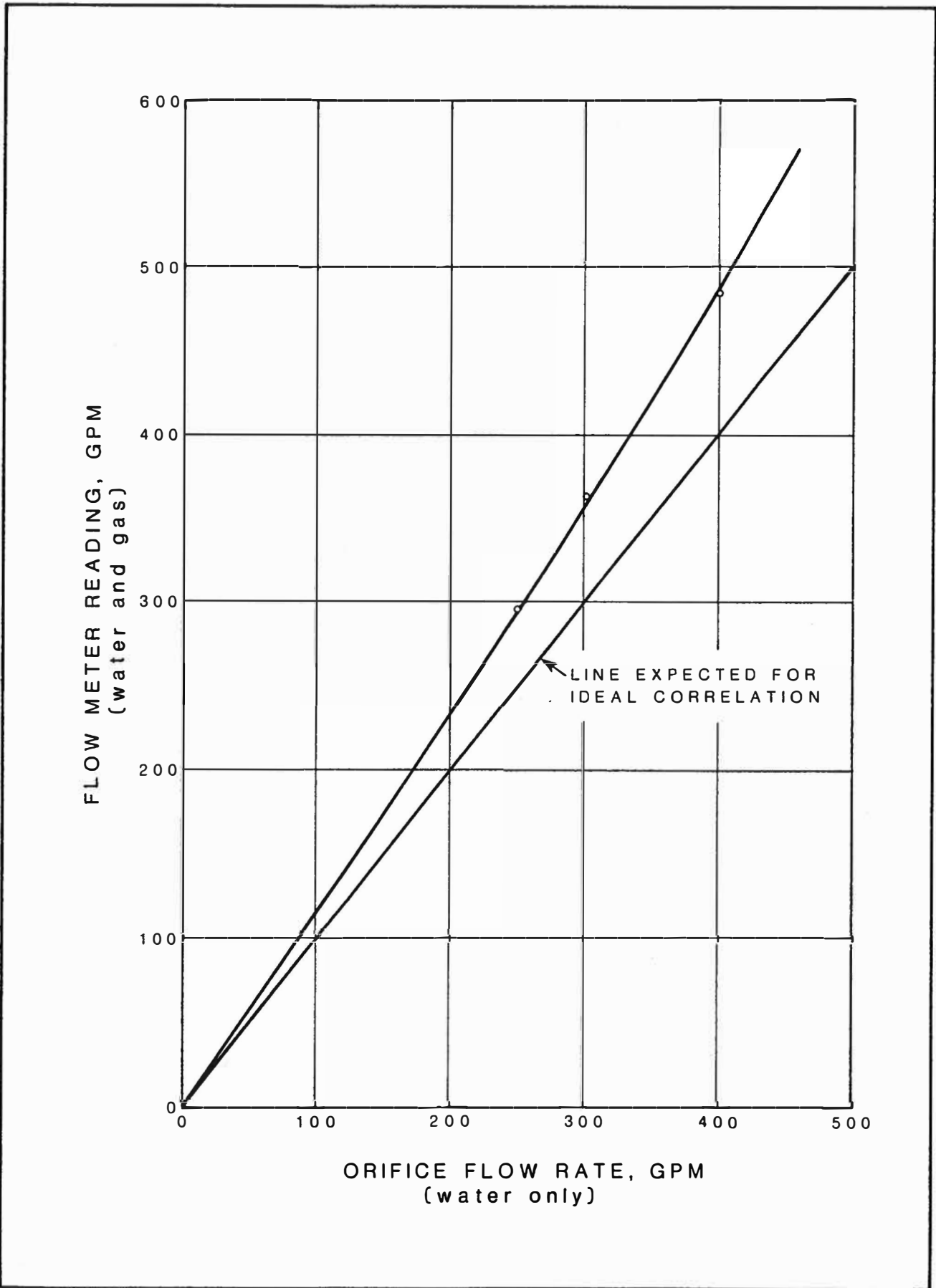
LOCATION OF WELLS AND TEST HOLES

Figure 1



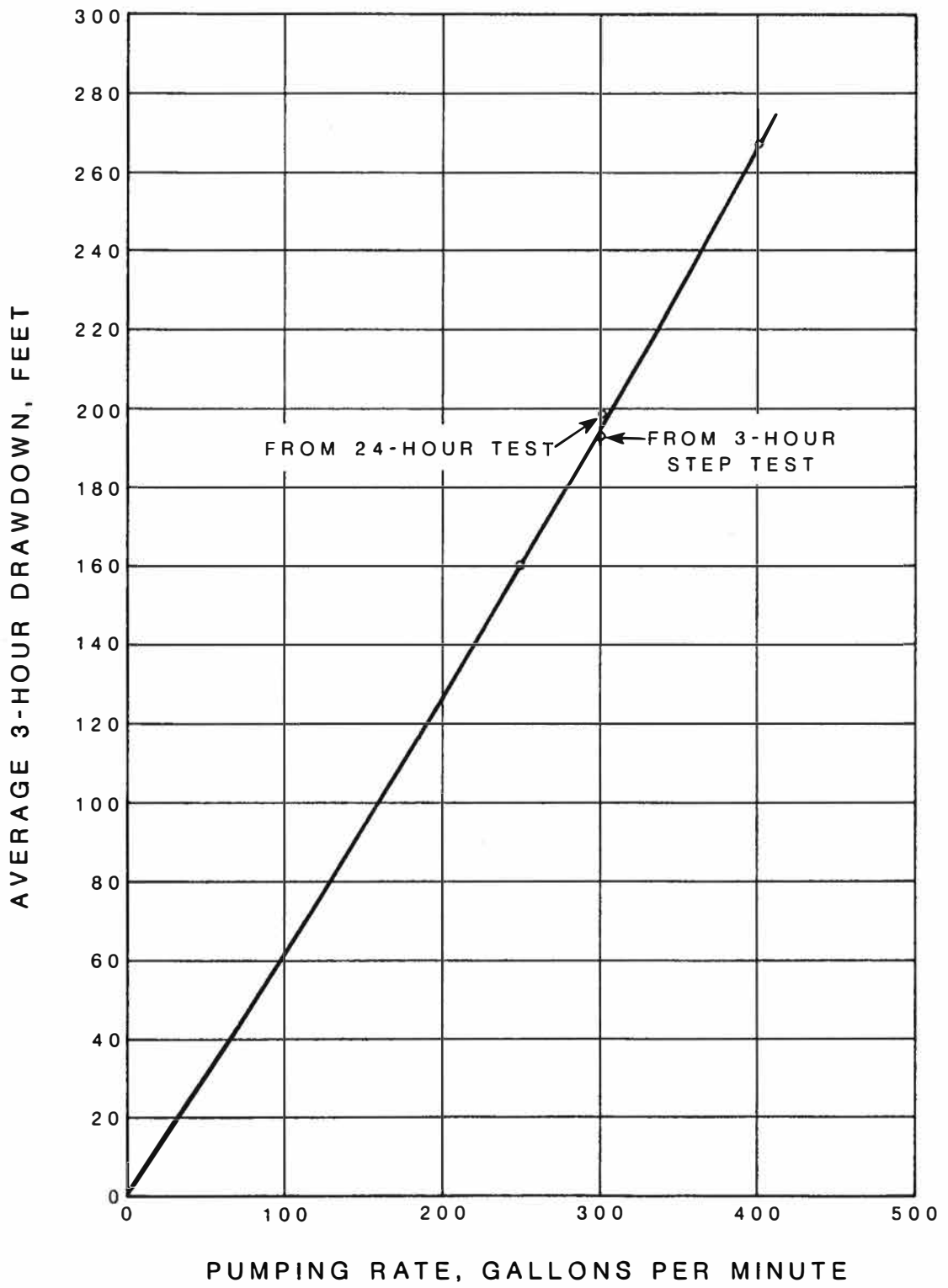
WELL CONSTRUCTION

Figure 2



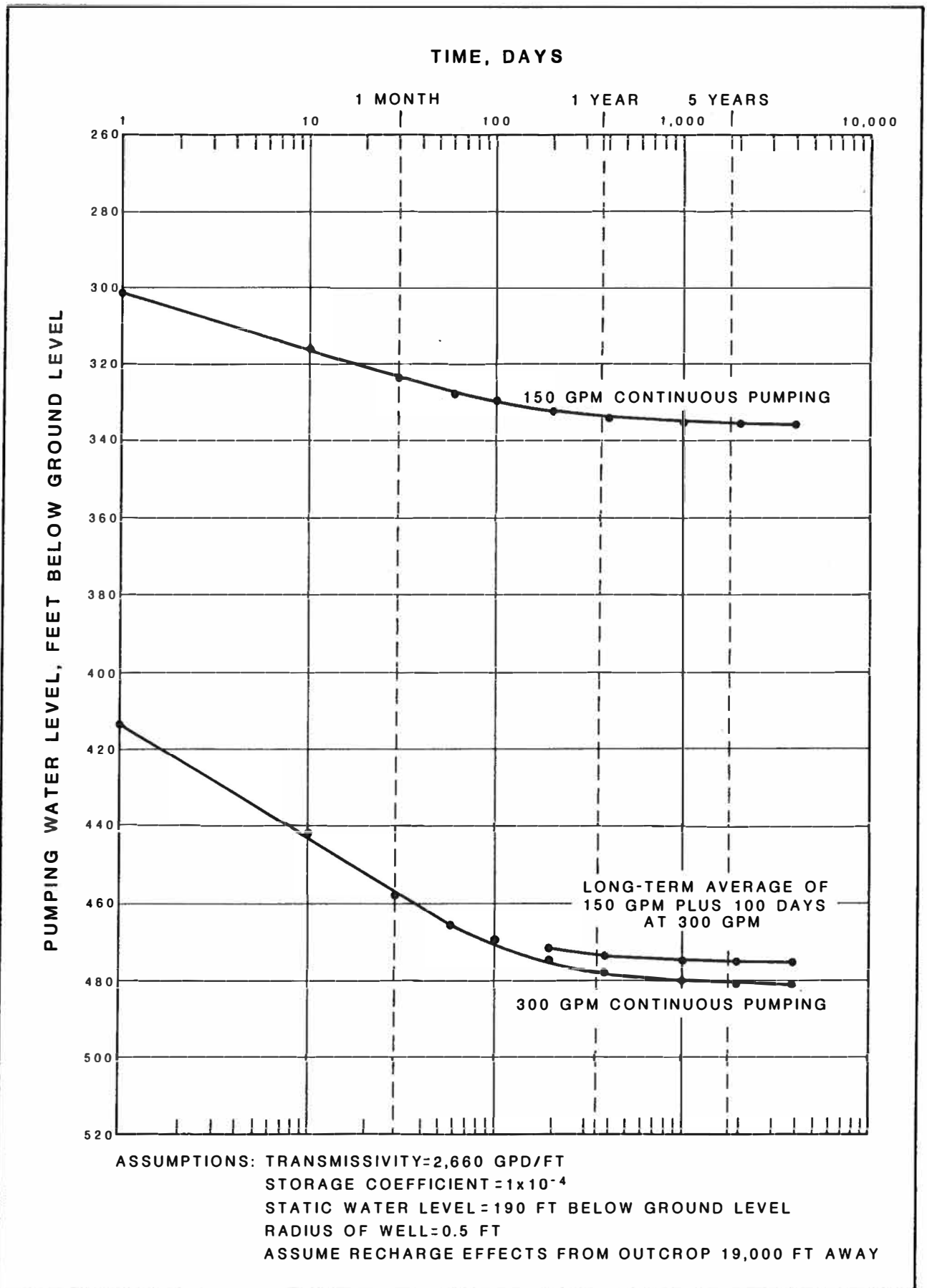
COMPARISON OF PUMPING RATE MEASUREMENTS

Figure 3



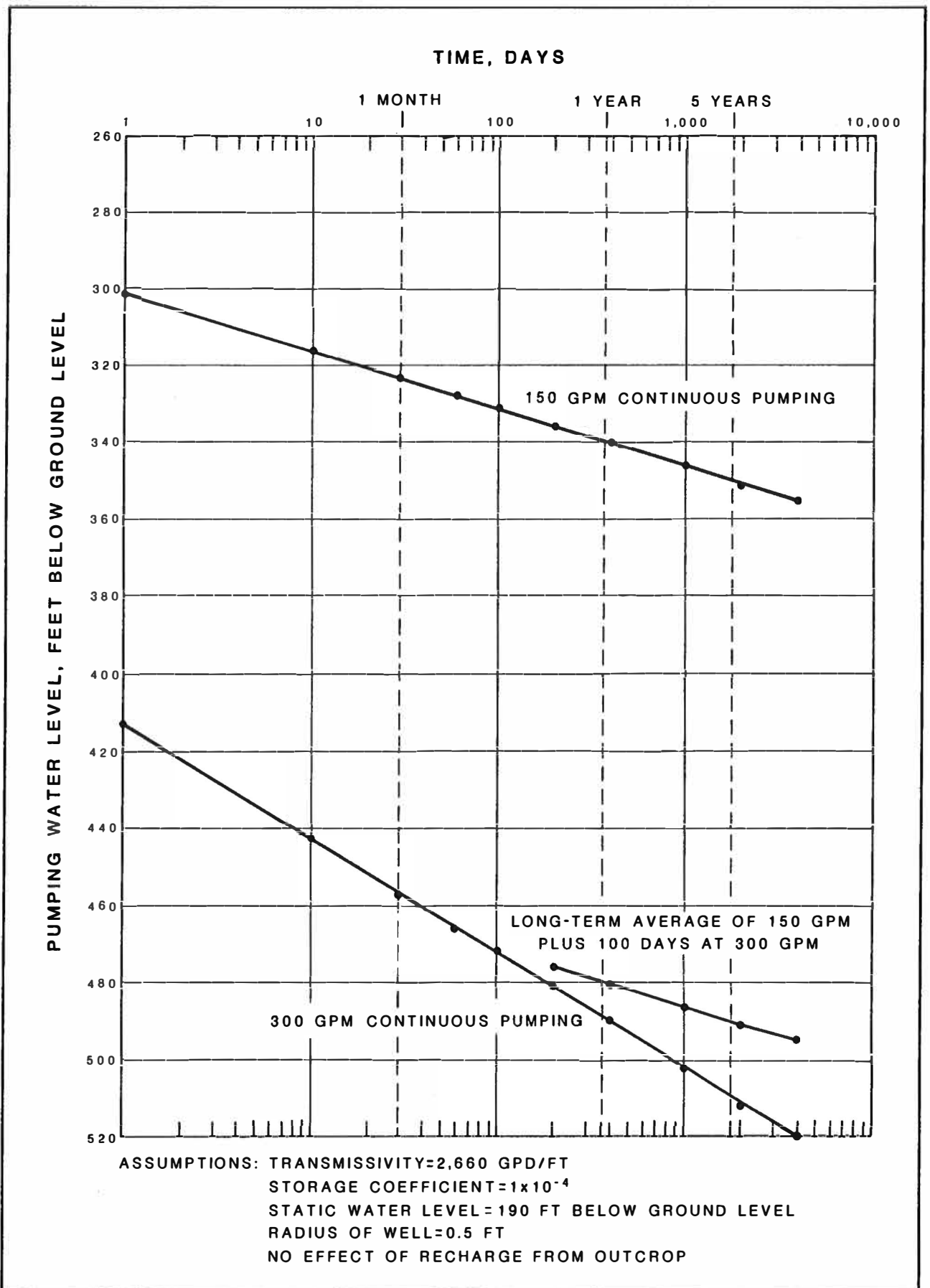
3-HOUR WELL PERFORMANCE

Figure 5



**ESTIMATED FUTURE PUMPING LEVELS, WITH RECHARGE**

**Figure 6**



**ESTIMATED FUTURE PUMPING LEVELS, WITHOUT RECHARGE**

**Figure 7**

APPENDIX  
CHEMICAL ANALYSES

# POPE *Testing* LABORATORIES, Inc.

CONSULTING ANALYTICAL CHEMISTS  
AND TESTING ENGINEERS

FOODS, FEEDS, DAIRY PRODS.  
WATER, MISCL. ANALYSES  
COTTON SEED PRODUCTS  
PACKING HOUSE PRODUCTS

P. O. BOX 903  
DALLAS, TEXAS 75221

OFFICIAL CHEMISTS  
WEIGHERS AND INSPECTORS  
NATL. COTTONSEED PRODUCTS ASS'N.  
NATL. SOYBEAN PROCESSOR'S ASS'N.  
REFEREE CHEMISTS  
AMERICAN OIL CHEMISTS SOCIETY

Date Rec'd 4-29-86

To: J.L. Myers Company  
Dallas, TX

TEST HOLE #1

Screened Interval: 980 -1,010 feet

Report of Tests on Water

Received From: You

Identification Marks: Riverside Service T.H. #1 Well #4 Sampled after pumping  
25 GPM 4-23-86 #3 4-24-86 12:00 pm

*Values reported are for minerals in solution*

	Parts Per Million:
Calcium.....	10.4
Magnesium.....	4.9
Iron.....	0.02
Manganese.....	0.0
Sodium.....	839.0
Carbonate.....	7.2
Bicarbonate.....	1156.0
Sulphate.....	8.0
Chloride.....	640.0
Fluoride.....	1.5
Nitrate.....	0.0
Phenolphthalein Alkalinity as CaCO <sub>3</sub> .....	6.0
Total Alkalinity as CaCO <sub>3</sub> .....	960.0
Total Hardness as CaCO <sub>3</sub> .....	46.0
Dissolved Residue (TS) Calculated.....	2667.0
Specific Conductance Micromhos/cm.....	3300
pH.....	7.9

## RECOMMENDED LIMITS FOR DRINKING WATER (P. P. M.)

Iron .....	0.3	Fluoride .....	0.6 - 1.0
Manganese .....	0.05	Nitrate.....	45
Sulphate .....	250	Total Solids.....	500
Chloride .....	250		

POPE TESTING LABORATORIES, Inc.

By

*Don Hunter*

Lab. No. 22788

POPE TESTING LABORATORIES, INC.

CONSULTING ANALYTICAL CHEMISTS  
AND TESTING ENGINEERS

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FERTILIZERS

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75221  
(214) 742-8491

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NATL. SOYBEAN PROCESSOR'S ASS'N.  
REFEREE CHEMISTS  
AMERICAN OIL CHEMISTS SOCIETY

TO J.L. Myers Company  
Dallas, TX

Date Rec'd 4-29-86

Report of Tests on Water TEST HOLE #1  
Received from You Screened Interval: 980 - 1,010 feet  
Identification Marks Riverside Service

Total Iron ----- 0.85 ppm

\*\*\*

LAB NO. 22789

POPE TESTING LABORATORIES, INC.

By

*John Hunter*

# POPE *Testing* LABORATORIES, Inc.

CONSULTING ANALYTICAL CHEMISTS  
AND TESTING ENGINEERS

P. O. BOX 903  
DALLAS, TEXAS 75221

FOODS, FEEDS, DAIRY PRODS.  
WATER, MISCL. ANALYSES  
COTTON SEED PRODUCTS  
PACKING HOUSE PRODUCTS

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NATL. SOYBEAN PROCESSOR'S ASS'N.  
REFEREE CHEMISTS  
AMERICAN OIL CHEMISTS SOCIETY

To: J.L. Myers Company  
Dallas, TX

Date Rec'd 5-5-86  
TEST HOLE #1  
Screened Interval: 740 - 770 feet

## Report of Tests on Water

Received From: You

Identification Marks: Riverside Service 1196-86 #3 Sampled 740-770' 5-1-86  
3:40 pm Pumped 25 gpm 20 hours

*Values reported are for minerals in solution*

	<i>Parts Per Million</i>
Calcium.....	9.6
Magnesium.....	5.6
Iron.....	0.02
Manganese.....	0.01
Sodium.....	686.3
Carbonate.....	4.8
Bicarbonate.....	1086.9
Sulphate.....	8.0
Chloride.....	448.0
Fluoride.....	0.5
Nitrate.....	0.0
Phenolphthalein Alkalinity as CaCO <sub>3</sub> .....	4.0
Total Alkalinity as CaCO <sub>3</sub> .....	898.9
Total Hardness as CaCO <sub>3</sub> .....	47.0
Dissolved Residue (TS) Calculated.....	2249.7
Specific Conductance Micromhos/cm.....	2900
pH.....	8.0
Total Iron -----	0.38

## RECOMMENDED LIMITS FOR DRINKING WATER (P. P. M.)

Iron .....	0.3	Fluoride .....	0.6 - 1.0
Manganese .....	0.05	Nitrate.....	45
Sulphate .....	250	Total Solids.....	500
Chloride .....	250		

POPE TESTING LABORATORIES, Inc.

By

*John Hunter*

Lab. No. 23105-6

# POPE *Testing* LABORATORIES, Inc.

CONSULTING ANALYTICAL CHEMISTS  
AND TESTING ENGINEERS

P. O. BOX 903  
DALLAS, TEXAS 75221

FOODS, FEEDS, DAIRY PRODS.  
WATER, MISCL. ANALYSES  
COTTON SEED PRODUCTS  
PACKING HOUSE PRODUCTS

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NATL. SOYBEAN PROCESSOR'S ASS'N.  
REFEREE CHEMISTS  
AMERICAN OIL CHEMISTS SOCIETY

Date Rec'd 7-14-66

To: **J L Myers Company**  
**Dallas, TX**

Report of Tests on Water

Received From: **Yos**

Identification Marks: **Riverside Services, Bastrop screen 900-1000' Test Hole #3**  
**Sample #1 sampled after 36 hrs pumping @ 18 gpm**

*Values reported are for minerals in solution*

	<i>Parts Per Million</i>
Calcium.....	4.0
Magnesium.....	1.8
Iron.....	0.03
Manganese.....	0.0
Sodium.....	428.8
Carbonate.....	16.8
Bicarbonate.....	627.7
Sulphate.....	12.0
Chloride.....	285.0
Fluoride.....	1.5
Nitrate.....	0.0
Phenolphthalein Alkalinity as CaCO <sub>3</sub> .....	14.0
Total Alkalinity as CaCO <sub>3</sub> .....	942.5
Total Hardness as CaCO <sub>3</sub> .....	17.5
Dissolved Residue (TS) Calculated.....	1377.6
Specific Conductance Micromhos/cm.....	<b>1800</b>
pH.....	<b>8.3</b>

## RECOMMENDED LIMITS FOR DRINKING WATER (P. P. M.)

Iron .....	0.3	Fluoride .....	0.6—1.0
Manganese .....	0.05	Nitrate.....	45
Sulphate .....	250	Total Solids.....	500
Chloride .....	250		

POPE TESTING LABORATORIES, Inc.

By *How Hunter*

Lab. No.

27404

# POPE *Testing* LABORATORIES, Inc.

CONSULTING ANALYTICAL CHEMISTS  
AND TESTING ENGINEERS

FOODS, FEEDS, DAIRY PRODS.  
WATER, MISCL. ANALYSES  
COTTON SEED PRODUCTS  
PACKING HOUSE PRODUCTS

P. O. BOX 903  
DALLAS, TEXAS 75221

OFFICIAL CHEMISTS  
WEIGHERS AND INSPECTORS  
NATL. COTTONSEED PRODUCTS ASS'N.  
NATL. SOYBEAN PROCESSOR'S ASS'N.  
REFEREE CHEMISTS  
AMERICAN OIL CHEMISTS SOCIETY

Date Rec'd **7-28-86**

To: **J L Myers Company  
Dallas, TX**

## Report of Tests on Water

Received From: **You**

Identification Marks: **Riverside Services Test Hole #3 Sample #2 Screen 380-410'  
sampled after 24 hrs @ 29 gpm**

*Values reported are for minerals in solution*

	<i>Parts Per Million</i>
Calcium.....	48.0
Magnesium.....	10.4
Iron.....	0.02
Manganese.....	0.04
Sodium.....	53.7
Carbonate.....	0.0
Bicarbonate.....	219.6
Sulphate.....	63.0
Chloride.....	24.0
Fluoride.....	0.1
Nitrate.....	0.0
Phenolphthalein Alkalinity as CaCO <sub>3</sub> .....	0.0
Total Alkalinity as CaCO <sub>3</sub> .....	180.0
Total Hardness as CaCO <sub>3</sub> .....	162.6
Dissolved Residue (TS) Calculated.....	418.9
Specific Conductance Micromhos/cm.....	600
pH.....	7.7

**Total Iron** ..... **0.25**

### RECOMMENDED LIMITS FOR DRINKING WATER (P. P. M.)

Iron .....	0.3	Fluoride .....	0.6 — 1.0
Manganese .....	0.05	Nitrate.....	45
Sulphate .....	250	Total Solids.....	500
Chloride .....	250		

POPE TESTING LABORATORIES, Inc.

By

*John Hunter*

Lab. No.

**28132**

# POPE *Testing* LABORATORIES, Inc.

CONSULTING ANALYTICAL CHEMISTS  
AND TESTING ENGINEERS

FOODS, FEEDS, DAIRY PRODS.  
WATER, MISCL. ANALYSES  
COTTON SEED PRODUCTS  
PACKING HOUSE PRODUCTS

P. O. BOX 903  
DALLAS, TEXAS 75221

OFFICIAL CHEMISTS  
WEIGHERS AND INSPECTORS  
NATL. COTTONSEED PRODUCTS ASS'N.  
NATL. SOYBEAN PROCESSOR'S ASS'N.  
REFEREE CHEMISTS  
AMERICAN OIL CHEMISTS SOCIETY

Date Rec'd 10-6-86

To: **J. L. Myers Company**  
**Dallas, Texas**

**Report of Tests on Water**

Received From: **You**

Identification Marks: **Bastrop County WC ID #2 Well #3 Sampled 10-2-86**  
**1196-86 11:45 A.M. 300 gpm 418 ft.**

*Values reported are for minerals in solution*

	<i>Parts Per Million</i>
Calcium.....	3.2
Magnesium.....	1.4
Iron.....	0.06
Manganese.....	0.0
Sodium.....	431.7
Carbonate.....	14.4
Bicarbonate.....	647.2
Sulphate.....	4.0
Chloride.....	279.0
Fluoride.....	2.3
Nitrate.....	0.0
Phenolphthalein Alkalinity as CaCO <sub>3</sub> .....	12.0
Total Alkalinity as CaCO <sub>3</sub> .....	554.5
Total Hardness as CaCO <sub>3</sub> .....	13.7
Dissolved Residue (TS) Calculated.....	1383.3
Specific Conductance Micromhos/cm.....	1800
pH.....	8.3
<b>Total Iron -----</b>	<b>0.18</b>

**RECOMMENDED LIMITS FOR DRINKING WATER (P. P. M.)** \*

Iron .....	0.3	Fluoride .....	0.6 - 1.0
Manganese .....	0.05	Nitrate.....	45
Sulphate .....	250	Total Solids.....	500
Chloride .....	250		

*7x 1.8 old new (EPA) 2.0 old up to 4.0 with pt*

POPE TESTING LABORATORIES, Inc.

By *John Hunter*

Lab. No. **31607**

*11/20/86  
Phone call  
11:30 AM  
G.T.*

*1. \* per Ted  
2. Priority: JLM. no records*

POPE TESTING LABORATORIES, INC.

CONSULTING ANALYTICAL CHEMISTS  
AND TESTING ENGINEERS

FOODS, FEEDS, DAIRY PROD.  
WATER, MISCL. ANALYSES  
COTTON SEED PRODUCTS  
PACKING HOUSE PRODUCTS  
SEED GERMINATION  
FERTILIZERS

P. O. BOX 903  
DALLAS, TEXAS  
75221  
(214) 742-8491

OFFICIAL CHEMISTS  
WEIGHERS AND INSPECTORS  
NATL. COTTONSEED PRODUCTS ASS'N.  
NATL. SOYBEAN PROCESSOR'S ASS'N.  
REFEREE CHEMISTS  
AMERICAN OIL CHEMISTS SOCIETY

TO J. L. Myers Company  
Dallas, Texas

Date Rec'd 10-6-86

Report of Tests on Water

Received from You

Identification Marks Bastrop County W.C.I.D. #2 Well #3  
Sampled 10-2-86 11:45 A.M. 1196-86  
300 gpm 418 ft.

Parts/Million

Arsenic ----- less than 0.02  
Barium ----- less than 0.1  
Cadmium ----- less than 0.002  
Chromium ----- less than 0.01  
Copper ----- 0.01  
Lead ----- less than 0.01  
Mercury ----- less than 0.002  
Selenium ----- less than 0.01  
Silver ----- less than 0.002  
Zinc ----- 0.02

LAB NO: 31607

POPE TESTING LABORATORIES, INC.

By *Jon Huerta*

POPE TESTING LABORATORIES, INC.

CONSULTING ANALYTICAL CHEMISTS  
AND TESTING ENGINEERS

FOODS, FEEDS, DAIRY PROD.  
WATER, MISCL. ANALYSES  
COTTON SEED PRODUCTS  
PACKING HOUSE PRODUCTS  
SEED GERMINATION  
FERTILIZERS

P. O. BOX 903  
DALLAS, TEXAS  
75221  
(214) 742-8491

OFFICIAL CHEMISTS  
WEIGHERS AND INSPECTORS  
NATL. COTTONSEED PRODUCTS ASS'N.  
NATL. SOYBEAN PROCESSOR'S ASS'N.  
REFEREE CHEMISTS  
AMERICAN OIL CHEMISTS SOCIETY

TO J.L. Myers Company  
Dallas, TX

Date Rec'd 10-15-86

Report of Tests on Water  
Received from You  
Identification Marks BC WC/D #3 10-15-86

Coliform ----- Negative

\*\*\*\*

LAB NO. 32109

POPE TESTING LABORATORIES, INC.

By

*John H. Hester*

## **Appendix C**

**Driller's Logs for 1986 Test Hole #1, Test Hole #2 and Test Hole #3  
in the Record of Deep Well for Bastrop WCID No. 2 Well No. 3,  
prepared by J. L. Myers Company**

DRILLER'S LOG

OWNER : BASTROP COUNTY WCID NO. 2  
WELL NO. 3 - TEST HOLE NO. 1

LOCATION: PINE FOREST AT TAHITIAN VILLAGE  
BASTROP, BASTROP COUNTY, TEXAS

DATE : APRIL 1986

DEPTH OF STRATA		EACH STRATUM	DESCRIPTION
From	To	Feet	
0	2	2	Clay
2	3	1	Sand rock
3	20	17	Sandy clay
20	35	15	Clay
35	50	15	Shale, gravel, clay
50	180	130	Clay
180	187	7	White sand, rock
187	200	13	Shale
200	220	20	Broken sandy shale
220	290	70	Sand
290	300	10	Broken sand
300	340	40	Sandy shale
340	450	110	Shale
450	470	20	Sandy shale
470	550	80	Coal
550	600	50	Shale
600	625	25	Sand streaks
625	629	4	Broken sand
629	700	71	Clay and shale
700	722	22	Sandy shale
722	775	53	Sand
775	823	48	Shale
823	843	20	Sand
843	855	12	Shale and sand
855	922	67	Sand
922	950	28	Sandy shale
950	955	5	Shale
955	964	9	Sand
964	974	10	Sandy clay, shale
974	1015	41	Sand
1015	1020	5	Sandy shale
1020	1035	15	Sand
1035	1110	75	Sand and broken shale
1110	1158	48	Shale

J. L. MYERS COMPANY  
8325 Forney Road  
Dallas, Texas 75227

DRILLER'S LOG

OWNER : BASTROP COUNTY WCID NO. 2  
WELL NO. 3 - TEST HOLE NO. 2

LOCATION: PINE FOREST AT TAHITIAN VILLAGE  
BASTROP, BASTROP COUNTY, TEXAS

DATE : MAY 1986

DEPTH OF STRATA		EACH STRATUM	DESCRIPTION
From	To	Feet	
0	2	2	Fill
2	5	3	Red clay
5	20	15	Blue clay
20	36	16	Brown clay
36	67	31	Gravel, clay, coal
67	122	55	Gray clay
122	125	3	Rock
125	230	105	Sandy shale
230	250	20	Shale
250	265	15	Sandy shale
265	275	10	Shale
275	277	2	Rock
277	325	48	Sandy shale
325	327	2	Rock
327	400	73	Sandy shale
400	401	1	Rock
401	435	34	Brown sand and shale
435	436	1	Rock
436	469	33	Shale, sand
469	470	1	Rock
470	530	60	Shale
530	531	1	Rock
531	571	40	Sandy, shale, coal
571	573	2	Rock
573	585	12	Sand
585	601	16	Sandy shale
601	620	19	Shale
620	631	11	Shale, coal
631	660	29	Sandy shale
660	680	20	Coal
680	690	10	Shale
690	728	38	Sand
728	765	37	Coal, shale
765	780	15	Sandy shale
780	800	20	Fine sand
800	817	17	Coarse sand
817	837	20	Sand

BASTROP COUNTY WCID NO. 2 - TEST HOLE NO. 2  
DRILLER'S LOG CONTINUED

DEPTH OF STRATA		EACH STRATUM	DESCRIPTION
From	To	Feet	
837	848	11	Sand, clay
848	849	1	Rock
849	880	31	Shale
880	900	20	Sandy shale
900	912	12	Better sand
912	944	32	Sand
944	947	3	Shale
947	976	29	Sandy shale
976	987	11	Sand
987	994	7	Hard rock
994	1007	13	Shale, clay
1007	1085	78	Sand, shale streaks
1085	1097	12	Sandy, gray clay

J. L. MYERS COMPANY  
8325 FORNEY ROAD  
DALLAS, TEXAS 75227

DRILLER'S LOG

OWNER : BASTROP COUNTY WCID NO. 2  
WELL NO. 3 - TEST HOLE NO. 3

LOCATION: PINE FOREST AT TAHITIAN VILLAGE  
BASTROP, BASTROP COUNTY, TEXAS

DATE : AUGUST 1986

DEPTH OF STRATA		EACH STRATUM	DESCRIPTION
From	To	Feet	
0	2	2	Rock
2	20	18	Rock, gravel
20	80	60	Gravel
80	85	5	Red clay
85	120	35	White sand
120	130	10	Gravel
130	153	23	Light blue shale
153	200	47	Sand and shale
200	210	10	Sand
210	240	30	Sand and shale
240	270	30	Shale
270	285	15	Fine sand
285	302	17	Blue shale
302	350	48	Shale and clay
350	392	42	Sand and shale
392	394	2	Hard streaks
394	400	6	Sand and shale
400	450	50	Sand
450	500	50	Sand streaks and shale
500	502	2	Rock
502	510	8	Shale and clay
510	540	30	Broken shale
540	660	120	Tight broken shale
660	670	10	Broken shale
670	680	10	Streaks coal
680	695	15	Broken sand
695	715	20	Broken clay
715	740	25	Gray clay
740	771	31	Sandy shale
771	775	4	Sand
775	792	17	Shale
792	802	10	Coal
802	847	45	Gray clay
847	855	8	Broken clay
855	890	35	Gray clay
890	900	10	Streaks coal

BASTROP COUNTY WCID NO. 2 - TEST HOLE NO. 3  
DRILLER'S LOG CONTINUED

DEPTH OF STRATA		EACH STRATUM	DESCRIPTION
From	To	Feet	
900	915	15	Gray clay
915	930	15	Clay and coal
930	942	12	Gray clay
942	975	33	Gray clay, little coal
975	1000	25	Sandy shale
1000	1030	30	Clay and coal
1030	1035	5	Brown and white clay
1035	1072	37	Gray clay, coal streaks
1072	1095	23	Gray clay
1095	1105	10	Brown clay
1105	1157	52	Blue clay
1157	1190	33	White clay

J. L. MYERS COMPANY  
8325 FORNEY ROAD  
DALLAS, TEXAS 75227

## **Appendix D**

**TCEQ Chapter 290, Subchapter D, 290.41(c)(1)(A)-(F),  
Water Sources, Groundwater sources and development:  
Pollution Hazards and Minimum Well Spacing Requirements,  
and Sanitary Control Easement Requirements and  
TCEQ Well Pollution Hazard Survey Checklist**



RG-195  
Revised December 2019

# Rules and Regulations for Public Water Systems

## §290.41 Water Sources

**§290.41(a) Water quality.** The quality of water to be supplied must meet the quality criteria prescribed by the commission's drinking water standards contained in Subchapter F of this chapter (relating to Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for Public Water Systems).

**§290.41(b) Water quantity.** Sources of supply, both ground and surface, shall have a safe yield capable of supplying the maximum daily demands of the distribution system during extended periods of peak usage and critical hydrologic conditions. The pipelines and pumping capacities to treatment plants or distribution systems shall be adequate for such water delivery. Minimum capacities required are specified in §290.45 of this title (relating to Minimum Water System Capacity Requirements).

**§290.41(b)(1)** A retail public utility as defined by Texas Water Code, §13.002(19) and each entity from which the utility is obtaining wholesale water service for the utility's retail system shall report to the executive director when the utility or entity is reasonably certain that the water supply will be available for less than 180 days. The reporting must be accomplished by utilizing the online "PWS Drought Contingency Plan Reporting Form."

**§290.41(b)(2)** If reporting cannot be accomplished in accordance with paragraph (1) of this subsection, then the retail public utility or entity from which the utility is obtaining wholesale water service may report to the executive director by United States Postal Service mail, program e-mail, or facsimile.

### §290.41(c) Groundwater sources and development.

**§290.41(c)(1)** Groundwater sources shall be located so that there will be no danger of pollution from flooding or from unsanitary surroundings, such as privies, sewage, sewage treatment plants, livestock and animal pens, solid waste disposal sites or underground petroleum and chemical storage tanks and liquid transmission pipelines, or abandoned and improperly sealed wells.

**§290.41(c)(1)(A)** No well site which is within 50 feet of a tile or concrete sanitary sewer, sewerage appurtenance, septic tank, storm sewer, or cemetery; or which is within 150 feet of a septic tank perforated drainfield, areas irrigated by low dosage, low angle spray on-site sewage facilities, absorption bed, evapotranspiration bed, improperly constructed water well, or underground petroleum and chemical storage tank or liquid transmission pipeline will be acceptable for use as a public drinking water supply. Sanitary or storm sewers constructed of ductile iron or polyvinyl chloride (PVC) pipe meeting American Water Works Association (AWWA) standards, having a minimum working pressure of 150 pounds per square inch (psi) or greater, and equipped with pressure type joints may be located at distances of less than 50 feet from a proposed well site, but in no case shall the distance be less than ten feet.

**§290.41(c)(1)(B)** No well site shall be located within 500 feet of a sewage treatment plant or within 300 feet of a sewage wet well, sewage pumping station, or a drainage ditch which contains industrial waste discharges or the wastes from sewage treatment systems.

**§290.41(c)(1)(C)** No water wells shall be located within 500 feet of animal feed lots, solid waste disposal sites, lands on which sewage plant or septic tank sludge is applied, or lands irrigated by sewage plant effluent.

**§290.41(c)(1)(D)** Livestock in pastures shall not be allowed within 50 feet of water supply wells.

**§290.41(c)(1)(E)** All known abandoned or inoperative wells (unused wells that have not been plugged) within 1/4-mile of a proposed well site shall be reported to the commission along with existing or potential pollution hazards. These reports are required for community and nontransient, noncommunity groundwater sources. Examples of existing or potential pollution hazards which may affect groundwater quality include, but are not limited to: landfill and dump sites, animal feedlots, military facilities, industrial facilities, wood-treatment facilities, liquid petroleum and petrochemical production, storage, and transmission facilities, Class 1, 2, 3, 4, and 5 injection wells, and pesticide storage and mixing facilities. This information must be submitted prior to construction or as required by the executive director.

**§290.41(c)(1)(F)** A sanitary control easement or sanitary control easements covering land within 150 feet of the well, or executive director approval for a substitute authorized by this subparagraph, shall be obtained.

**§290.41(c)(1)(F)(i)** The sanitary control easement(s) secured shall provide that none of the pollution hazards covered in subparagraphs (A) - (E) of this paragraph, or any facilities that might create a danger of pollution to the water to be produced from the well, will be located thereon.

**§290.41(c)(1)(F)(ii)** For the purpose of a sanitary control easement, an improperly constructed water well is one which fails to meet the surface and subsurface construction standards for public water supply wells. Residential type wells within a sanitary control easement must be constructed to public water well standards.

**§290.41(c)(1)(F)(iii)** A copy of the recorded sanitary control easement(s) shall be included with plans and specifications submitted to the executive director for review.

**§290.41(c)(1)(F)(iv)** With the approval of the executive director, the public water system may submit any of the following as a substitute for obtaining, recording, and submitting a copy of the recorded sanitary control easement(s) covering land within 150 feet of the well:

**§290.41(c)(1)(F)(iv)(I)** a copy of the recorded deed and map demonstrating that the public water system owns all real property within 150 feet of the well;

**§290.41(c)(1)(F)(iv)(II)** a copy of the recorded deed and map demonstrating that the public water system owns a portion of real property within 150 feet of the well, and a copy of the sanitary control easement(s) that the public water system has obtained, recorded, and submitted to the executive director applicable to the remaining portion of real property within 150 feet of the well not owned by the public water system; or

**§290.41(c)(1)(F)(iv)(III)** for a political subdivision, a copy of an ordinance or land use restriction adopted and enforced by the political subdivision which provides an equivalent or higher level of sanitary protection to the well as a sanitary control easement.

**§290.41(c)(1)(F)(v)** If the executive director approves a sanitary control easement substitute identified in clause (iv)(I) or (II) of this subparagraph for a public water system and the public water system conveys the property it owns within 150 feet of the well to another person or persons, the public water system must at that time obtain, record, and submit to the executive director a copy of the recorded sanitary control easement(s) applicable to the conveyed portion of the property within 150 feet of the well, unless the executive director approves a substitute identified in clause (iv) of this subparagraph.

**§290.41(c)(2)** The premises, materials, tools, and drilling equipment shall be maintained so as to minimize contamination of the groundwater during drilling operation.

**§290.41(c)(2)(A)** Water used in any drilling operation shall be of safe sanitary quality. Water used in the mixing of drilling fluids or mud shall contain a chlorine residual of at least 0.5 milligrams per liter (mg/L).

**§290.41(c)(2)(B)** The slush pit shall be constructed and maintained so as to minimize contamination of the drilling mud.

**§290.41(c)(2)(C)** No temporary toilet facilities shall be maintained within 150 feet of the well being constructed unless they are of a sealed, leakproof type.

# Well Pollution Hazard Survey Checklist

	<u>Yes or No</u>
<p>Any of the following within <b>50</b> feet of the well:</p> <ul style="list-style-type: none"> <li>• Sanitary sewer<sup>1</sup></li> <li>• Septic tank other tanks used to hold or treat sewage or sewerage appurtenance`</li> <li>• Storm sewer<sup>1</sup></li> <li>• Cemetery</li> <li>• Livestock in pastures</li> </ul> <p>1. Sanitary or storm sewers constructed of ductile iron or PVC pipe with a working pressure of at least 150 pounds per square inch and meeting American Water Works Association standards, and with pressure type joints may be located at a distance of less than 50-feet, but no closer than 10-feet to the well.</p>	_____ _____ _____ _____ _____
<p>Any of the following within <b>150</b> feet of the well:</p> <ul style="list-style-type: none"> <li>• Septic tank perforated drainfield</li> <li>• Areas irrigated by low dosage, low angle spray on-site sewage facilities</li> <li>• Absorption and/or evapotranspiration bed</li> <li>• Improperly constructed water well.<sup>2</sup></li> <li>• Underground petroleum and chemical storage tank</li> <li>• Liquid petroleum or chemical transmission pipeline</li> </ul> <p>2. An improperly constructed well includes all wells not constructed to public water well standards (e.g. residential wells, industrial wells, agricultural wells).</p>	_____ _____ _____ _____ _____ _____
<p>Any of the following within <b>300</b> feet of the well:</p> <ul style="list-style-type: none"> <li>• Sewage wet well</li> <li>• Sewage pumping station</li> <li>• Drainage ditch which contains industrial waste discharges or wastes from sewage treatment systems</li> </ul>	_____ _____ _____
<p>Any of the following within <b>500</b> feet of the well:</p> <ul style="list-style-type: none"> <li>• Sewage treatment plant</li> <li>• Animal feed lots</li> <li>• Solid waste disposal sites</li> <li>• Lands on which sewage plant or septic tank sludge is applied</li> <li>• Lands irrigated by sewage plant effluent</li> </ul>	_____ _____ _____ _____ _____
<p>Any of the following within <b>0.25-miles</b> of the well <b>including but not limited to:</b> known abandoned or inoperative wells, landfills, dumpsites, animal feed lots, military facilities, industrial facilities, wood-treatment facilities, liquid petroleum and petrochemical production, storage and transmission facilities, Class 1, 2, 3, 4 or 5 injection wells, and pesticide storage and mixing facilities.</p>	_____
<p>All found well pollution hazards have been shown on attached map or site drawing</p>	_____

\_\_\_\_\_  
 Signature of Person Responsible for  
 Well Pollution Hazard Survey

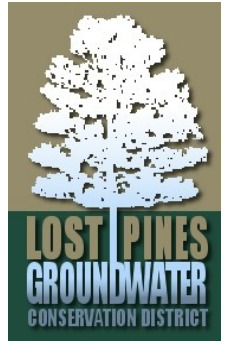
\_\_\_\_\_  
 Date

## **Appendix E**

### **Lost Pines Groundwater Conservation District (GCD) Form 100 – Well Drilling Application**

# FORM 100

## Well Drilling Application



For District Use Only:

_____
Application Date
_____
Well Drilling Permit Number

Return this Form to: LPGCD, PO Box 1027 (908 Loop 230), Smithville, TX 78957  
Phone: 512-360-5088 FAX: 512-360-5448 Email: [lpgcd@lostpineswater.org](mailto:lpgcd@lostpineswater.org)

### SECTION I – APPLICANT

Name _____
Company (if applicable) _____
Street (or PO Box) _____
City _____ State _____ Zip _____
Phone Number (____) _____

### SECTION II – DRILLING SITE DESCRIPTION

Physical Description of Proposed Drilling Site (use GPS coordinates if known.) _____
County that the Drilling Site is Located in: Bastrop _____ Lee _____
Is the proposed well located within a neighborhood or subdivision? Yes _____ No _____
If Yes, which neighborhood or subdivision? _____

### SECTION III – AUTHORIZATION TO DRILL

Is the Applicant the same as the Property Owner of the Proposed Drilling Site? Yes _____ No _____
If Property Owner is different from Applicant shown in Section I, contact information and a notarized letter of authorization to drill from the property owner <b>must</b> be attached to this application.

**SECTION V – WELL INFORMATION**

What will be the primary use of the well (circle one)?

*Domestic Livestock Irrigation Municipal Supply Mining Rig Supply Test Other* \_\_\_\_\_

What is the proposed aquifer that the well will produce from (if known)? \_\_\_\_\_

What will be the approximate total depth of the well (if known)? \_\_\_\_\_ feet

Will the Applicant be requesting an exemption under LPGCD Rule 3.1? Yes \_\_\_\_\_ No \_\_\_\_\_

If Yes, type of exemption claimed:

\_\_\_\_\_ A well that is solely for domestic or livestock use that is incapable of producing more than 25,000 gallons per day (gpd).

\_\_\_\_\_ A well that uses less than 200 acre-feet/year solely for agricultural use.

\_\_\_\_\_ A well that is 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.

\_\_\_\_\_ A water well authorized under a permit issued by the Railroad Commission of Texas for mining activities.

\_\_\_\_\_ A water well drilled and completed solely for the purposes of aquifer testing.

**SECTION IV – AFFIRMATION**

**I certify that all statements and information in this application are true and correct.**

\_\_\_\_\_  
Signature of Applicant

\_\_\_\_\_  
Date

# Appendix C

## Preliminary Engineering Report for TCEQ Revenue Note Application

# BASTROP COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #2

## BOND APPLICATION

### PRELIMINARY ENGINEERING REPORT

#### BASTROP COUNTY, TEXAS

Prepared For:



BASTROP COUNTY WCID #2

106 Conference Drive  
Bastrop, Texas 78602

Contact: Paul Hightower, General Manager  
Phone: 512-321-1688

*Bradley C. Loehr*



*2/22/2021*

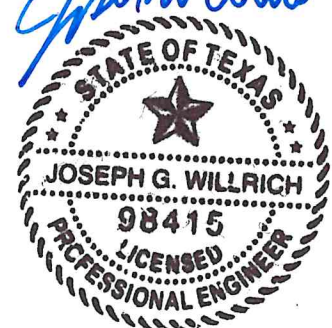
Prepared By:



BEFCO Engineering, Inc.  
485 N. Jefferson  
La Grange, Texas 78945

Texas Registered Engineering Firm # F-2011

*Joseph G. Willrich*



*2-22-2021*

FEBRUARY 2021

# SECTION CONTENTS

	<u>Section</u>
History.....	1.0
Bond Projects Summary.....	2.0
Water System Summary.....	3.0
TCEQ Water System Capacity Summary.....	4.0
Bond Project Descriptions and Cost.....	5.0
Cost Summary and Closure.....	6.0

## **1.0 History**

Bastrop County Water Control and Improvement District #2 (BCWCID #2) was created in 1985 by petition submitted and approved by Bastrop County and the City of Bastrop. The district boundary for BCWCID #2 presently consists of Units 1 through 5 of the Tahitian Village Subdivision. The Tahitian Village Subdivision consists of over 3,000 acres and approximately 7,000 platted lots and was developed in the 1970s. BCWCID #2 has provided water service since its inception. In 1998, BCWCID #2 received approval from TCEQ to provide retail wastewater service and entered into an agreement with LCRA to provide wholesale wastewater service to BCWCID #2. LCRA also entered into an agreement with City of Bastrop to treat the wastewater discharge from BCWCID #2. In early 2000s, LCRA constructed a wastewater collection system within portions of Units 1, 2 and 4 of Tahitian Village. In 2016, BCWCID #2 purchased the wastewater system from LCRA with Texas Water Development Board funds and maintained the wholesale agreement with City of Bastrop for wastewater treatment. BCWCID #2 continues to serve water for over 1,979 connections and wastewater to 775 connections.

## **2.0 Bond Projects Summary**

BCWCID #2 is pursuing a bond application to finance various water infrastructure projects. The projects include:

- Water line replacement to increase line size due to meter compliance/capacity issues;
- Water line replacement due to ongoing maintenance issues;
- Eliminating dead end lines where possible by extending lines to the main looped system;
- Installing automatic flush valves at some dead-end water line locations;
- New elevated storage tank;
- New water well;
- New ground storage tank and water plant.

These projects will be described in more detail in the report and a bond project map is attached to graphically depict the location of the proposed improvements. Wastewater improvements are not included in the bond.

## **3.0 Water System Summary**

BCWCID #2 has a total connection count of 1,979 when factoring in the Tahitian Village Apartments Multi-Family Connections. BCWCID #2's water system is setup in two pressure planes. The system consists of three water plants, five water wells, booster pumps, pressure tanks and ground storage tanks. Following is a summary of existing infrastructure serving each pressure plane.

Pressure Plane 1: Water Plants 1 & 2 (Pressure Setting - 50 psi (636' MSL))

- 1,249 connections (of which 69 are located outside District Boundary);
- Well 1 – 65 GPM & Well 2 – 180 GPM at Water Plant 1 (WP1);
- Well 3 – 350 GPM & Well 4 – 150 GPM at Water Plant 2 (WP2);
- Three (3) – 100,000 Gallon Ground Storage Tanks, Two at WP1 and One at WP2;
- Four (4) – 500 GPM Booster Pumps, Two each at Water Plants 1 & 2;
- Two (2) – 5,000 Gallon Pressure Tanks at WP1. One (1) – 10,000 Gallon Pressure Tank at WP2;
- Permanent Generator Set at WP2.

Pressure Plane 2: Water Plant 3 (Pressure Setting – 75-80 psi (547' MSL))

- 730 connections (of which 81 are located outside District Boundary)
- Well 5 – 380 GPM;
- One (1) – 125,200 Gallon Ground Storage Tank;
- Two (2) – 500 GPM Booster Pumps;
- One (1) – 10,000 Gallon Pressure Tank.

***NOTE:** All wells are within Lost Pines Groundwater Conservation District permitted acre-foot limits. Should also be noted that water from Pressure Plane 1 (PP1) can supplement Pressure Plane 2 (PP2) through a pressure reducing valve (PRV) when pressures in PP2 drop below the PRV setting.*

#### **4.0 TCEQ Water System Capacity Summary**

TAC 290.45 Rules and Regulations for Public Water Systems establishes minimum system capacity requirements. BCWCID #2 has two pressure planes; therefore, both systems must meet the minimum capacity requirements. The capacity requirements are summarized as follows:

- Two or more wells having a total capacity of 0.6 GPM per connection
- Total storage capacity of 200 gallons per connection
- Two or more pumps that have a total capacity of 2.0 GPM per 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. Pump capacity can be reduced if elevated storage is provided.
- Elevated storage capacity of 100 gallons per connection or a pressure tank capacity of 20 gallons per connection. If pressure tanks are utilized, maximum capacity of 30,000 gallons is allowed for up to 2,500 connections. Elevated storage capacity of 100 gallons per connection is required for systems with more than 2,500 connections.
- Emergency power is required for systems serving more than 250 connections and do not meet elevated storage requirements. Emergency power can be accomplished with emergency generators and interconnects with other public water systems. BCWCID #2 has an emergency generator at Water Plant #2 and has a means of interconnect with the City of Bastrop.

Based on the TCEQ capacity requirements, following is the capacity summary for each pressure plane.

Pressure Plane 1: Water Plants 1 & 2 (Pressure Setting - 50 psi (636' MSL))

Pressure plane 1 has a total connection count of 1,249. Of these connections, 69 connections are outside of the district boundary, but within the CCN of BCWCID #2.

TABLE 1 - Water System Capacity Table (Water Plants 1 & 2)				
			Existing System	TCEQ Capacity Requirements
Number of Meter Equivalents				1,249
Well Capacity (GPM)			1,045	749
Booster Pump Capacity (GPM)			2,000	2,498
Pressure Tank Capacity (Gallons)			20,000	24,980
Storage Capacity (Gallons)			320,000	249,800
Elevated Storage Capacity (Gallons)			0	N/A
Emergency Power			Gen at WP2	-

Pressure plane 1 is insufficient in booster pump and pressure tank capacity. It is also nearing storage capacity requirements (78% capacity).

Pressure Plane 2: Water Plant 3 (Pressure Setting – 75-80 psi (547' MSL))

Pressure plane 2 has a total connection count of 730. Of these connections, 81 connections are outside of the district boundary, but within the CCN of BCWCID #2.

TABLE 2 - Water System Capacity Table (Water Plant 3)				
			Existing System	TCEQ Capacity Requirements
Number of Meter Equivalents				730
Well Capacity (GPM)			380	438
Booster Pump Capacity (GPM)			1,000	1,460
Pressure Tank Capacity (Gallons)			10,000	14,600
Storage Capacity (Gallons)			135,200	146,000
Elevated Storage Capacity (Gallons)			0	N/A
Emergency Power			-	-

Pressure plane 2 is insufficient in well, booster pump, pressure tank and storage capacity. It should be noted that water from Pressure Plane 1 can supplement water needs in Pressure Plane 2 through a Pressure Reducing Valve located at the Keanahalululu/Kaanapali Intersection.

## 5.0 Bond Project Descriptions and Cost

BCWCID #2 has identified several projects for the proposed bond application to address existing system capacity issues, maintenance issues and future growth. A summary of the projects and opinion of probable construction cost is provided and a map of the projects is attached to this report.

### A. Water Line Replacement - Compliance

TAC 290.44 (C) Rules and Regulations for Public Water Systems establishes minimum water line sizes based on the number of connections.

<b>Maximum Number of Connections</b>	<b>Minimum Line Size (inches)</b>
10	2
25	2.5
50	3
100	4
150	5
250	6
>250	8 and larger

BCWCID #2 has several existing water lines that are undersized based on this requirement. BCWCID #2 is proposing to replace and increase the line size at various locations to come into compliance with this requirement. Following is a list and estimated construction cost.

- N. Kaupo Drive (Existing 2" will be replaced with new 6" water line) **\$200,000**
- El Camino River Road (Existing 2" will be replaced with new 8" water line) **\$350,000**
- Hawea Lane (Existing 2"/4" will be replaced with new 6" water line) **\$175,000**
- Keanahalululu Lane west of Nuuanu (Services on existing 2" line will be reconnected to an existing 4" line located on the south side of Keanahalululu Lane) **\$45,000**

The opinion of probable construction cost for water line replacement for compliance is estimated to be **\$770,000**.

B. Water Line Replacement – High Maintenance

BCWCID #2 has identified several existing water lines as high maintenance due to frequent leaks and emergency repairs that are required. Most of these lines have been in service since the establishment of the Tahitian Village Subdivision in the 1970s. Following is a list of the lines proposed to be replaced and estimated construction cost.

- Tahitian Drive (Existing 8" between Industry and Mauna Kea will be replaced with a new 16" water line, existing 8" between Makaha and Kaanapali will be replaced with a new 10" water line. It is noted that BCWCID #2 has already replaced the existing water line with a new 10" water line between Mauna Kea and Makaha) **\$600,000**
- Kamaiki Drive (Existing 6" will be replaced with new 6" water line) **\$190,000**
- Keanahalululu Lane near Riverside Drive and Air Strip Road (Existing 6" will be replaced with new 8" water line) **\$80,000**
- Mahalua Lane (Existing 6" will be replaced with new 6" water line) **\$130,000**
- Wainee Lane (Existing 4" will be replaced with new 6" water line) **\$70,000**
- Mauna Loa between Tahitian Drive and Pine Hollow Drive (Existing 6" will be replaced with new 10" water line) **\$260,000**

The opinion of probable construction cost for water line replacement for high maintenance is estimated to be **\$1,330,000**.

C. Water Line Extensions and Automatic Flush Valves

BCWCID #2 has identified several existing dead-end water lines that they propose to extend and tie into existing water mains. This will eliminate dead ends and the ongoing maintenance and water waste of flushing water lines. There are also select dead-end lines that cannot be looped and BCWCID #2 proposes to replace existing manual flush valves with automatic flush valves. Locations of dead-end water line extensions are located on Hawea Lane, Air Strip Road, Kokomo Lane, Haliimaile Lane, Kalalea Lane, Paho Lane, Kaeleku, Kahana Lane, Pohakuloa Drive, Nuuanu Lane, Diamondhead Drive, Waimanola Lane, Helemano Drive, Riverside Drive, Akaloa Drive, Mokuleia Circle, Wailupe Circle, Mokolea Lane, Kahalulu Drive, Kainalu Lane, Tall Forest Drive, and Aloha Lane. These water line extensions shall match the existing line size being extended, but in no case shall be less than 4 inches in size. Automatic flush valve locations are shown on the bond project map.

The opinion of probable construction cost for water line extensions to eliminate dead-ends and install automatic flush valves is **\$290,000**.

D. Elevated Storage Tank

Based on the TCEQ capacity summary tables, the water system is currently undersized in booster pump and pressure tank capacity. It is also nearing capacity for storage in pressure plane 1 and deficient in storage in pressure plane 2. BCWCID #2 is proposing a new elevated storage tank. The elevated storage tank will be sized between 400,000 gallons and 600,000 gallons. Final size will be determined at the time of tank design. Installing a new elevated storage tank will provide the following benefits to BCWCID #2:

- Reduce booster pump capacity requirements to be within thresholds (eliminates need for additional or larger pumps);
- Eliminates pressure tank capacity deficit;
- Provides storage for the existing system and future growth;
- Provides additional supply to the District for fire protection or in the event of a power failure.

The location of the elevated storage tank has not been finalized and possible locations of the tank are identified on the bond project map. The opinion of probable construction cost for the elevated storage tank is **\$1,750,000**.

E. Water Well

Based on the TCEQ capacity summary tables well capacity is deficient in pressure plane 2. In pressure plane 1, water well 3 has poor water quality. Based on the deficiencies, poor water quality and future growth of the system, a new water well is proposed. The new water well will be setup to serve both pressure planes. The location of the water well has not been finalized and possible locations of the well are identified on the bond project map. Quality and capacity of the new well is not known until a test well is completed. The opinion of probable construction cost for the new well is **\$700,000**.

F. Ground Storage Tank and Water Plant

Based on the TCEQ capacity summary tables storage capacity is deficient in pressure plane 2 and nearing deficiency in pressure plane 1. A new ground storage tank and pump station is proposed at the pressure plane boundary in Unit 5. The ground storage tank and pump station would provide the following benefits to BCWCID #2:

- Provides an interconnect between the two pressure planes for water supply (wells);
- Provides ground storage for both pressure planes;
- Provides elevated storage for portions of pressure plane 2.

The final size of tank and pumps will be determined at final design. The opinion of probable construction cost for the new ground storage tank and water plant is **\$500,000**.

## **6.0 Cost Summary and Closure**

BCWCID #2 has identified several projects for the proposed bond application. These projects include water line replacement, extensions, automatic flush valves, elevated storage tank, water well, ground storage tank and water plant improvements. The projects address existing system capacity issues, maintenance issues and future growth. The elevated storage tank will additionally provide water service during grid electrical outages and fire protection. The new ground storage tank and water plant near the pressure plane boundary in Unit 5 is proposed to provide redundancy when sharing water between the two pressure planes and water service during grid electrical outages & fire protection to Pressure Plane 2. The estimated opinion of probable construction cost is listed below:

Water Line Replacement - Compliance	\$770,000
Water Line Replacement – High Maintenance	\$1,330,000
Water Line Extensions and Automatic Flush Valves	\$290,000
Elevated Storage Tank	\$1,750,000
Water Well	\$700,000
Ground Storage Tank and Water Plant	<u>\$500,000</u>
Total Construction	<b>\$5,340,000</b>
Contingency (15%)	<b>\$801,000</b>
Engineering\Surveying (12%)	<b>\$640,800</b>
<b>Grand Total</b>	<b>\$6,781,800</b>

# Appendix D

## TCEQ Approval Order for Revenue Note



# TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



## AN ORDER APPROVING THE ISSUANCE OF A \$6,775,000 REVENUE NOTE FOR BASTROP COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT NO. 2

An application by Bastrop County Water Control and Improvement District No. 2 (District) was presented to the Executive Director of the Texas Commission on Environmental Quality (TCEQ) for consideration of a Revenue Note approval pursuant to TEX. WATER CODE § 5.122 and 49.153 and 30 TEX. ADMINISTRATIVE CODE § 293.80. The District requests approval of the issuance of a \$6,775,000 Revenue Note to finance the design and construction costs of the following projects: water line replacements; elevated storage tank; water well; ground storage tank; and water plant. The TCEQ has jurisdiction to consider this matter, and the following Findings of Fact and Conclusions of Law are appropriate after examining the application and supporting documentation.

### FINDINGS OF FACT

1. The District filed an application with the TCEQ on March 30, 2021 for approval of the issuance of a \$6,775,000 Revenue Note.
2. The Executive Director of the TCEQ has investigated the District.
3. The application and accompanying documents have been examined. The project site was inspected by a member of the Districts Section on May 5, 2021, and a memorandum was prepared on the project dated May 28, 2021, a copy of which is attached and made a part hereof.
4. The District's issuance of the \$6,775,000 Revenue Note at a maximum net effective interest rate of 3.78% should be approved.
5. The District should be directed not to expend a total of \$5,630,800 pending District board receipt of plans and specifications approved by all entities with jurisdiction as follows:
  - a. \$2,118,747 (\$1,840,000 in construction plus \$278,747 in contingencies) for the water line replacements;
  - b. \$2,072,687 (\$1,800,000 in construction plus \$272,687 in contingencies) for the elevated storage tank;
  - c. \$806,045 (\$700,000 in construction plus \$106,045 in contingencies) for the water well; and
  - d. \$633,321 (\$550,000 in construction and \$83,321 in contingencies) for the ground storage and water plant.

6. The District's board should be directed to ensure that operating revenues are sufficient to meet operating expenses and debt service requirements on revenue debt.

7. The District should be advised that the legal, fiscal agent, and engineering fees have not been evaluated to determine whether these fees are reasonable or competitive. These fees are included as presented in the engineering report.

#### CONCLUSIONS OF LAW

1. The TCEQ has jurisdiction to consider the Revenue Note application pursuant to TEX. WATER CODE § 49.153 and 30 TEX. ADMINISTRATIVE CODE § 293.80.

2. The Executive Director of the TCEQ has investigated the District, and the TCEQ has found it legally organized and feasible.

3. The Districts Section's memorandum dated May 28, 2021, on this Revenue Note issue, and this Order, should be adopted as the written TCEQ report in compliance with TEX. WATER CODE § 49.153 and 30 TEX. ADMINISTRATIVE CODE § 293.80.

NOW, THEREFORE, BE IT ORDERED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY that the memorandum dated May 28, 2021, on this Revenue Note issue, and this Order, is adopted as the written TCEQ report. Pursuant to TEX. WATER CODE § 49.153 and 30 TEX. ADMINISTRATIVE CODE § 293.80, the request by Bastrop County Water Control and Improvement District No 2 for the issuance of a \$6,775,000 Revenue Note at a maximum net effective interest rate of 3.78% is hereby approved. The District should be directed not to expend a total of \$5,630,800 pending District board receipt of plans and specifications approved by all entities with jurisdiction as follows: a) \$2,118,747 (\$1,840,000 in construction plus \$278,747 in contingencies) for the water line replacements; b) \$2,072,687 (\$1,800,000 in construction plus \$272,687 in contingencies) for the elevated storage tank; c) \$806,045 (\$700,000 in construction plus \$106,045 in contingencies) for the water well; and d) \$633,321 (\$550,000 in construction and \$83,321 in contingencies) for the ground storage and water plant. The District's board is directed to ensure that operating revenues are sufficient to meet operating expenses and debt service requirements on revenue debt. The District is advised that the legal, fiscal agent, and engineering fees have not been evaluated to determine whether these fees are reasonable or competitive. These fees are included as presented in the engineering report.

BE IT FURTHER ORDERED that failure of said District to comply with all applicable laws and with provisions of this Order shall subject the District and its directors to all penalties that are provided by law and shall further be considered by the TCEQ as grounds for refusal to approve other bonds of the District.

The Chief Clerk of the TCEQ is directed to forward the District a copy of this Order.

If any provision, sentence, clause, or phrase of this Order is for any reason held to be invalid, the invalidity of any portion shall not affect the validity of the remaining portions of the Order.

Issue Date: **June 15, 2021**

  
For the Commission

# Texas Commission on Environmental Quality

## TECHNICAL MEMORANDUM

*CSU 06/10/21*  
**To:** Chris S. Ulmann, P.E., Manager  
Districts Section

**Date:** May 28, 2021

**Thru:** Daniel Finnegan, Team Leader  
Districts Bond Team

**From:** Dennis Mostowy, P.E.  
Districts Bond Team

**Subject:** Bastrop County Water Control and Improvement District No. 2; Application for Approval of a \$6,775,000 Revenue Note, 3.78% Net Effective Interest Rate; Pursuant to Texas Water Code Section 49.153 and 30 Texas Administrative Code Section 293.80.  
TCEQ Internal Control No. D-03302021-046 (TC)  
CN: 600739544      RN: 101428886

### A. GENERAL INFORMATION

The Texas Commission on Environmental Quality (TCEQ) received an application from Bastrop County Water Control and Improvement District No. 2 (District) requesting approval for the issuance of a \$6,775,000 revenue note to finance design and construction costs for the following projects:

1. Water line replacements;
2. Elevated storage tank;
3. Water well; and
4. Ground storage tank and water plant

Application material indicates that the District provides water, wastewater and drainage service to 1,810 equivalent single-family connections (ESFCs) on 2,195 developable (3,022 total) acres as of January 1, 2021.

### B. ECONOMIC ANALYSIS

#### Tax Rate Analysis

The economic feasibility of this Note is based on growth to the existing 1,810 ESFCs and secured by revenue earned by the District from its customers. A market study has not been provided and is not required for revenue notes where proceeds are not used to reimburse a developer as defined in TWC Section 49.052(d) as stated in 30 TAC 293.80(d).

The average annual debt service requirement for the requested \$6,775,000 Revenue Note is \$800,554 for the 20-year life of the Note.

The District's financial advisor submitted an amortization schedule for the requested \$6,775,000 Note, no capitalized interest, growth to 2,065 water ESFCs and 826 wastewater ESFCs, an interest rate of 3.50%, and \$589,868 (\$2,074,400 in water revenue, \$1,221,300 in wastewater revenue minus \$1,604,007 in water expenses and \$1,101,825 in wastewater expenses) in operating funds available for Note payments. A TCEQ's Districts Section's financial analyst has reviewed the financial

information submitted and concluded that operating revenues generated by the District are expected to be sufficient for operating expenses and the projected annual Note payments.

### C. ENGINEERING ANALYSIS

#### Water Supply

The District's source of water is groundwater from 5 wells at its existing plant. The wells (5862505, 5862302, 5862304, 5862305, and 5862307), permitted by the Lost Pines Groundwater Conservation District capacity of 1.544 million gallons per day aggregated with other permitted wells

The following table summarizes the existing and proposed water supply facilities along with the ESFC capacity of each component based on criteria stated in 30 TAC Section 290.45.

<u>Facility</u>	<u>Minimum Requirements</u>	<u>Proposed Capacity</u> <sup>(1)</sup>	<u>Existing Capacity (ESFCs)</u>
Wells	0.6 gpm/ESFC	TBD	1,125 gpm (1,875 ESFCs)
Pressure Tank	20 gal/ESFC	0 ESFCs	30,000 gal <sup>(2)</sup> (2,500 ESFCs)
Elevated Storage Tank	100 gal/ESFC	TBD	0 gal
Total Storage	200 gal/ESFC	TBD	455,200 gal (2,276 ESFCs)
Booster Pumps	2 gpm/ESFC 1,000 gpm max	TBD	3,000 gpm (1,500 ESFCs)

Notes:

- (1) The proposed facilities have not been designed yet. Final sizing will be determined at the time of design and will address current and future needs of the District.
- (2) Pursuant to 30 TAC Section 290.45(b), a maximum capacity of 30,000 gallons is sufficient for up to 2,500 connections.

The District has no emergency interconnects.

The District's existing and proposed water supply capacity appears adequate to serve the 2,065 (1,810 in-District, 150 out-of-District, and 105 additional) water ESFCs upon which the feasibility of this Note is based.

#### Wastewater Treatment

Wastewater treatment for the District is provided by the City of Bastrop pursuant to the "Assignment of Agreement between City of Bastrop and LCRA Concerning the Treatment of Wastewater" dated April 21, 2000. The District's wastewater is treated at the East Bastrop Wastewater Treatment Plant. The plant operates under Texas Pollutant Discharge Elimination System Permit No. WQ0011076-001, which authorizes a final discharge of 1.4 million gallons per day.

The District has requested a reduced design criteria of 242 gpd/ESFC based on flow data collected from January 2018 through December 2020. Based on a review of the flow data, using a flow factor of 242 gpd/ESFC appears appropriate.

The existing wastewater supply capacity appears adequate to serve the 826 wastewater ESFCs upon which the feasibility of this Note is based. Wastewater supply for all other ESFCs upon which the feasibility of this Note is based is provided by septic systems.

Storm Water Drainage

Storm water within the District is collected via drainage channels which drain to the south into the Colorado River.

Purchase of Facilities and/or Assumption of Existing Contracts

None.

Facilities to be Constructed

<u>Project</u>	<u>Status</u>	<u>Estimated Construction Cost</u>	<u>Amt. Subj. to Distr. Contrib.</u>
Water Line Replacement	Planning Phase	\$1,840,000	\$1,840,000
Elevated Storage Tank	Planning Phase	\$1,800,000	\$1,800,000
Water Well	Planning Phase	\$700,000	\$700,000
Ground Storage Tank and Water Plant	Planning Phase	\$550,000	\$550,000

The facilities proposed for funding in this application have not been designed. Cost estimates and the report on the system needs were prepared by the District's project engineer BEFCO Engineering, Inc. Approved plans and specifications and various construction contract documents have not been provided.

Inspection

The District was inspected by the TCEQ's Districts Section staff on May 5, 2021. The District appeared as represented in the engineering report. District name signs were properly posted.

**D. SUMMARY OF COSTS**

<u>Construction Costs</u>	<u>District's Share</u>
A. Developer Contribution Items - None	
B. District Items	
1. Water Line Replacement	\$ 1,840,000
2. Elevated Storage tank	1,800,000
3. Water Well	700,000
4. Ground Storage Tank and Water Plant	550,000
5. Contingencies (15% of Items No. 1-4)	740,800
6. Engineering (12% of Item Nos. 1-4)	<u>586,800</u>
Total District Items	\$ 6,217,600

TOTAL CONSTRUCTION COSTS (91.77% of Note Requirement)	\$	6,217,600
<u>Nonconstruction Costs</u>		
A. Legal Fees (2.0%)	\$	135,500 <sup>(1)</sup>
B. Fiscal Agent Fees (2.0%)		135,500 <sup>(2)</sup>
C. Underwriter's Discount (3.0%)		203,250
D. Bond Issuance Expenses		46,375
E. Bond Application Report Costs		30,000
F. Attorney General Fee (0.10% or \$9,500 max.)		<u>6,775</u>
TOTAL NONCONSTRUCTION COSTS (8.23% of Note Requirement)	\$	557,400
<b>TOTAL NOTE REQUIREMENT</b>	<b>\$</b>	<b>6,775,000</b>

Notes:

- (1) According to contract provided, legal fees are based on 2.0% of the bonds issued.
- (2) According to contract provided, fiscal agent fees are based on 2.0% of the bonds issued with a minimum fee of \$25,000.

**E. SPECIAL CONSIDERATION**

Delayed Funding

The cost summary includes funds for District projects and/or facilities which are incomplete or proposed and for which approved plans and specifications are not available. Therefore, the District should be directed not to expend these funds until the District's board has received plans and specifications approved by all entities with jurisdiction.

**F. CONCLUSIONS**

1. Based on the review of the application and supporting documents, the Note is considered feasible and meets the criteria established by the TCEQ's economic feasibility rules, 30 TAC Section 293.59.
2. The recommendations are made under authority delegated by the Executive Director of the TCEQ.

**G. RECOMMENDATIONS**

1. Approve the Revenue Note in the amount of \$6,775,000 in accordance with the recommended summary of costs, at a maximum net effective interest rate of 3.78%.
2. The District should be directed not to expend a total of \$5,630,800 pending District board receipt of plans and specifications approved by all entities with jurisdiction as follows:
  - a. \$2,118,747 (\$1,840,000 in construction plus \$278,747 in contingencies) for the water line replacements;
  - b. \$2,072,687 (\$1,800,000 in construction plus \$272,687 in contingencies) for the elevated storage tank;

- c. \$806,045 (\$700,000 in construction plus \$106,045 in contingencies) for the water well; and
  - d. \$633,321 (\$550,000 in construction and \$83,321 in contingencies) for the ground storage and water plant.
3. Direct the District's board to ensure that operating revenues are sufficient to meet operating expenses and debt service requirements on revenue debt.
  4. Standard recommendations regarding consultant fees apply.

# Agenda

## Item #8

Discussion related to  
FY2023 Financial Audit  
Report



# **Bastrop County Water Control & Improvement District #2**

## **GASB-as-a-Service Technical Accounting and Consulting Services**

**May 8<sup>th</sup>, 2025**



# Status of Tasks

Tasks	Estimated Completion Date	Status	% Complete	Recent Activities
Phase 4: Assist with closing the FY 2023 trial balance	April 7, 2025	Completed	100%	<ul style="list-style-type: none"> <li>CB provided Debt, AR, AP, capital assets, and manual journal entries.</li> </ul>
Phase 5: Prepare the FY 2023 Financial Statements	May 12, 2025	In Progress	80%	<ul style="list-style-type: none"> <li>Audit support – FY23</li> <li>Prepaid Mowing – FY23</li> <li>Additional Journal Entries – FY 23</li> </ul>
Phase 6: Assist with closing the FY 2024 trial balance	May 30, 2025	Paused	30%	<ul style="list-style-type: none"> <li>CB to complete preparing the financial statements</li> <li>Bastrop to provide the outstanding support for FY24</li> <li>Bastrop to post additional entries for FY23</li> </ul>
Phase 7: Prepare the FY 2024 Financial Statements	TBD	Not Started	0%	



# Questions?

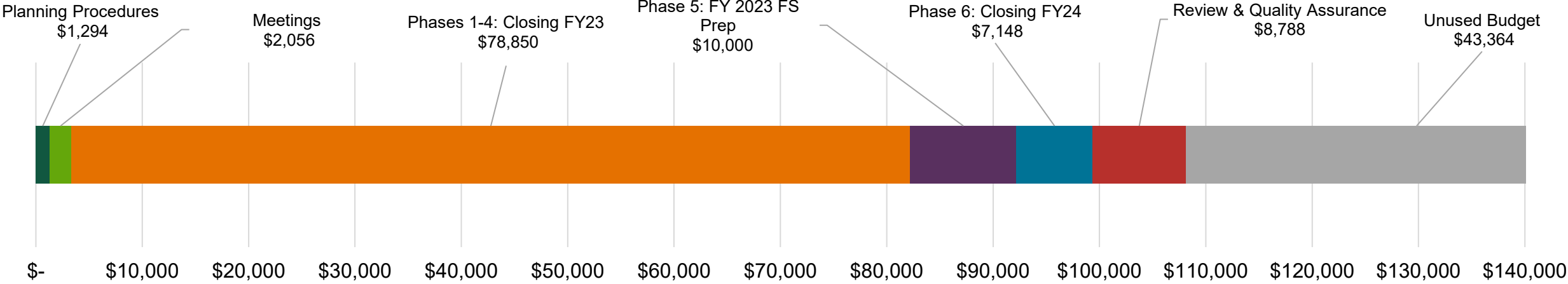
Danny Martinez, CPA, CGFM

[Danny.Martinez@cbh.com](mailto:Danny.Martinez@cbh.com)

Nicholas Falbo, CPA

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# Bastrop County WCID #2 – Budget Usage



▪ Chart reflects budget for hours worked through May 2<sup>nd</sup>, 2025

Tasks worked on to date include:



- Phases 1-4: Close Fiscal Year 2023
- Phase 5: Prepare the 2023 FS
- Phase 6: Close Fiscal Year 2024

- Fiscal Year 2023 (Close & FS Prep): \$101,500
- Fiscal Year 2024 (Close & FS Prep): \$50,000
- Total Engagement Fees: \$151,500
- Available Budget: \$43,364



# Agenda

## Item #9

Discussion regarding Test  
Well Bid Openings





**Bastrop County WCID No. 2  
Test Hole and Test Well 1**

**Bid Tabulation - 4/10/2024**

Base Bid General Items				Engineer's Estimate		Hydro Resources	
Bid No.	Item Description	Quantity	Unit	Unit Price	Total Price	Unit Price	Total Price
B-1	Contractor Mobilization and Demobilization, Bonds and Insurance	1	LS	\$ 50,000.00	\$ 50,000.00	\$ 34,000.00	\$ 34,000.00
B-2	Drilling, Drill Cutting Sampling, Sieve Analyses and Geophysical Logging of a Water Well Test Hole to a Total Depth of 850 Feet	1	LS	\$ 275,000.00	\$ 275,000.00	\$ 175,500.00	\$ 175,500.00
B-3	Test Hole Water Quality Sampling, Completed in the Test Hole Borehole Location Using the Temporary Test Well Method with a Total Well Screen Length of 20 to 40 Feet Installed Within a Depth Interval Between 350 and 850 Feet	2	EA	\$ 50,000.00	\$ 100,000.00	\$ 70,300.00	\$ 140,600.00
B-4	Test Hole Plugging and Abandonment as per Rules and Regulations of All Applicable Regulatory Agencies	1	LS	\$ 50,000.00	\$ 50,000.00	\$ 33,000.00	\$ 33,000.00
<b>Base Bid General Items Total</b>				<b>\$</b>	<b>475,000.00</b>	<b>\$</b>	<b>383,100.00</b>

Unit Price Adjustments				Engineer's Estimate		Hydro Resources	
Bid No.	Item Description	Quantity	Unit	Unit Price	Total Price	Unit Price	Total Price
B-ADJ-1	Additional Test Hole Depth	1	LF	\$ 230.00	\$ 230.00	\$ 61.00	\$ 61.00
B-ADJ-2	Spectra Gamma Ray Log of the Test Hole	1	LS	\$ 10,000.00	\$ 20,000.00	\$ 1,786.00	\$ 3,572.00

Base Bid General Items				Engineer's Estimate		Hydro Resources	
Bid No.	Item Description	Quantity	Unit	Unit Price	Total Price	Unit Price	Total Price
A1-1	Contractor Mobilization and Demobilization, Bonds and Insurance	1	LS	\$ 50,000.00	\$ 50,000.00	\$ 40,000.00	\$ 40,000.00
A1-2	Drilling, Drill Cutting Sampling, Sieve Analyses and Geophysical Logging of a Water Well Test Hole to a Total Depth of 850 Feet	1	LS	\$ 150,000.00	\$ 150,000.00	\$ 170,000.00	\$ 170,000.00
A1-3	Test Hole Water Quality Sampling 1, Completed in the Test Hole Borehole Location Using the PVC Test Well Method	1	LS	\$ 100,000.00	\$ 100,000.00	\$ 147,500.00	\$ 147,500.00
A1-4	Test Hole Water Quality Sampling 2, Completed Within 50 Feet of the Test Hole Borehole Location Using the PVC Test Well Method	1	LS	\$ 75,000.00	\$ 75,000.00	\$ 333,500.00	\$ 333,500.00
A1-5	PVC Test Well 1, Plugging and Abandonment as per Rules and Regulations of All Applicable Regulatory Agencies	1	LS	\$ 30,000.00	\$ 30,000.00	\$ 32,300.00	\$ 32,300.00
A1-6	PVC Test Well 2, Plugging and Abandonment as per Rules and Regulations of All Applicable Regulatory Agencies	1	LS	\$ 30,000.00	\$ 30,000.00	\$ 32,300.00	\$ 32,300.00
<b>Base Bid General Items Total</b>				<b>\$</b>	<b>435,000.00</b>	<b>\$</b>	<b>755,600.00</b>

Unit Price Adjustments				Engineer's Estimate		Hydro Resources	
Bid No.	Item Description	Quantity	Unit	Unit Price	Total Price	Unit Price	Total Price
A1-ADJ-1	Test Hole Drilling Depth	1	LF	\$ 230.00	\$ 230.00	\$ 61.00	\$ 61.00
A1-ADJ-2	Spectra Gamma Ray Log of the Test Hole	1	LS	\$ 10,000.00	\$ 10,000.00	\$ 1,786.00	\$ 1,786.00
A1-ADJ-3	5-inch diameter PVC SDR 17 Casing and Pressure Cementing	1	LF	\$ 150.00	\$ 150.00	\$ 30.00	\$ 30.00
A1-ADJ-4	2-1/2 diameter PVC Blank Liner	1	LF	\$ 100.00	\$ 100.00	\$ 6.00	\$ 6.00
A1-ADJ-5	2-1/2 diameter PVC Slotted Well Screen	1	LF	\$ 100.00	\$ 100.00	\$ 11.00	\$ 11.00

Base Bid General Items				Engineer's Estimate		Hydro Resources	
Bid No.	Item Description	Quantity	Unit	Unit Price	Total Price	Unit Price	Total Price
A2-1	Contractor Mobilization and Demobilization, Bonds and Insurance	1	LS	\$ 75,000.00	\$ 75,000.00	\$ 46,600.00	\$ 46,600.00
A2-2	Drilling, Drill Cutting Sampling, Sieve Analyses and Geophysical Logging of a Water Well Test Hole to a Total Depth of 1,300 Feet	1	LS	\$ 325,000.00	\$ 325,000.00	\$ 229,000.00	\$ 229,000.00
A2-3	Test Hole Water Quality Sampling 1, Completed in the Test Hole Borehole Location Using the Temporary Test Well Method with a Total Well Screen Length of 20 to 40 Feet Installed Within a Depth Interval Between 350 and 650 Feet	1	EA	\$ 40,000.00	\$ 40,000.00	\$ 176,700.00	\$ 176,700.00
A2-4	Test Hole Water Quality Sampling 2, Completed in the Test Hole Borehole Location Using the Temporary Test Well Method with a Total Well Screen Length of 20 to 40 Feet Installed Within a Depth Interval Between 651 and 950 Feet	1	EA	\$ 50,000.00	\$ 50,000.00	\$ 176,700.00	\$ 176,700.00
A2-5	Test Hole Water Quality Sampling 3, Completed in the Test Hole Borehole Location Using the Temporary Test Well Method with a Total Well Screen Length of 20 to 40 Feet Installed Within a Depth Interval Between 951 and 1,300 Feet	1	EA	\$ 60,000.00	\$ 60,000.00	\$ 176,700.00	\$ 176,700.00
A2-6	Test Hole Plugging and Abandonment as per Rules and Regulations of All Applicable Regulatory Agencies	1	LS	\$ 50,000.00	\$ 50,000.00	\$ 45,500.00	\$ 45,500.00
<b>Base Bid General Items Total</b>				<b>\$</b>	<b>600,000.00</b>	<b>\$</b>	<b>851,200.00</b>

Unit Price Adjustments				Engineer's Estimate		Hydro Resources	
Bid No.	Item Description	Quantity	Unit	Unit Price	Total Price	Unit Price	Total Price
A2-ADJ-1	Test Hole Drilling Depth	1	LF	\$ 250.00	\$ 250.00	\$ 61.00	\$ 61.00
A2-ADJ-2	Spectra Gamma Ray Log of the Test Hole	1	LS	\$ 15,000.00	\$ 15,000.00	\$ 2,850.00	\$ 2,850.00

# Agenda

## Item #10

Discussion regarding sale  
of BCWCID2 property  
R# 62318 to TRWA

ORDER NO. \_\_\_\_ - \_\_\_\_\_ - \_\_\_\_

**ORDER DECLARING REAL PROPERTY TO BE SURPLUS AND AUTHORIZING  
THE SALE AND DISPOSITION THEREOF**

WHEREAS, Bastrop County Water Control and Improvement District No. 2 (the "District") is a conservation and reclamation district, a body corporate and political subdivision of the State of Texas, created under Article XVI, Sec. 59 of the Texas Constitution, and the District operates under Chapters 49 and 51 of the Texas Water Code, as amended;

WHEREAS, Section 49.226 of the Texas Water Code provides that any interest in land owned by a water district that is found by the board of directors of a water district to be surplus and is not needed by the district may be sold under order of the board either by public or private sale; and

WHEREAS, the Board of Directors of the District desires to declare surplus that certain real property more particularly described in Exhibit "A" attached hereto (the "Property"), and further desires to authorize the District's General Manager to negotiate a contract for sale and conveyance of the Property by private sale to the Texas Rural Water Association ("Purchaser").

NOW, THEREFORE, BE IT ORDERED BY THE BOARD OF DIRECTORS OF BASTROP COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT NO. 2 THAT:

Section 1. The facts and recitations in the preamble of this Order are hereby found and declared to be true and correct, and are incorporated by reference herein and expressly made a part hereof, as if copied verbatim.

Section 2. The Board of Directors of the District hereby finds and declares that the Property is surplus and not needed by the District.

Section 3. The Board of Directors hereby authorizes the General Manager to negotiate a contract providing for sale and conveyance of the Property by the District to Purchaser for subsequent consideration and approval by the Board of Directors, which contract shall provide, without limitation, for the following:

- i. That the Property shall be sold and conveyed for fair market value, which value may be monetary or in kind services (or a combination thereof);
- ii. That Purchaser shall be responsible for surveying the Property;
- iii. That Purchaser shall be responsible for platting the Property;
- iv. That Purchaser shall pay all costs and expenses of the transaction, except as otherwise approved by the Board of Directors; and

- v. That the Property shall be sold, transferred and conveyed without representation or warranty of any kind.

Section 4. The General Manager of the District is hereby authorized to take any and all actions necessary to effectuate this Order.

Section 5. An executed copy of this Order shall be filed in the permanent records of the District.

BCWCID #2

PASSED AND APPROVED this \_\_\_\_ day of \_\_\_\_\_, 2025.

\_\_\_\_\_  
President, Board of Directors

ATTEST:

\_\_\_\_\_  
Secretary, Board of Directors

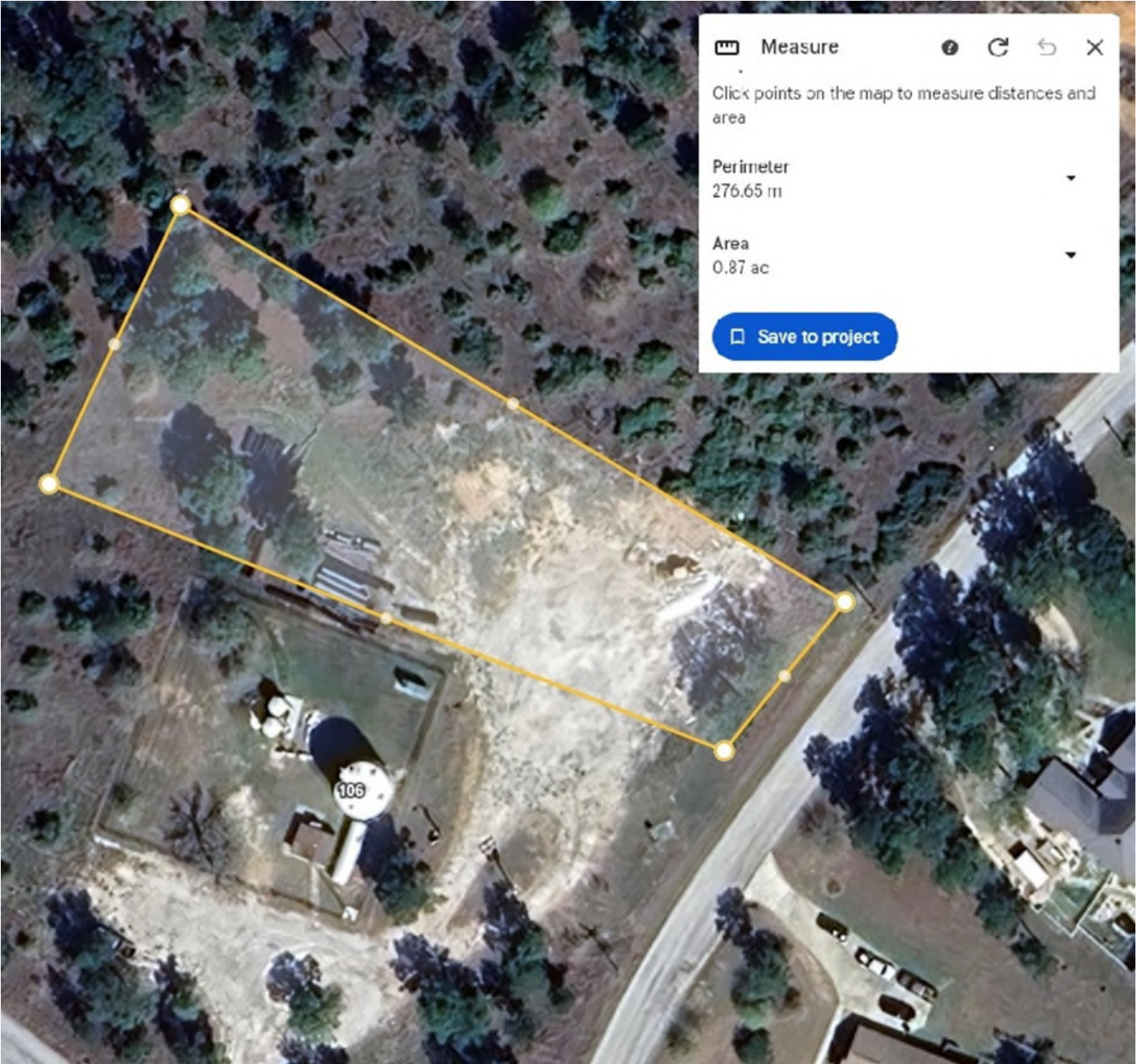
(SEAL)

BCWCID #2

**Exhibit "A"**  
**Description of Surplus Property**

1. **Parcel #62318, Legal Description: PINE FOREST UNIT 13 P III, LOT RESERVE, ACRES 2.8090**

**Approximately 0.87 acres to be re-platted and purchased by Texas Rural Water Association. Final lot size to be determined from survey.**



# Agenda

## Item #12

Discussions regarding  
ASR Project Meetings

April 28, 2025

## **Materials prepared by City of Austin**

### **Table of Contents**

- I. Austin Water ASR Phase 1A Desktop Study
- II. Austin Water ASR Revised Phase 1B  
Exploratory Drilling and Field Testing Plan
- III. Working draft ASR MOU Framework
- IV. Communication and Engagement Framework
- V. Austin Water Finished Water UCMR Testing  
Results



# I. Austin Water ASR Phase 1A Desktop Study

April 28, 2025

## Materials prepared by City of Austin

In accordance with the City of Austin's standard practice for land transactions, redactions are included to protect individual landowner confidentiality and privacy. These redactions are also needed at this time, given this early stage of project planning and development.

### Table of Contents

#### a. Initial Storage Zone Screening Technical Memorandum

This memorandum describes the process to perform a high-level, initial storage zone screening across all of the major and minor aquifer systems within Travis County and the seven adjoining counties surrounding Austin Water's service area. The data-driven initial storage zone screening process described in this memo identified top options in Travis, Bastrop, and Lee Counties for further evaluation through detailed spatial analysis.

#### b. Spatial Analysis Technical Memorandum

This memorandum describes additional evaluation and detailed spatial analysis of preferable storage zones in Travis, Bastrop, and Lee Counties identified in the Initial Storage Zone Screening. Criteria relevant to ASR success were identified and spatially-based scores and weights were developed in ArcMap. The scores were then compiled in a single composite storage zone favorability map. This map identified top options in Bastrop and Lee Counties.



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# INITIAL AQUIFER STORAGE ZONE SCREENING

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City of Austin Aquifer Storage and Recovery Pilot Project CLMP293

Austin, Texas

Prepared by



**DRAFT – Initial Aquifer Storage Zone Screening**



## Contents

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# INTRODUCTION

HDR Engineering, Inc. (HDR) performed a high-level, initial storage zone screening to identify a shortlist of aquifer storage zone options that have the most potential for aquifer storage and recovery (ASR), so that Austin Water can evaluate those promising zones in more detail. The goal of the initial storage zone screening was to cast a wide net by looking at all of the major and minor aquifer systems within Travis County and the seven adjoining counties<sup>1</sup> surrounding Austin Water's service area, as shown in **Figure 1**. The screening identified a shortlist of preferable storage zones capable of achieving Austin Water's Water Forward (Austin Water, 2018) goals for a reliable, compatible, and readily available ASR water supply of 60,000 acre-feet (ac-ft) by 2040. The data-driven initial storage zone screening process described in this memo identified top options for further evaluation through detailed spatial analysis, while also developing data for all nearby aquifers to be considered during subsequent project phases, as needed, including during wellfield siting and project configuration evaluation.

The storage zone options evaluated in the initial screening are generally defined using the Texas Water Development Board (TWDB) aquifer designation for major and minor aquifer systems, classified by county. Exceptions to this are the recognized subunits of the Trinity and Carrizo-Wilcox aquifers, which were evaluated separately due to highly variable properties within these two aquifer systems that would require the subunits to be developed with dedicated ASR wells. The Glen Rose, Pearsall, and Hosston subunits of the Trinity aquifer were distinctly evaluated where present in Bastrop, Burnet, Lee, Travis, and Williamson counties. For the more western counties of Blanco, Hays, and Travis, the upper, middle, and lower Trinity subunits were evaluated. The Carrizo, Calvert Bluff, Simsboro, and Hooper subunits of the Carrizo-Wilcox aquifer were distinctly evaluated where present in Bastrop, Caldwell, Lee, and Williamson counties. After accounting for the major and minor aquifer systems, the Trinity and Carrizo-Wilcox aquifer subunits, and both confined and unconfined aquifers in the eight-county study area, 91 unique county/aquifer combinations (defined by the spatial extent of a particular aquifer storage zone within a county) were identified for evaluation. A list of these aquifer-county combinations is included in the **Appendix**.

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<sup>1</sup> Lee, Williamson, Burnet, Blanco, Hays, Caldwell, and Bastrop Counties.

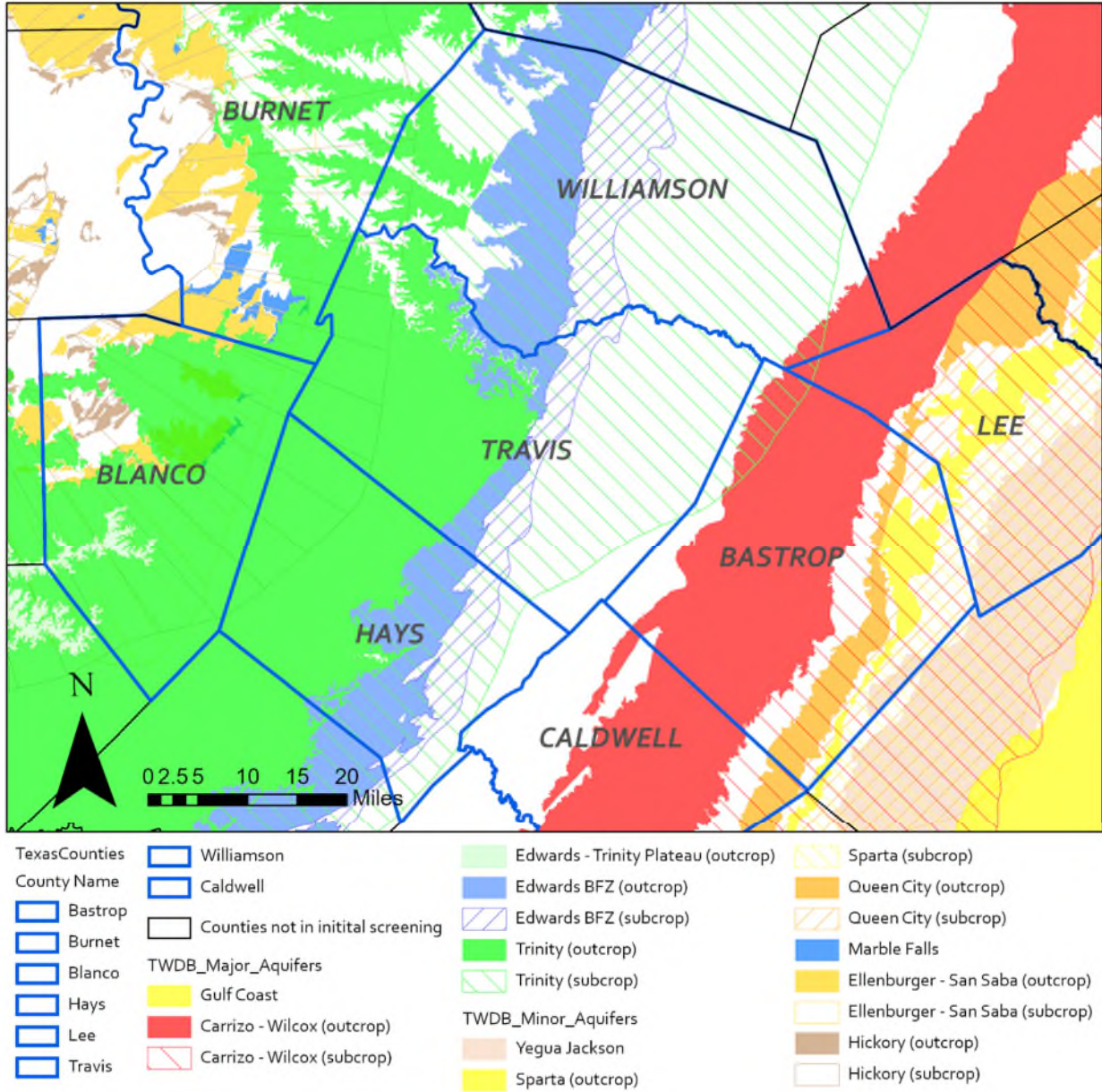


Figure 1. Counties and major/minor aquifers included in initial storage zone screening.

# INITIAL STORAGE SCREENING APPROACH

The initial storage zone screening considers three categories: hydrogeology, proximity to the Austin Water service area, and permitability (ease of permitting). The scores for

each storage zone are included in **Appendix Table 1**. For both hydrogeology and permitability, multiple criteria are considered and factored into each of the category scores (**Appendix Tables 2** and **3**). Details on distance-related parameters relevant to the proximity score are included in **Appendix Table 4**. After developing category data for each county/aquifer storage zone combination, HDR performed a feasibility filtering to determine combinations that are capable of meeting Austin Water’s project goals. The most favorable counties and aquifers were then selected for further evaluation. Data were retained on aquifers with storage potential that were not selected for further evaluation and will be considered, as needed, during subsequent project tasks. An overview of the storage zone screening process is shown in **Figure 2**.

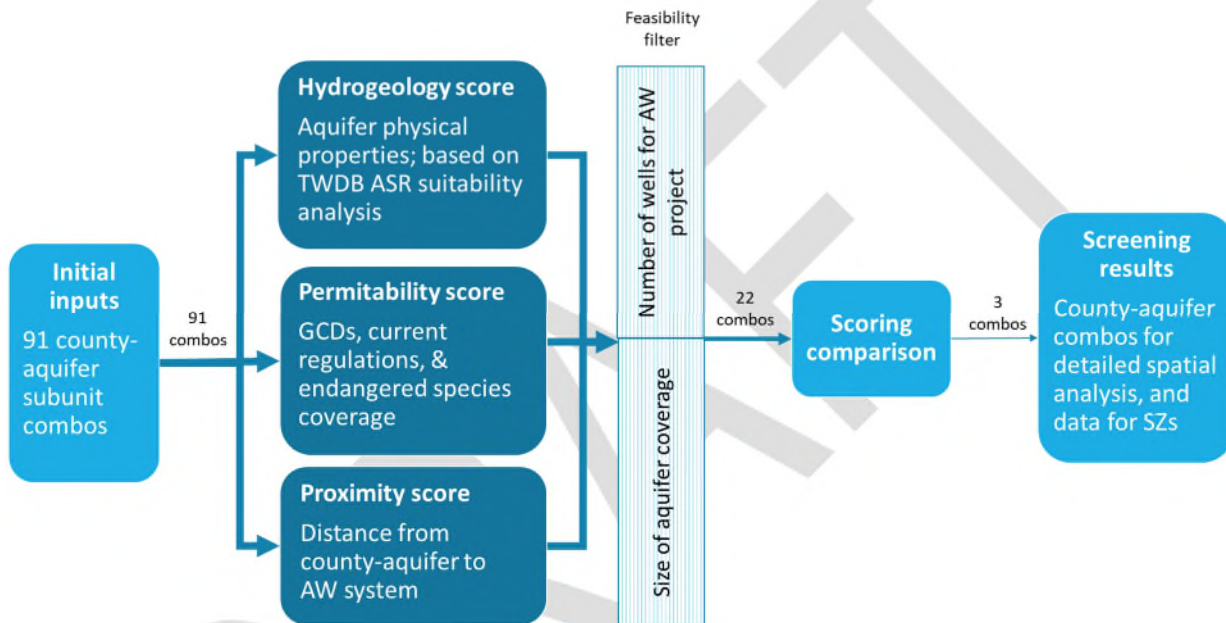


Figure 2. Initial storage zone screening process.

## HYDROGEOLOGY SCREENING CATEGORY

The hydrogeology assessment uses the same criteria, normalized scoring, and relative weights that were used in the TWDB statewide assessment of ASR suitability (HDR, 2020). **Table 1** summarizes the TWDB hydrogeological parameters that contributed to the overall hydrogeology score. **Table 2** describes the scoring ranges and weightings of each parameter contributing to the hydrogeology score. Hydrogeological parameters are associated with recharge, storage, and recoverability categories that were equally weighted in the overall hydrogeology score. For subunits of the Trinity and Carrizo-Wilcox aquifers, some criteria have common scores corresponding to the overall aquifer, while others are determined based on subunit properties contained in the associated groundwater availability model (Jones, 2011; Intera, 2020).

Table 1. TWDB hydrogeological parameter screening for ASR.

Parameter Name	Category <sup>1</sup>	Notes
Storage zone depth	Recharge	Depth to top of aquifer in a confined system; in an unconfined system, storage zone depth is estimated to be 100 feet below the top of the saturated zone
Horizontal hydraulic conductivity	<b>Recharge</b> , Recoverability	Primary factor for rate of recharge or recovery
Drawup available	Recharge	Distance between hydraulic head and ground surface
Dominant lithology	<b>Recharge</b> , Recoverability	Aquifer texture/porosity; parameter scoring also includes secondary porosity features associated with fractured rock and limestone or karst formations.
Aquifer thickness	<b>Storage</b> , Recharge	For unconfined aquifers, this is based on saturated thickness
Aquifer storativity	Storage	Relevant in confined aquifers
Specific yield	Storage	Relevant in unconfined aquifers
Sediment age	Storage	A qualitative indication of aquifer induration
Confinement	Recoverability	Important for control of recharge water
Groundwater quality	Recoverability	Total dissolved solids (TDS)
Drift velocity	Recoverability	Natural drift of recharged water
Drawdown available	Recoverability	Amount of head available above the top of aquifer

Source: HDR and TWDB "Statewide Survey of Aquifer Suitability for Aquifer Storage and Recovery Projects or Aquifer Recharge Projects", September 2020.

Notes:

<sup>1</sup> For parameters related to multiple categories, the parameter was included in calculating scoring for the category that is bolded.

Table 2. TWDB hydrogeological criteria, normalized scores, and weights.

Criteria	Normalized Score Range	Category <sup>1</sup>	Weight	Notes on Weighting
Storage zone depth	< 200 ft bgs or > 2,500 ft bgs 1 between 200 - 1,000 ft bgs	Recharge	0.25	Lower weight because depth generally drives challenges that can be overcome with careful design

Criteria	Normalized Score Range	Category <sup>1</sup>	Weight	Notes on Weighting
Horizontal hydraulic conductivity	0.2 < 1 ft/d to 1 > 30 ft/d	<b>Recharge, Recoverability</b>	1	Key parameter for overall well recharge/recovery rates
Drawup available <sup>2</sup>	0.1 < 50 ft to 1 > 400 ft	Recharge	0.5	Can limit recharge rate, but wellheads can be designed to withstand up to distribution pressure
Dominant lithology	0.1 for silt/clay to 1 for sand/gravel	<b>Recharge, Recoverability</b>	1	Broad factor separating more suitable from less suitable aquifers
Aquifer thickness	0.1 < 100 ft to 1 > 300 ft	<b>Storage, Recharge</b>	0.5	Very site specific
Aquifer storativity	0.2 < 1e-5 to 1 > 1e-2	Storage	0.5	Drives shorter term hydraulic response, but does not typically affect longer-term performance
Specific yield	0.1 < 1e-2 to 1 > 2e-1	Storage	0.5	Similar to storativity, for unconfined aquifers
Sediment age	0.1 > 541 mya to 1 < 56 mya	Storage	1	Broad factor separating more suitable from less suitable aquifers
Confinement	0.1 for unconfined and 1 for confined	Recoverability	1	Broad factor governing hydraulic control challenges
Groundwater quality	0.1 > 3000 mg/L TDS to 1 < 300 mg/L TDS	Recoverability	0.75	Can be a critical factor for recoverability, but also can be overcome by large buffer zones; not much of a discriminator among aquifers
Drift velocity	0.1 > 1,000 ft/y to 1 < 20 ft/y	Recoverability	0.75	Similar to groundwater quality in terms of recoverability
Drawdown available	0.1 < 50 ft to 1 > 400 ft	Recoverability	0.5	Very site specific. Can be overcome by increasing local heads through recharge, but this strategy is not possible at all sites.

Source: HDR and Texas Water Development Board, "Statewide Survey of Aquifer Suitability for Aquifer Storage and Recovery Projects or Aquifer Recharge Projects", September 2020.

Notes:

<sup>1</sup> Bolded category used in scoring.

<sup>2</sup> Score based on overall aquifer for subunits of the Trinity and Carrizo-Wilcox Aquifers.

Abbreviations: f = feet; bgs = below ground surface; d = day; mya = million years ago; y = year; mg/L = milligrams per liter



## PROXIMITY SCREENING CATEGORY

The distance to the Austin Water service area was the second criterion considered for the initial storage zone screening. This criterion considers the distance from the county/aquifer centroid to the nearest major Austin Water distribution system pump station. The distances were normalized on a scale from 0 to 1 as a proximity indicator, with larger values assigned for options closer to Austin Water pump stations.

The distance of the storage zone from the Austin Water service area will have a direct impact on the capital and operating cost of the entire system. Since transmission pipe and transmission pumping represent a major capital and operating cost of the ASR project, and increased transmission distance increases the likelihood of encountering environmentally-sensitive habitat, protected lands, or neighborhood impacts, this criterion is an important part of evaluating high-level storage zone suitability.

## PERMITABILITY SCREENING CATEGORY

The third category included in the initial storage zone screening is related to the ease of permitting. There are three separate qualitative criteria that roll up into the overall permitting score:

1. Ability to receive an authorization to store Austin Water drinking water under Texas Commission on Environmental Quality (TCEQ) current underground injection control (UIC) rules;
2. Portion of the storage zone included within the jurisdiction of an existing groundwater conservation district (GCD) with permitting authority over ASR projects; and
3. Potential for terrestrial threatened or endangered (T&E) species habitat and conserved or protected lands to significantly affect the ability to develop in an area within a county/aquifer storage zone.

In general, in Texas, storage of drinking water in an aquifer is authorized by TCEQ rule and the permit application process is well-defined. However, storage of drinking water into or through the Edwards aquifer within the study area is currently prohibited except for areas within the Barton Springs/Edwards Aquifer Conservation District (BSEACD)<sup>2</sup>. Within the BSEACD, injection of drinking water through or into the Edwards aquifer (where native groundwater exceeds 10,000 milligrams per liter [mg/L] of total dissolved solids [TDS]) is generally permissible; however, there are provisions that may extend the permitting process and require additional monitoring that might affect the operation

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<sup>2</sup> 30TAC§331.19.(c).

of an ASR project. Legislation would be required to enable drinking water injection into or through the Edwards aquifer in Hays, Travis, and Williamson counties outside of the BSEACD, which would add substantial time, effort, and risk to project implementation. Therefore, a lower score was assigned for these county/aquifer options. The TCEQ underground injection control (UIC) criteria related to permissible storage zones comprises 45 percent of the overall permitability score.

The second permitting criteria relates to GCDs with the authority to permit ASR systems. GCDs do not generally have the authority to regulate ASR systems that maintain a positive net storage volume, as determined by their permitted TCEQ authorization. However, within the eight-county study area for this project, there are two groundwater conservation-type districts that have permitting authority of ASR systems. These are the BSEACD, covering portions of Hays, Caldwell, and Travis counties; and the Edwards Aquifer Authority (EAA), covering portions of Hays and Caldwell counties (in the study area). The GCD criteria comprises 30 percent of the overall permitability score, with lower scores for areas within BSEACD and EAA jurisdiction that would require additional time and effort for permitting coordination for ASR systems allowed by TCEQ.

The third permitting criteria develops a relative score based on the density of T&E species habitat. There are numerous areas of documented or suspected habitat related to T&E species within the eight-county study area. The most extensive of these species are the Barton Springs, Austin Blind, and Jollyville Plateau salamanders in Travis County; the Golden-cheeked warbler, Black-capped Vireo, several cave invertebrates in Travis, Burnet, and Williamson counties; and the Houston toad in Bastrop and Lee counties. Wellfield layouts within these habitats would likely be more complicated, increasing capital, operation, and maintenance costs in proportion to the T&E species habitat density. The impact of T&E species habitat is evaluated for each county/aquifer combination based on publicly available information on T&E habitat indicators, extent of coverage, and the distribution of designated habitat conservation areas. The T&E species criteria weighting comprises 25 percent of the overall permitability score. In areas with dense T&E habitat coverage, it is assumed project layout and construction methods would seek to avoid permanent habitat impacts, which would increase environmental permitting and infrastructure costs.

A higher overall permitability score for a county/aquifer combination indicates that an option is more favorable for permitting and ease of project siting. Further notes on the weighting justifications for permitability criteria are included in **Table 3**.

*Table 3. Permitability criteria, scores, and weights related to ASR suitability for initial storage screening.*

Criteria	Score Range	Weight	Notes
TCEQ UIC Authorization	0.1 for SZs currently prohibiting ASR and 1 for SZs allowing ASR	0.45	Would require legislation to enable drinking water ASR development into or through the Edwards Aquifer

Criteria	Score Range	Weight	Notes
BSEACD or EAA coverage	0.1 for inside coverage and 1 for outside coverage	0.30	If permissible, ASR development would require increased time and cost
T&E species habitat occurrence	0-1 based on percent of T&E habitat coverage (0 to 100%)	0.25	Related to increased permitting and infrastructure cost; assumes strict habitat avoidance

Abbreviations: TCEQ = Texas Commission on Environmental Quality; UIC = underground injection control; SZ = storage zone; ASR = aquifer storage recovery; BSEACD = Barton Springs/Edwards Aquifer Conservation District; EAA = Edwards Aquifer Authority; T&E = threatened and endangered

## FEASIBILITY FILTERING

After gathering data for the 91 unique county/aquifer combinations in the eight-county area, based on hydrogeology, permitability, and distance to Austin Water system, HDR performed an analysis to filter county/aquifer combinations based on implementation feasibility. Two thresholds were used to identify feasible units:

1. A maximum estimated number of wells needed to recover a target water supply of 60,000 acre-feet per year (ac-ft/yr) by 2040, as described in the Water Forward Plan (Austin Water, 2018)
2. County/aquifer land area of at least 75 square miles to enable adequate well spacing and flexibility for land agreements<sup>3</sup>

An estimated well yield was calculated for each unique county/aquifer storage zone using the Driscoll (1986) equation based on available drawdown<sup>4</sup>, thickness, and hydraulic conductivity values from the TWDB statewide assessment (TWDB, 2020), as well as hydrogeological parameters included in TWDB groundwater availability models (GAMs) for Trinity and Carrizo-Wilcox subunits. The estimated well yield for each county-aquifer combination is included in **Appendix Table 5**.

To determine an appropriate feasibility filter, HDR examined ASR data from the American Water Works Association (AWWA). The AWWA published a report

<sup>3</sup> Of the 91 county aquifer combinations, 26 county-aquifers were filtered out (removed) with this criteria.

<sup>4</sup> Drawdown was limited to 300 feet.

summarizing 45 ASR programs in the United States<sup>5</sup>. Of these, over 90 percent of the projects had project wellfields that used fewer than 40 wells. Based on this information, a maximum wellfield size of 40 wells would result in a per-well recovery rate of approximately 1.34 million gallons per day (MGD) to recover 60,000 ac-ft/yr (or 54 MGD). This was considered a reasonable upper limit for the number of wells to balance operational complexity and cost, while being conservatively inclusive of various potential county/aquifer opportunities.

For the second feasibility metric, county/aquifer combinations where an aquifer has a land area less than 75 square miles within a county were not considered feasible due to the project's anticipated land needs, landowner agreements, and wellfield and well spacing needs to achieve the ASR project supply goal of 60,000 ac-ft/yr by 2040.

After filtering out the less feasible options based on low well yield and limited space, the 91 county/ aquifer combinations were reduced to 22 more feasible county/aquifer combinations for consideration.

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## RESULTS OF INITIAL STORAGE ZONE SCREENING

The results of the initial storage zone screening are discussed beginning with the broad initial input assessment of the 91 unique county/aquifer combinations, progressing to the 22 most promising options based on feasibility filtering, and finally to the top three counties and aquifers selected for further analysis.

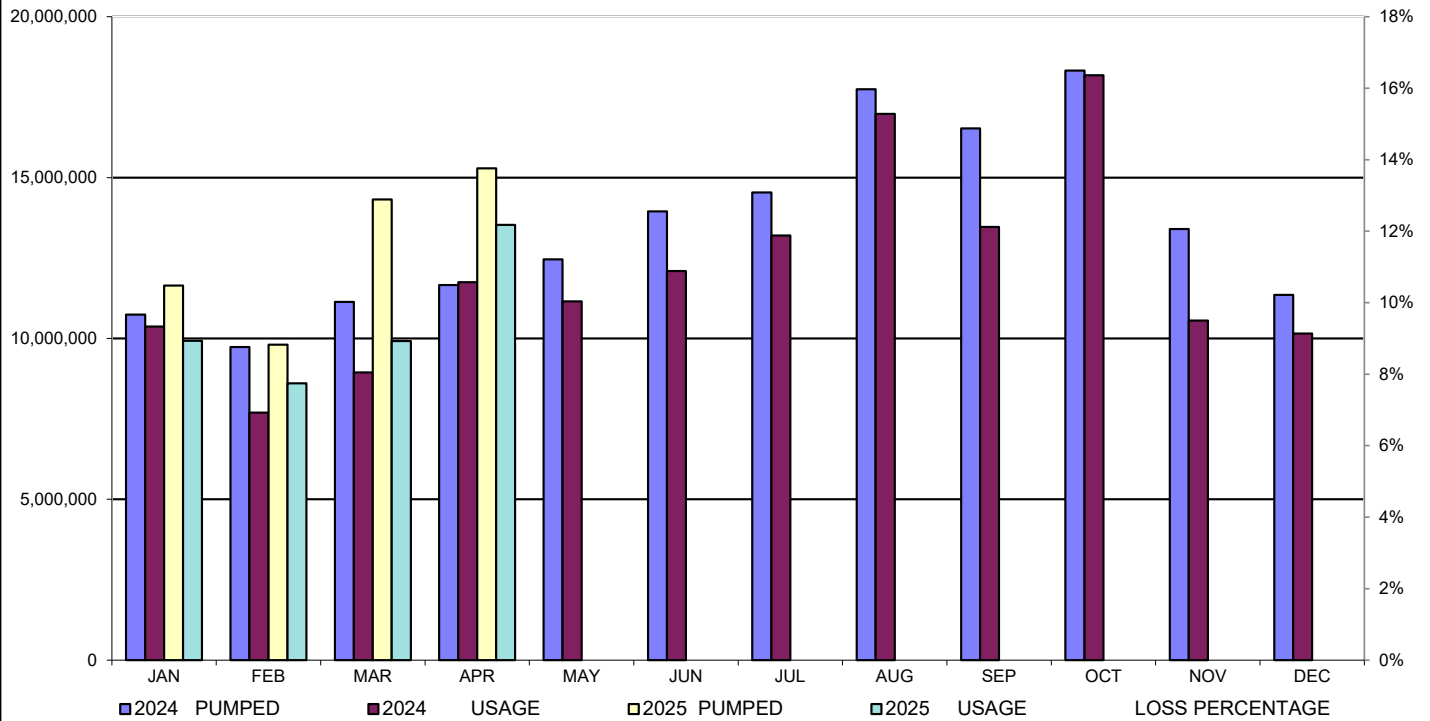
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<sup>5</sup>American Water Works Association, Aquifer Storage and Recovery Manual of Water Supply Practices M63, First Edition, 2015.

# Misc Reports

## Consumption Report

MONTH	2024	2024	2025	2025	2025	ACTIVE	LOSS
	PUMPED	USAGE	PUMPED	USAGE	PUMPED		
	WATER	OF WATER	WATER	OF WATER	UNBILLED	METERS	%
JAN	10,742,789	10,367,301	11,644,829	9,929,979	1,284,425	2,363	4%
FEB	9,733,921	7,695,855	9,804,440	8,605,351	714,200	2,366	5%
MAR	11,134,303	8,939,458	14,316,694	9,915,235	2,143,275	2,363	16%
APR	11,662,091	11,746,378	15,289,055	13,530,994	1,280,125	2,374	3%
MAY	12,460,572	11,151,158					
JUN	13,951,837	12,095,889					
JUL	14,534,984	13,196,265					
AUG	17,748,387	16,980,487					
SEP	16,524,854	13,461,341					
OCT	18,326,500	18,178,879					
NOV	13,401,272	10,553,461					
DEC	11,350,025	10,149,752					
<b>TOTALS</b>	<b>161,571,535</b>	<b>144,516,224</b>	<b>51,055,018</b>	<b>41,981,559</b>	<b>5,422,025</b>		<b>7%</b>



JOB CODE	----- ISSUED THIS PERIOD -----				----- PRIOR ORDERS -----			TOTAL	TOTAL
	ISSUED	COMPLETED	VOIDED	OUTSTANDING	COMPLETED	VOIDED	OUTSTANDING	COMPLETED	OUTSTANDING
ALARM SEWER ALARM	22	17	1	0	2,799	32	1	2,816	1
BROWN BROWN WATER	3	3	0	0	405	3	0	408	0
CHANG CHANGE SIGN	0	0	0	0	37	0	0	37	0
CULVE CULVERT PERMIT	0	0	0	0	523	11	0	523	0
FLUSH FLUSH WATER LINE	1	1	0	0	960	1	0	961	0
HSWAP METER HEAD SWAP	0	0	0	0	154	17	0	154	0
IRRIG IRRIGATION PERMIT	0	0	0	0	65	2	1	65	1
LEAK CHECK FOR LEAK	4	4	0	0	2,080	27	0	2,084	0
LKMTR LOCK MTR	0	0	0	0	242	76	0	242	0
LNLOC LINE LOCATE	0	0	0	0	268	5	0	268	0
METER MOVE METER CHARGE	0	0	0	0	7	8	0	7	0
MI METER INFORMATION	1	1	0	0	193	14	0	194	0
MISCE MISCELLANEOUS	7	7	0	0	3,556	190	10	3,563	10
MOW MOWING GRASS	1	0	0	0	279	1	0	279	0
OCC OCCUPANT CHANGE	11	11	0	0	4,738	73	0	4,749	0
ODOR SMELLY WATER	0	0	0	0	54	0	0	54	0
OFF TURN OFF SERVICE	14	13	1	0	3,184	308	0	3,197	0
OFFEE TRIP CHARGE TURN OFF	0	0	0	0	23	0	0	23	0
ON TURN ON SERVICE	23	23	0	0	4,333	92	0	4,356	0
ONFEE TRIP CHARGE TURN ON	0	0	0	0	25	2	0	25	0
POOLS POOL/SPA PERMIT	1	1	0	0	61	1	0	62	0
RADIO RADIO READ REPORT	0	0	0	0	154	5	0	154	0
RC READ CHECK	1	1	0	0	455	111	0	456	0
ROAD ROAD REPAIR	1	0	0	0	4,007	26	8	4,007	8
RRMON RADIO READ MONITOR (RENT)	0	0	0	0	0	1	0	0	0
SEWER WASTEWATER MISC SERVICE	0	0	0	0	1,511	32	3	1,511	3
SIGN STREET SIGN	0	0	0	0	77	4	1	77	1
SWAP METER SWAP-OUT	0	0	0	0	1,860	118	0	1,860	0
SWTAP W/W TAP	2	1	0	1	579	27	1	580	2
TMPWT TMP WTR	0	0	0	0	9	5	0	9	0
W/W W/W ESTIMATE	8	6	1	1	1,365	56	5	1,371	6
WMEAS MEASURE FOR WATER TAP	14	13	0	1	2,133	57	1	2,146	2
WPRES LOW WATER PRESSURE	1	1	0	0	455	19	0	456	0
WTRTP WATER TAP	6	3	0	3	494	794	0	497	3
WWMOV W/W ESTIMATE FOR RELOCATE	0	0	0	0	11	6	0	11	0
** GRAND TOTALS **	121	106	3	6	37,096	2,124	31	37,202	37

# APRIL 2025

## BCWCID#2

### Re-Cap of Water Tap Applications WATER TAPS:

2025 Pending .....	7	
2025 Complete.....	15	
2024 Complete.....	99	
2023 Complete.....	78	
2022 Complete.....	117	
2021 Complete.....	112	
2020 Complete.....	119	
2019 Complete.....	96	
2018 Complete.....	96	
2017 Complete.....	78	
2016 Complete .....	88	
2015 Complete .....	60	
2014 Complete .....	39	
2013 Complete.....	35	
2012 Complete.....	37	
2011 Complete.....	42	
2010 Complete.....	49	
2009 Complete.....	43	
2008 Complete.....	35	
2007 Complete.....	47	
2006 Pending.....	1	(Sac-N-Pac)
2006 Complete.....	25	
2005 Complete.....	26	
2004 Complete.....	39	
2003 Complete.....	72	
2002 Complete.....	113	

# APRIL 2025

## BCWCID#2

### Re-Cap of Wastewater Tap Applications\

#### WASTEWATER TAPS:

2025 Pending .....	3
2025 Complete.....	14
2024 Pending .....	3
2024 Complete.....	45
2023 Complete.....	32
2022 Complete.....	35
2021 Pending .....	1
2021 Complete.....	33
2020 Complete.....	43
2019 Complete.....	34
2018 Complete.....	52
2017 Complete .....	35
2016 Complete .....	40
2015 Complete .....	32
2014 Complete .....	26

**Active Wastewater Customers: 943**