

Water and Wastewater Master Plan Update

September 2025

CITY OF WEATHERFORD

PREPARED BY:
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Innovative approaches
Practical results
Outstanding service

WATER AND WASTEWATER MASTER PLAN UPDATE

Prepared for:

City of Weatherford

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FREESE AND NICHOLS, INC.
801 Cherry Street, Suite 2800
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TEXAS REGISTERED
ENGINEERING FIRM
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FNI Project #: WEA24052

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EXECUTIVE SUMMARY

INTRODUCTION

The goal of the comprehensive Water and Wastewater Master Plan was to evaluate and analyze the systems to measure existing performance, identify deficiencies, and determine improvements needed to meet projected future conditions. Historical water and wastewater usage were reviewed to establish trends and project demands and flows for the system evaluations. Based on the evaluations, a phased Capital Improvement Plan (CIP) through the twenty-five-year planning period (2049) was developed for each system. The recommended improvements will serve as a basis for the design, construction, and financing of lines and facilities required to meet Weatherford's future system needs. The significant elements of the scope of this project include:

- Data Collection and Review
- Water and Wastewater Projections
- Hydraulic Field Testing
- Hydraulic Model Updates and Calibration
- Existing and Future System Analyses
- Water and Wastewater Renewal Planning
- Water and Wastewater Capital Improvement Plans

LAND USE ASSUMPTIONS

Population and land use are important elements of analyzing water and wastewater systems. Water demand and wastewater flows depend on the residential population and commercial development served by the system. An analysis of historical and projected populations, along with land use, provides the basis for projecting future demands and flows. The projected city-wide population and non-residential acreage for each planning year for the City are shown in **Table ES-1**.

Table ES-1: City-wide Population and Non-Residential Acreage Projections

Year	Population	Non-Residential Acreage
2024	35,751	2,295
2029	39,309	2,828
2034	44,552	3,292
2049	60,462	3,580

EXISTING WATER DISTRIBUTION SYSTEM

The City of Weatherford (City) treats water from Lake Weatherford at the Dr. Paul Philips Water Purification Plant (WPP) with an associated high service pump station (HSPS) and clearwell. The existing water distribution system also includes six elevated storage tanks (ESTs), two standpipes, three ground storage tanks (GSTs), and four pump stations (PSs). The City is divided into six pressure planes with a total of 287 miles of water distribution lines ranging in diameter from 0.75 to 36 inches.

WATER DEMANDS

Water demands were projected for existing (2024), five-year (2029), ten-year (2034), and twenty-five-year conditions. The evaluation of historical average day consumption data provided a basis for determining the design criteria used to project water demands. A residential consumption of 105 gallons per capita per day (gpcd) and a non-residential consumption of 800 gallons per acre per day (gpad) were recommended for determining water demand projections for 2024 and future planning years. These estimates for consumption values account for dry weather conditions. **Table ES-2** summarizes the projected water demands for each planning year.

Table ES-2: Water Demand Projections

Year	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
2024	5.59	11.18	16.77
2029	6.39	12.78	19.17
2034	7.31	14.62	21.93
2049	9.22	18.44	27.66

HYDRAULIC FIELD TESTING AND WATER MODEL CALIBRATION

A hydraulic model of the City's water distribution system was developed using the Bentley WaterGEMS software to simulate the operation of the piping system, storage, and pumping facilities in a water distribution system. The hydraulic model is one of the most critical elements in the analysis of water distribution systems. Field pressure testing was performed to assist with the calibration of the water system model. The calibrated water system model was then used to conduct hydraulic analyses to identify deficiencies in the City of Weatherford's existing water distribution system before developing a CIP to improve the existing system and meet projected water demands through the twenty-five-year planning period. Field pressure monitoring was conducted from July 17 to August 1, 2024, to gather data about the

performance of the distribution system. System pressure was monitored simultaneously at 16 locations across the city at five-minute intervals. Modeled pressures were calibrated to observed pressures, providing a strong correlation between observed data and modeled predicted results.

WATER DISTRIBUTION SYSTEM ANALYSIS

As a public water utility, the City is required to meet the rules and regulations for public water systems established by the Texas Commission on Environmental Quality (TCEQ) in Chapter 290 of the Texas Administrative Code. Desktop and hydraulic modeling analyses were conducted to identify deficiencies in the City's existing water distribution system. To evaluate the performance of the existing system, FNI and the City worked to establish a set of criteria to determine triggers for CIP projects. A 24-hour extended period simulation (EPS) was performed for the maximum day scenario, which includes the peak hour demand condition. By examining the water system under maximum day and peak hour demands, it is possible to determine where pressure issues occur, if pipeline velocities exceed the recommended criteria, if tanks are filling or draining properly, and if the pumping facilities are adequate to meet the required demand at acceptable pressures.

WATER DISTRIBUTION SYSTEM RISK-BASED ASSESSMENT

FNI developed a risk-based assessment (RBA) for the City's water distribution system. The goal of the RBA program is to develop a more proactive approach to maintaining the City's pressurized water mains through effective rehabilitation and renewal. FNI conducted an RBA analysis to assign condition and criticality scores to water lines owned by the City. The condition and criticality scores were then used to calculate total risk scores for each water main. These scores are intended to help the City prioritize renewal projects.

PUMP STATION RISK-BASED ASSESSMENT

In addition to water mains, FNI developed an RBA for the City's PSs. The condition of each PS was assessed during site visits conducted by the City and FNI, and criticality was scored based on several parameters. The condition and criticality scores were then used to assign each PS to a risk scoring matrix. These scores are intended to help the City prioritize renewal projects.

WATER DISTRIBUTION SYSTEM CAPITAL IMPROVEMENT PLAN

A water CIP was developed to deliver a high level of service that promotes residential and commercial development. The recommended improvements will provide the required capacity and reliability to meet

projected water demands through 2049. FNI developed planning-level cost estimates for each project identified in the proposed CIP. Cost estimates are in Year 2025 dollars and consist of material costs, engineering design, contractor markup, and general contingency. Additional fees related to environmental, traffic control, geotechnical, land acquisition, change order contingency, and legal fees are not included. **Table ES-3** summarizes the cost of the water system CIP by planning period.

Table ES-3: Water Distribution System Capital Improvement Costs

Planning Period	Total Project Cost
5-Year	$49,062,600
10-Year	$43,933,900
25-Year	$61,691,600
Total	**$154,688,100**

EXISTING WASTEWATER COLLECTION SYSTEM

The City's wastewater collection system covers approximately 30 square miles and contains approximately 200 miles of gravity mains and 25 miles of force mains owned and operated by the City. The wastewater collection system is primarily a gravity flow system that follows the major drainage features of the service area, and it consists of four sewer basins: the Sanchez Creek, Town Creek, Willow Creek and Lake Basins. The wastewater lines range from 6 to 24 inches in diameter and convey wastewater flow to a wastewater treatment plant (WWTP) in the center of the City with an average day permitted capacity of 4.5 MGD. The existing WWTP is operated by the City. Additionally, there are 23 lift stations (LSs) in the City's wastewater system that pump wastewater flows into gravity mains.

WASTEWATER FLOW MONITORING

Dry weather and wet weather system responses within the collection system service area were evaluated by installing temporary flow meters in strategic locations to observe and document existing flow conditions. Rainfall data was simultaneously collected with rain gauges. A total of 12 flow meters and two rain gauges were used for this study. The temporary flow monitors and temporary rain gauges collected data in the City's collection system between 4/1/2024 and 7/8/2024 for a total monitoring period of 99 days. Flow meter and rain gauge data were collected in five-minute time step intervals. Hydrographs (flow vs. time) and flow depth (depth in pipe vs. time) plots for each flow monitor site are provided in **Appendix H**.

WASTEWATER FLOWS

Average day wastewater flows for the existing, five-year, ten-year and twenty-five-year planning periods were developed using historical average daily flow rates as the base flow. A residential production of 65 gallons per capita per day (gpcd) and a non-residential production of 550 gallons per acre per day (gpad) were recommended for determining flow projections for 2024 and future planning years. The peak wet weather peaking factor was assumed to be 4.0 and was then used to determine the peak wet weather flow projections. **Table ES-5** summarizes the projected wastewater flows for each planning year.

Table ES-4: Wastewater Flow Projections

Year	Average Day Flow (MGD)	Peak Wet Weather Flow (MGD)
2024	3.37	12.66
2029	3.78	14.28
2034	4.32	16.46
2049	5.35	20.57

WASTEWATER MODEL DEVELOPMENT AND CALIBRATION

The City's GIS data was imported into InfoWorks Integrated Catchment Modeling (ICM) hydraulic modeling software by Autodesk. InfoWorks ICM combines a relational database with geographic analysis to provide a single environment that integrates asset planning with hydraulic modeling. The City's GIS provided the basis for constructing the hydraulic model of the wastewater collection system. The model consists of approximately 4,363 links and 4,348 nodes, including 23 lift stations (LSs), and is an all-pipes model. The pipes range in size from 6 to 24 inches. The hydraulic model was used to evaluate the adequacy of the existing system and to develop system improvements required to meet future growth conditions in the City.

Model calibration is the process of rectifying parameters within the InfoWorks ICM sewer model until the model generates and conveys flow in the same manner as was observed during the flow monitoring period. A properly calibrated model produces results reflective of the flow, depth and velocity data obtained during flow monitoring. The flow monitoring data, along with the rainfall data, were the key components utilized to establish per capita flow rates and RDII parameters.

WASTEWATER COLLECTION SYSTEM ANALYSIS AND HYDRAULIC MODELING

In evaluating the existing system, FNI analyzed the collection system by applying a design storm to identify system deficiencies and determine where the HGL is within three feet below the top of the manhole rim. Ultimately, the Five-Year Six-Hour ATLAS 14 design storm was selected to be utilized for existing system analysis. This design storm was chosen to be representative of peak wet weather condition analysis and is consistent with what other large utilities in Texas are using for wastewater system capacity planning. Hydraulic analyses were conducted to identify deficiencies in the City's wastewater collection system and to establish a CIP to reinforce the existing system and convey projected wastewater flows through the twenty-five-year planning period. Various combinations of improvements and modifications were investigated to determine the most appropriate approach for conveying projected flows. Wastewater treatment capacity was also evaluated at the WWTP to determine future timing for capacity improvements.

WASTEWATER COLLECTION SYSTEM RISK-BASED ASSESSMENT

FNI developed an RBA for the City's wastewater collection system. The goal of the RBA program is to develop a more proactive approach to maintaining the City's wastewater gravity lines through effective rehabilitation and renewal. FNI conducted an RBA analysis to assign condition and criticality scores to wastewater gravity lines owned by the City. The condition and criticality scores were then used to calculate total risk scores for each gravity main. These scores are intended to help the City prioritize renewal projects.

LIFT STATION RISK-BASED ASSESSMENT

In addition to gravity mains, FNI developed an RBA for the City's LSs. The condition of each LS was visually assessed by the City, and criticality was scored based on several parameters. The condition and criticality scores were then used to assign each LS to a risk scoring matrix. These scores are intended to help the City prioritize renewal projects.

WASTEWATER COLLECTION SYSTEM CAPITAL IMPROVEMENT PLAN

A wastewater CIP was developed for the City to address existing deficiencies in the system, as well as provide capacity for future loading in the wastewater collection system. Upon completion of the wastewater model that represents existing and future loading conditions, the CIP projects were analyzed and phased into the planning period in which they become hydraulically necessary. FNI developed

planning-level cost estimates for each project identified in the proposed CIP. Cost estimates are in Year 2025 dollars and consist of material costs, engineering design, contractor markup, and general contingency. Additional fees related to environmental, traffic control, geotechnical, land acquisition, change order contingency, and legal fees are not included. **Table ES-5** summarizes the cost of the wastewater system CIP by planning period.

Table ES-5: Wastewater Collection System Capital Improvement Costs

Planning Period	Total Project Cost
5-Year	$56,717,600
10-Year	$37,720,000
25-Year	$118,016,600
Total	**$212,454,200**

1.0 INTRODUCTION

The City of Weatherford (City) contracted with Freese and Nichols, Inc. (FNI) to perform an update to the Water and Wastewater Master Plan. The goal of the comprehensive Water and Wastewater Master Plan Update was to evaluate and analyze the City's water and wastewater systems to measure existing (2024) performance, identify deficiencies, and determine improvements needed to meet projected future conditions. Historical water and wastewater usage were reviewed to establish trends, and project demands and flows for the system evaluations. Based on the evaluations, a five-, ten- and twenty-five-year Capital Improvement Plan (CIP) was developed for each system. The recommended improvements will serve as a basis for the design, construction, and financing of lines and facilities required to meet Weatherford's future system needs.

1.1 SCOPE OF WORK

The scope of work consisted of the following tasks:

Data Collection and Review:

FNI requested and obtained the most current data on the existing water and wastewater systems including:

- Latest GIS data
- Water/wastewater SCADA data
- Water production data
- Work order history
- Water/wastewater as-built drawings
- Utility billing information
- Development/redevelopment information
- Wastewater treatment operational data

Additionally, the City's existing water and wastewater Geographic Information System (GIS) geodatabase was evaluated for assets necessary for hydraulic modeling. A topology review was conducted in ArcGIS Pro to identify missing nodes, floating nodes, connectivity issues, overlapping nodes, and additional geometric deficiencies that would require manual correction in the water/wastewater hydraulic models.

Water and Wastewater Projections: Water demands and wastewater flow projections for 2029, 2034, and 2049 conditions were developed using future land use assumptions and design criteria. These projections were distributed throughout the water and wastewater service areas based on the existing and future population distribution. This task included geocoding water billing meter data.

Hydraulic Field Testing: Sixteen pressure recorders were installed at fire hydrants throughout the City from July 17 to August 1, 2024, to capture data for the water model calibration.

Twelve temporary flow meters and two rain gauges were furnished, installed, and maintained for 99 days in Weatherford's wastewater collection system. Sites were determined strategically with input from City staff, to evaluate and calibrate the wastewater model.

Water Model Update and Calibration: The existing water model was updated in the Bentley WaterGEMS software and then calibrated to match observed pressure, flow, and level data using the following:

- Summer 2024 pressure recorder data.
- Supervisory control and data acquisition (SCADA) recorded elevated storage tank (EST) levels and pump discharge flows.
- Adjusted c-factors, diurnal curves, and demand distribution.

Wastewater Hydraulic Model Update and Calibration: The updated GIS database, as-built drawings, and operational data were utilized to update the City's hydraulic model in Autodesk InfoWorks ICM. Data flagging was reviewed and updated to reflect each source of information. The updated wastewater model and ground contours were used to update the City's sewer basin delineation. The existing wastewater model was calibrated to both dry and wet weather conditions. The flow volume over a four-day period was calibrated to match the field recorded data during dry weather by adjusting per capita flows, diurnal curves, and dry weather infiltration. Lift station (LS) levels were also adjusted during calibration using SCADA records and meter responses. The wet weather model calibration was scoped for two wet weather storm events; however, insufficient rainfall during the monitoring period did not provide enough data for a system-wide wet weather calibration. RTK values from the previous master plan's calibrated model were utilized for flow meter basins that did not see a wet weather response during monitoring.

Water and Wastewater Existing System Analysis: The existing water distribution system was evaluated under maximum day demand conditions to determine deficiencies within the distribution system. A fire flow analysis under maximum day demand conditions was also performed.

The existing wastewater collection system was evaluated utilizing the National Oceanic and Atmospheric Administration (NOAA) Five-Year, Six-Hour Atlas 14 design storm to identify existing surcharging and overflow locations and other capacity/restriction issues. These problem areas determined critical projects to be included in the CIP planning process.

Water and Wastewater Renewal Planning: Condition and criticality scoring parameters were developed for pipes in both the water and wastewater systems. These scoring parameters were then applied to all pipes. Condition and criticality scoring parameters were also applied to the City's pump stations (PSs) and LSs to prioritize rehabilitation efforts.

Water and Wastewater Future System Analysis and Capital Improvement Plan: Design criteria for future water and wastewater system evaluations were developed and used to develop recommendations for future pumping, elevated storage, ground storage, water purification plant (WPP), and wastewater treatment plant (WWTP) capacity requirements. The 2049 hydraulic models were utilized to prepare capital improvement plans to serve the projected twenty-five-year demands and flows. The 2029 and 2034 hydraulic models were used to phase and prioritize the recommended improvements. Estimated cost, in 2025 dollars, including engineering and contingencies, was developed for each recommended project. A prioritized list of projects was prepared to address existing and projected future deficiencies in the water and wastewater systems.

1.2 LIST OF ABBREVIATIONS

The frequently used abbreviations in this report are presented in **Table 1-1**.

Table 1-1: List of Abbreviations

Abbreviation	Actual
AC	Asbestos Cement
ACR	Alternative Capacity Requirement
ADS	Advanced Drainage Systems
CIP	Capital Improvement Plan
City	City of Weatherford, Texas
COF	Consequence of Failure
CPP	Concret Pressure Pipe
CU	Copper
DI	Ductile Iron
EPS	Extended Period Simulation
EST	Elevated Storage Tank
FNI	Freese and Nichols, Inc.
fps	Feet per Second
ft	Feet
gal	Gallon
GALV	Galvanized
GEMS	Geospatial Engineering Modeling System (software)
GIS	Geographic Information System
gpad	Gallons per Acre per Day
gpcd	Gallons per Capita per Day
gpm	Gallons per Minute
GST	Ground Storage Tank
HDPE	High-Density Polyurethane
HGL	Hydraulic Grade Line
hr	Hour
HSPS	High Service Pump Station
I/I	Inflow and Infiltration
ICM	Integrated Catchment Modeling (software)
in	Inch
LOF	Likelihood of Failure
LS	Lift Station
MG	Million Gallons
MGD	Million Gallons per Day
mi	Mile
NCTCOG	North Central Texas Council of Governments
NOAA	National Oceanic and Atmospheric Administration
POLY	Polyurethane
PRV	Pressure Reducing Valve
PS	Pump Station

Table 1-1: List of Abbreviations - Continued

Abbreviation	Actual
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
RBA	Risk-Based Assessment
RDII	Rainfall-Derived Inflow and Infiltration
SCADA	Supervisory Control and Data Acquisition
SSO	Sanitary Sewer Overflow
TCEQ	Texas Commission on Environmental Quality
VFD	Variable Frequency Drive
WPP	Water Purification Plant
WWTP	Wastewater Treatment Plant
yr	Year

2.0 LAND USE ASSUMPTIONS

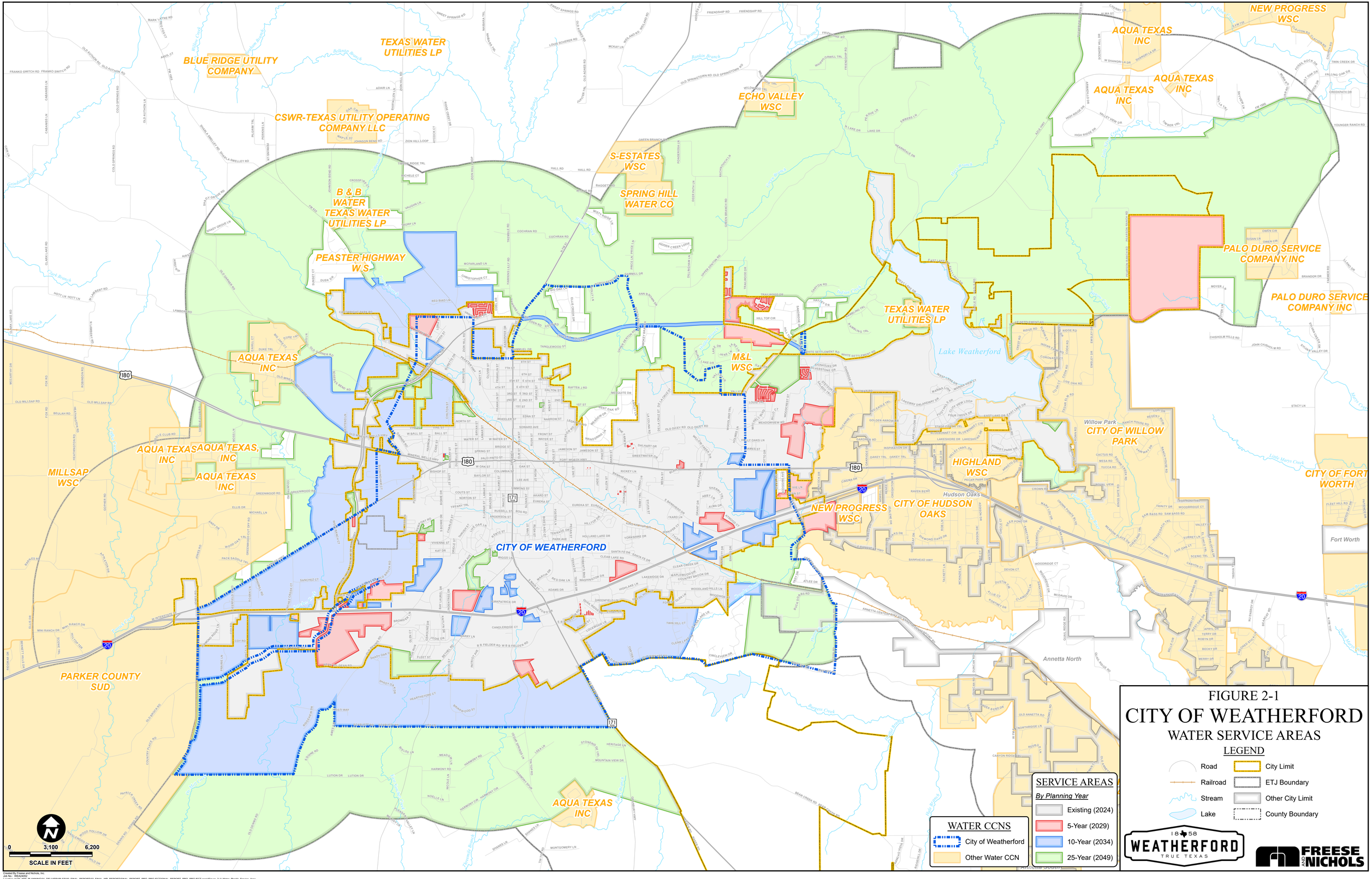
Population and land use are important elements in the analysis of water and wastewater systems. Water demands and wastewater flows are dependent on the residential population and commercial development served by the systems and determine the sizing and location of the respective system infrastructure. A thorough analysis of historical and projected populations and non-residential acreage provides the basis for accurately predicting future water demands and wastewater flows. For this study, FNI completed a Land Use Assumptions Tech Memo which can be found in **Appendix A**. The tech memo includes the City's water and wastewater service areas, historical population, and population and land use projections through 2049.

2.1 SERVICE AREAS

Delineating the water and wastewater service areas is an important aspect for any master plan. The service area determines where and the extent to which the water or wastewater system will expand. The City's water and wastewater service areas can be found in **Figures 2-1** and **2-2**, respectively.

2.1.1. LaSalle Ranch Development

The LaSalle Ranch is a proposed development that is generally located northeast of Lake Weatherford. The City is planning to extend water service to the LaSalle Ranch development, but not wastewater service. The LaSalle Ranch Development will convey wastewater flows to a package WWTP. The wastewater service area and land use assumptions included in this report do not include the LaSalle Ranch Development.



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SPRING VALLEY UTILITY COMPANY

LaSalle Ranch

CITY OF WEATHERFORD

CITY OF HUDSON OAKS

CITY OF WILLOW PARK

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

Fort Worth

FIGURE 2-2
CITY OF WEATHERFORD
WASTEWATER SERVICE AREAS

LEGEND

- Road
- Railroad
- Stream
- Lake
- City Limit
- ETJ Boundary
- Other City Limit
- County Boundary

SERVICE AREAS
By Planning Year

- Existing (2024)
- 5-Year (2029)
- 10-Year (2034)
- 25-Year (2049)

WASTEWATER CCNS

- City of Weatherford
- Other Wastewater CCN

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SCALE IN FEET

1858 WEATHERFORD TRUE TEXAS

FREESE AND NICHOLS

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2.2 HISTORICAL POPULATION

Total population data for 2009-2023 was obtained from the North Central Texas Council of Governments (NCTCOG), the U.S. Census Bureau, and the City. Based on this data, the three-year, five-year, and overall average annual growth rates were determined to be between 1.4% and 7.0% for 2009-2023. **Table 2-1** summarizes the historical population data and corresponding annual growth rates from all sources.

Table 2-1: Historical Population

Year	NCTCOG Estimates		Census Estimates		City Estimates	
	Total Population	Growth Rate	Total Population	Growth Rate	Total Population	Growth Rate
2009	24,939	-	27,440	-	-	-
2010	25,250	1.2%	25,250	-8.0%	-	-
2011	25,300	0.2%	26,217	3.8%	-	-
2012	25,440	0.6%	26,763	2.1%	-	-
2013	25,940	2.0%	27,242	1.8%	-	-
2014	26,200	1.0%	27,918	2.5%	-	-
2015	26,600	1.5%	28,775	3.1%	-	-
2016	27,080	1.8%	29,618	2.9%	-	-
2017	27,660	2.1%	30,744	3.8%	-	-
2018	27,900	0.9%	31,882	3.7%	-	-
2019	28,090	0.7%	33,582	5.3%	28,175	-
2020	30,854	9.8%	31,144[1]	-7.3%	28,539	1.3%
2021	31,180	1.1%	33,954[1]	9.0%	30,933	8.4%
2022	31,690	1.6%	36,231[1]	6.7%	32,208	4.1%
2023	32,209	1.6%	38,109[1]	5.2%	34,586	7.4%
Overall Average Growth Rate		**1.9%**	--	**2.5%**	--	**5.3%**
5-Year Average Growth Rate		**3.0%**	--	**3.8%**	--	**5.3%**
3-Year Average Growth Rate		**1.4%**	--	**7.0%**	--	**6.6%**

[1]Census estimate values provided for 2020-2023 are based on the U.S. Census Bureau's estimates updated as of July 1, 2023.

2.3 POPULATION AND NON-RESIDENTIAL ACREAGE PROJECTIONS

As part of the Land Use Assumptions Tech Memo in **Appendix A** FNI developed a projections database based on data provided by the City. All parcels within the twenty-five-year service area are included, and the database criteria were utilized to estimate population and non-residential demographics. The projections serve as the basis for determining future water demands and wastewater flows that will be utilized to hydraulically assess the systems. The magnitude and distribution of the growth in population and non-residential development dictate where future infrastructure may be required. The methodology utilized to determine the existing and future land use assumptions is summarized in **Appendix A,** along

with maps showing the City's existing and future land use assumptions per parcel. **Tables 2-2** and **2-3** summarize the water service area and wastewater service area population and non-residential acreage projections, respectively. **Figure 2-3** shows a map of individual parcels identified for development in the five-year, ten-year and twenty-five-year planning periods.

Table 2-2: Water Service Area Projections

Planning Year	Population	Annual Growth Rate	Non-Residential Acreage	Acreage Difference
Existing (2024)	35,751	--	2,295	--
5-Year (2029)	39,309	1.9%	2,828	533
10-Year (2034)	44,552	2.5%	3,292	464
25-Year (2049)	60,462	2.1%	3,580	288

Table 2-3: Wastewater Service Area Projections

Planning Year	Population	Annual Growth Rate	Non-Residential Acreage	Acreage Difference
Existing (2024)	33,693	--	2,146	--
5-Year (2029)	36,616	1.7%	2,539	393
10-Year (2034)	41,063	2.3%	3,002	463
25-Year (2049)	54,608	1.9%	3,271	269

FIGURE 2-3

CITY OF WEATHERFORD

PARCELS BY PLANNING YEAR

LEGEND

Road	Parcel
Railroad	City Limit
Stream	ETJ Boundary
Lake	Other City Limit
	County Boundary

PARCELS BY PLANNING YEAR

- Existing
- 5-Year
- 10-Year
- 25-Year
- No Current Plan for Service

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1858 WEATHERFORD TRUE TEXAS

FREESE AND NICHOLS

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3.0 EXISTING WATER DISTRIBUTION SYSTEM

The City's water distribution system consists of a network of water lines, a water treatment plant with an associated high service pump station and clearwell, six elevated storage tanks, two standpipes, three ground storage tanks, and four pump stations. **Figure 3-1** shows the existing water distribution system for the City.

3.1 PRESSURE PLANES

The City's distribution system is separated into six major pressure planes: Central, Dubellette, Franklin, Miller, Oakridge, and West Lake.

Central Pressure Plane

The Central Pressure Plane is the largest plane spanning from Lake Weatherford on the eastern portion of the city limits to Main Street in the middle of the City. The Central Pressure Plane is supplied directly from the WPP through the 16.1 MGD high service pump station. The Central Pressure Plane operates at a static hydraulic grade of 1,185 feet. The hydraulic grade is established by the overflow elevation of the Harberger Hill, Dubellette, and College Hill ground storage tanks (GSTs) that act as elevated storage for the Central Pressure Plane. Ground elevations throughout the pressure plane range from 920 feet to 1,000 feet. A small area in the eastern portion of the Central Pressure Plane, north of Hudson Oaks is regulated by pressure reducing valves (PRVs).

Dubellette Pressure Plane

The Dubellette Pressure Plane is the second largest pressure plane in the City. It encompasses the downtown portion of Weatherford and extends south of I-20. The ground elevations range from 880 feet to 1,160 feet, and the hydraulic gradient of 1,257 feet is established by the West Park and Dubellette ESTs. Water is supplied by the 11.3 MGD College Hill PS and GST located on the campus of Weatherford College. The Dubellette Pressure Plane may also receive water from the Miller Pressure Plane via transfer valves along its western boundary.

Franklin Pressure Plane

The Franklin Pressure Plane includes areas in the northern portion of the City with ground elevations ranging from 1,020 feet to 1,160 feet. The Franklin Pressure Plane is supplied by the 2.1 MGD Harberger

Hill PS and GST located at the intersection of King Street and Common Street. The hydraulic gradient of 1,257 feet is established by the Franklin EST along Franklin Street in the northern portion of the pressure plane. The Franklin Pressure Plane may also receive water from the Miller Pressure Plane from transfer valves along its western boundary.

Miller Pressure Plane

The Miller Pressure Plane is on the west side of the City. The Miller Pressure Plane encompasses the highest ground elevations throughout the City with elevations ranging from 1,030 feet to 1,200 feet. The hydraulic gradient of 1,320 feet is established by the Miller and Newport ESTs. The pressure plane is supplied by the 4.0 MGD Dubellette PS and GST located near the intersection of Love Street and Oak Street.

Oakridge Pressure Plane

The Oakridge Pressure Plane is located west of Lake Weatherford. The Oakridge Pressure Plane is supplied by the 2.7 MGD West Lake PS. The hydraulic grade of 1,235 feet is established by the 0.25 MG Oakridge EST located along Saddle Ridge Trail.

West Lake Pressure Plane

The West Lake Pressure Plane is a small pressure plane around Lake Weatherford. The hydraulic grade is established at 1,050 feet by both West Lake standpipes. Water is supplied to the West Lake Pressure Plane by the WPP through a PRV along West Lake Drive.

Future Pressure Plane

The LaSalle Ranch Development is located northeast of Lake Weatherford and will require a separate pressure plane to provide water service. The LaSalle Development future pressure plane will be served by the LaSalle PS, GST, and hydropneumatic tank. The LaSalle PS will be supplied water from an under design/under construction water line extending from the Central Pressure Plane. The LaSalle Ranch development is expected to develop within the five-year planning period.

0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

Harberger PS
(2) - 730 gpm Pumps

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(3) - 1,400 gpm Pumps

0.25 MG Dubellette EST
Ground Elev. = 1,165.83'
Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

0.5 MG Newport EST
Ground Elev. = 1,172'
Overflow Elev. = 1,320'

College Hill PS
(3) - 2,610 gpm Pumps

2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

0.2 MG West Park EST
Ground Elev. = 1,166'
Overflow Elev. = 1,257'

West Lake PS
(1) - 710 gpm Pump
(1) - 740 gpm Pump
(1) - 400 gpm Pump

0.2 MG "New" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.25 MG Oakridge EST
Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD Dr. Paul Philips
Water Purification Plant

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

WATER LINES BY
PRESSURE PLANES

- Central Pressure Plane
- Dubellete Pressure Plane
- Franklin Pressure Plane
- Miller Pressure Plane
- Oakridge Pressure Plane
- West Lake Pressure Plane

PRESSURE PLANES

- Central
- Dubellette
- Franklin
- Miller
- Oakridge
- West Lake

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SCALE IN FEET

FIGURE 3-1
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
LEGEND

- Divider Valve
- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

1858 WEATHERFORD TRUE TEXAS

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3.2 WATER PURIFICATION PLANT

The City currently operates the Dr. Paul Philips Water Purification Plant near Lake Weatherford. The current treatment capacity is 14 MGD. The purification plant has one clearwell with a total storage capacity of 1.0 MG. The high service pump station (HSPS), which has a firm capacity of 12.1 MGD, supplies water directly to the Central Pressure Plane through 30-inch and 36-inch water lines. There are four 2,800 gpm pumps at the HSPS. Two of the pumps have variable frequency drives (VFD) that allow the operator to choke down the flow rate into the system. An expansion to construct a second HSPS is currently under design and will include the addition of two 2,800 gpm pumps bringing the firm capacity up to 20.1 MGD within the next five years.

3.3 PUMP STATIONS

In addition to the HSPS at the WPP, the City operates four booster pump stations that supply water to the Franklin, Dubellette, Miller, and Oakridge Pressure Planes. The West Lake PS takes suction from the West Lake standpipe and discharges it into the Oakridge Pressure Plane. The College Hill PS supplies water to the Dubellette Pressure Plane; the Harberger Hill PS supplies water to the Franklin Pressure Plane; and Dubellette PS supplies water to the Miller Pressure Plane. **Table 3-1** presents a summary of the pumping facilities in the City's distribution system.

Table 3-1: Existing Pumping Facilities

Facility	Pump	Capacity (gpm)	Firm Capacity (gpm)	Firm Capacity (MGD)	Total Capacity (gpm)	Total Capacity (MGD)	Pressure Plane
WPP HSPS	#1	2,800	8,400	12.10	11,200	16.13	Central
	#2	2,800					
	#3	2,800					
	#4	2,800					
West Lake PS	#1	710	1,110	1.60	1,850	2.66	Oakridge
	#2	740					
	#3	400					
Harberger PS	#1	730	730	1.05	1,460	2.10	Franklin
	#2	730					
Dubellette PS	#1	1,400	2,800	4.03	4,200	6.05	Miller
	#2	1,400					
	#3	1,400					
College Hill PS	#1	2,610	5,220	7.52	7,830	11.28	Dubellette
	#2	2,610					
	#3	2,610					
Total Firm Capacity			**18,260**	**26.30**	**26,540**	**38.22**	**--**

3.4 STORAGE FACILITIES

Six tanks provide elevated storage within the City's distribution system. The West Lake standpipe serves as elevated storage for the West Lake Pressure Plane. The Franklin EST provides storage for the Franklin Pressure Plane. The Oakridge EST provides storage for the Oakridge Pressure Plane. The Miller and Newport ESTs provide storage for the Miller Pressure Plane. The Dubellette and West Park ESTs provide storage for the Dubellette Pressure Plane. The College Hill, Harberger Hill, and Dubellette GSTs can also be utilized to provide elevated storage for the Central Pressure Plane. **Tables 3-2** and **3-3** summarize the elevated and ground storage facilities in the City's distribution system, respectively.

Table 3-2: Existing Elevated Storage Facilities

Pressure Plane	Name	Capacity (MG)	Overflow Elevation (ft)
Central	Harberger GST	1.00[1]	1,185.00
	College Hill GST	1.00[1]	1,184.87
Central Pressure Plane Total		2.00	--
Dubellette	Dubellette EST	0.25	1,257.38
	West Park EST	0.50	1,257.00
Dubellete Pressure Plane Total		0.75	--
Franklin	Franklin EST	0.25	1,257.00
Franklin Pressure Plane Total		0.25	--
Miller	Miller EST	0.25	1,320.00
	Newport EST	0.50	
Miller Pressure Plane Total		0.75	--
Oakridge	Oakridge EST	0.25	1,234.94
Oakridge Pressure Plane Total		0.25	--
West Lake	Old West Lake Standpipe	0.08[2]	1,049.80
	New West Lake Standpipe	0.15[2]	
West Lake Pressure Plane Total		0.23	--
Total Elevated Storage		**3.65**	**--**

[1]Portion of capacity allocated for different pressure planes.

[2]Portion of capacity allocated for ground storage.

Table 3-3: Existing Ground Storage Facilities

Facility	Total Capacity (MG)	Overflow Elevation (ft)	Pressure Plane
WPP HSPS Clearwell #1	1.00	929.50	Central
College Hill GST	1.00[1]	1,184.87	Dubellette
Harberger GST	1.00[1]	1,185.00	Franklin
Dubellette GST	1.00	1,186.46	Miller
Old West Lake Standpipe	0.03[2]	1,049.80	Oakridge
New West Lake Standpipe	0.05[2]	1,049.80	Oakridge
Total Ground Storage	**4.15**	**--**	**--**

[1]Portion of capacity allocated for different pressure planes.

[2]Portion of capacity allocated for elevated storage.

3.5 WATER LINES

The water distribution system consists of pipes ranging in size from 0.75 inches to 36 inches. **Table 3-4** presents the length of pipe by pressure plane in the City's distribution system.

Table 3-4: Length of Pipe by Pressure Plane

Pressure Plane	Length (ft)	Percent of Total Length
Central	628,515	41%
Dubellette	437,188	29%
Franklin	113,972	8%
Miller	200,584	13%
Oakridge	63,709	4%
West Lake	73,195	5%
Total	**1,517,163**	**100%**

4.0 WATER DEMANDS

A water utility must be able to supply water throughout the City at rates that fluctuate over a wide range. A thorough analysis of historical and projected demands provides the basis for efficient growth and operations.

4.1 HISTORICAL WATER DEMANDS

The City provided historical water usage data from January 2009 through December 2023. The City supplied water to Hudson Oaks until June 2023, so the City's usage was calculated by subtracting the Hudson Oaks usage. The historical residential per capita usage calculated was based on the available production data and ranges from 88 to 112 gallons per capita per day (gpcd) with an average of 95 gpcd. The historical non-residential usage ranges from 711 to 1,155 gallons per acre day (gpad) with an average of 891 gpad. The maximum residential average day per capita usage was 112 gpcd in 2011 and, since then, has been no greater than 101 gpcd. As summarized in **Appendix A**, design criteria for water demand projections were determined using data from the historical water usage summary.

4.2 PROJECTED WATER DEMANDS

As summarized in **Appendix A**, FNI developed design criteria for water demand projections, as shown in **Table 4-1**. The projected water demands by pressure plane are summarized in **Table 4-2**.

Table 4-1: Water Demand Design Criteria

Criteria	
Residential Average Day Per Capita Usage (gpcd)	105[1]
Non-Residential Average Day Per Acre Usage (gpad)	800[1]
Maximum Day to Average Day Peaking Factor	2.0
Peak Hour to Maximum Day Peaking Factor	1.5

[1]Usage estimates are based on dry weather conditions.

Table 4-2: Water Demand Projections

Year	Pressure Plane	Population	Connections	Non-Residential Acreage	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
2024	Central	14,064	6,559	923.97	2.22	4.44	6.66
	Dubellette	10,364	4,825	945.10	1.85	3.70	5.55
	Franklin	2,955	1,243	116.74	0.40	0.80	1.20
	LaSalle Ranch	0	0	0.00	0.00	0.00	0.00
	West Lake	1,824	735	45.62	0.23	0.46	0.69
	Miller	4,933	2,076	244.91	0.71	1.42	2.13
	Oakridge	1,611	677	18.45	0.18	0.36	0.54
	Total	**35,751**	**16,115**	**2,294.79**	**5.59**	**11.18**	**16.77**
2029	Central	15,075	7,031	1,080.21	2.45	4.90	7.35
	Dubellette	11,567	5,385	1,133.39	2.13	4.26	6.39
	Franklin	2,955	1,243	116.74	0.40	0.80	1.20
	LaSalle Ranch	555	251	141.00	0.17	0.34	0.51
	West Lake	1,824	735	45.62	0.23	0.46	0.69
	Miller	5,229	2,201	244.91	0.74	1.48	2.22
	Oakridge	2,104	885	66.60	0.27	0.54	0.81
	Total	**39,309**	**17,731**	**2,828.47**	**6.39**	**12.78**	**19.17**
2034	Central	16,590	7,737	1,223.52	2.72	5.44	8.16
	Dubellette	12,046	6,309	1,361.22	2.36	4.72	7.08
	Franklin	4,266	1,243	156.71	0.57	1.14	1.71
	LaSalle Ranch	1,250	564	141.00	0.24	0.48	0.72
	West Lake	1,824	735	45.62	0.23	0.46	0.69
	Miller	5,856	2,381	296.99	0.85	1.70	2.55
	Oakridge	2,720	1,144	66.60	0.34	0.68	1.02
	Total	**44,552**	**20,046**	**3,291.66**	**7.31**	**14.62**	**21.93**
2049	Central	21,538	10,045	1,242.29	3.26	6.52	9.78
	Dubellette	18,664[1]	8,688[1]	1,452.01	3.13	6.26	9.39
	Franklin	4,359[1]	1,833[1]	176.13	0.60	1.20	1.80
	LaSalle Ranch	3,238	1,461	141.00	0.45	0.90	1.35
	West Lake	1,831	738	45.62	0.23	0.46	0.69
	Miller	7,335[1]	3,087[1]	442.27	1.12	2.24	3.36
	Oakridge	3,497	1,470	80.60	0.43	0.86	1.29
	Total	**60,462**	**27,322**	**3,579.92**	**9.22**	**18.44**	**27.66**

[1]Population and connection projections for Dubellette, Franklin, and Miller pressure planes anticipate shifting a portion of demands from the Dubellette Pressure Plane to the Frankline Pressure Plane in the twenty-five-year planning period.

5.0 HYDRAULIC FIELD TESTING AND WATER MODEL CALIBRATION

The hydraulic model is one of the most critical elements in the analysis of a water distribution system. Field pressure testing was performed to assist with the calibration of the water system model. The calibrated water system model was then used to conduct hydraulic analyses to identify deficiencies in the City's existing water distribution system before developing a CIP to improve the existing system and meet projected water demands through the 2049 planning period.

5.1 MODEL DEVELOPMENT

A hydraulic model of the City's water distribution system was developed using the Bentley WaterGEMS software to simulate the operation of the piping system, ESTs, GSTs, and pumping facilities. The City maintains a GIS geodatabase containing all the water lines currently in the City's water distribution system. The GIS information was utilized to update the City's existing water model which includes nearly all the City's water distribution system and newly developed water lines. The model includes approximately 10,500 pipes, ranging in size from 2 inches to 36 inches. After the lines were imported into the model, tanks, pumps, and valves were added to complete the computer model. The Hazen-Williams equation was used to determine the friction losses in the distribution pipelines. Initial Hazen-Williams roughness coefficients (c-value) for pipes were assigned based on pipe diameter and age, as listed in **Table 5-1**. Future lines were assigned a roughness value of 150 during CIP development.

Table 5-1: Initial C-Value Assignment

Installation Year	Diameter ≤ 12 inches	Diameter > 12 inches
2000 – Present	130	130
1980 - 1999	110	120
1960 - 1979	100	110
Before 1960	90	100

5.2 PRESSURE TESTING AND CALIBRATION

Field pressure monitoring was conducted from July 17 to August 1, 2024, to gather data about the performance of the distribution system. System pressure was monitored simultaneously at 16 locations across the City at five-minute intervals. The locations of the pressure monitoring sites are illustrated in **Figure 5-1**. Monitoring was performed at five locations in the Central Pressure Plane, four locations in the Dubellette Pressure Plane, two locations in the Franklin Pressure Plane, two locations in the Miller

Pressure Plane, two locations in the Oakridge Pressure Plane, and one location in the West Lake Pressure Plane. A summary of the pressure recorder information is included as part of **Table 5-2**. **Appendix B** contains charts showing the recorded pressures in the distribution system during the testing period.

July 24, 2024, was selected as the calibration day, which represents a relatively high-demand day, and there was a strong correlation of data between the pressure recorders and the SCADA. Observed levels and flows were supplied by the City for the calibration period in the form of SCADA data. Data recorded every hour was used as the baseline for calibrating the model. All modeled system pressures were matched such that 74% of modeled pressures were within five psi of the observed pressures and 81% of modeled EST levels were within five feet of observed levels. Summaries of the calibration results are found in **Tables 5-3** and **5-4**. When calibrating EST levels and pressures, it is important to match not only the values of the data but also the shape of the curves. **Appendix C** contains calibration results of each individual pressure recorder.

Table 5-2: Pressure Recorder Summary

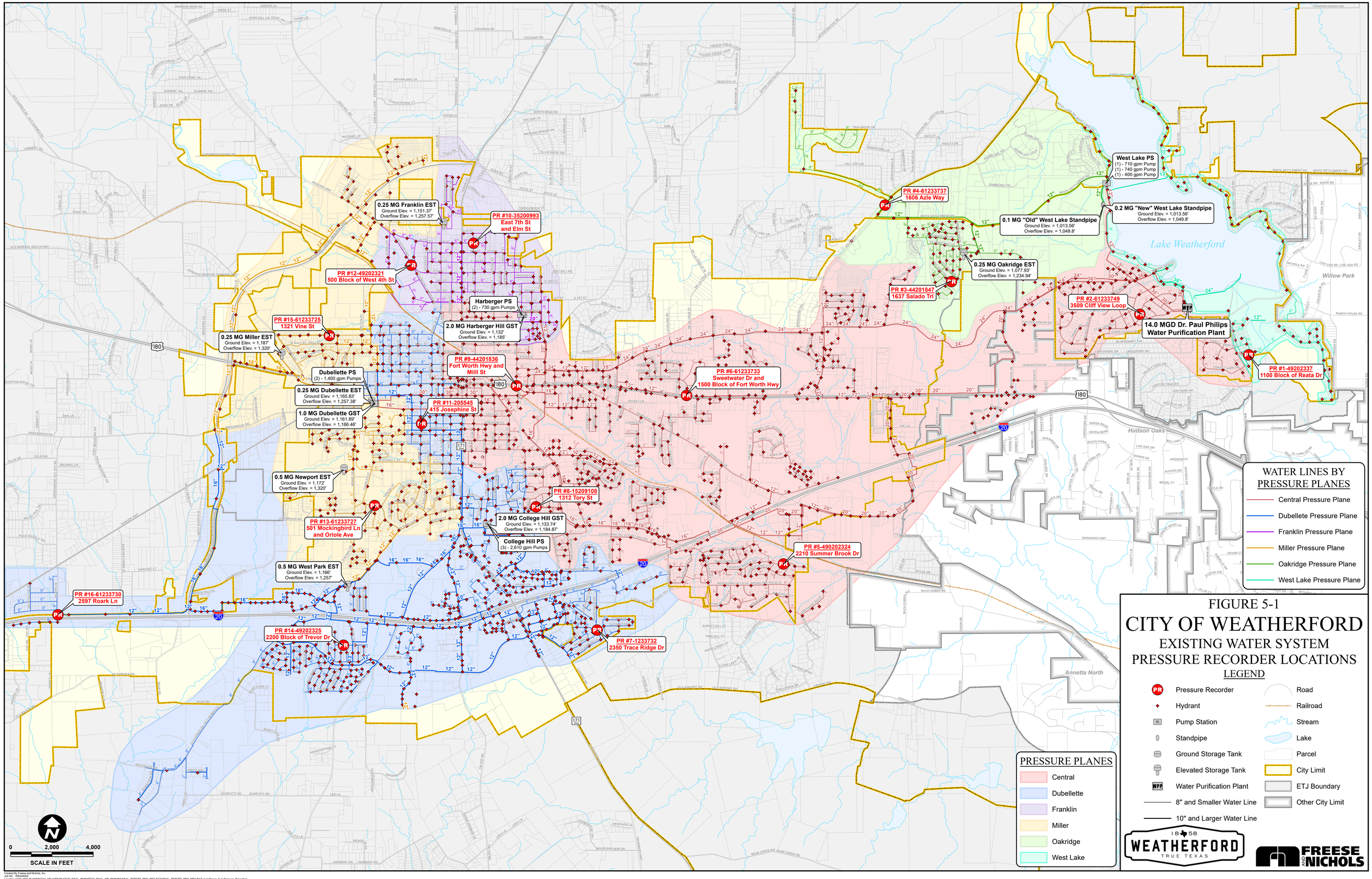
PR-ID	General Location	Elevation	Lat	Long
PR #1	1100 Block of Reata Drive	860	-97.67356493	32.76202579
PR #2	3509 Cliff View Loop	990	-97.69065846	32.76753471
PR #3	1637 Salado Trail	1,055	-97.72027145	32.77207089
PR #4	1606 Azle Highway	0	-97.73064297	32.78229359
PR #5	2210 Summer Brook Drive	920	-97.74706139	32.73468239
PR #6	Sweetwater Drive and Fort Worth Highway	1,040	-97.76210785	32.75718476
PR #7	2350 Trace Ridge Drive	1,095	-97.77643480	32.72606302
PR #8	1312 Tory Street	1,075	-97.78591554	32.74250987
PR #9	North Mill Street and Fort Worth Highway	995	-97.78885977	32.75862047
PR #10	East 7th Street and Elm Street	1,105	-97.79547383	32.77761842
PR #11	415 West Josephine Street	1,095	-97.80384023	32.75367396
PR #12	500 Block of West 4th Street	1,040	-97.80530181	32.77475340
PR #13	501 Mockingbird Lane and Oriole Avenue	1,155	-97.81132264	32.74282900
PR #14	2200 Block of Trevor Drive	1,050	-97.81636617	32.72428023
PR #15	1321 Vine Street	1,100	-97.81826474	32.76546712
PR #16	2597 Roark Lane	995	-97.86126413	32.72856576

Table 5-3: Pressure Recorder Calibration Results

Pressure Recorder	Within 5 psi	Within 3 psi
PR #1	76%	48%
PR #2	100%	100%
PR #3	100%	100%
PR #4	100%	88%
PR #5	60%	44%
PR #6	64%	40%
PR #7	80%	40%
PR #8	72%	60%
PR #9	52%	44%
PR #10	68%	44%
PR #11	80%	52%
PR #12	68%	48%
PR #13	64%	52%
PR #14	100%	68%
PR #15	12%	8%
PR #16	92%	60%
Average	**74%**	**56%**

Table 5-4: Tank Level Calibration Results

Facility	Within 5 feet	Within 3 feet
Franklin EST	100%	100%
Newport EST	88%	76%
Dubellette EST	88%	60%
West Park EST	48%	24%
College Hill GST	60%	52%
Harberger GST	100%	96%
Average	**81%**	**68%**



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6.0 WATER DISTRIBUTION SYSTEM ANALYSIS

As a public water utility, the City is required to meet the rules and regulations for public water systems established by the TCEQ in Chapter 290 of the Texas Administrative Code. Desktop and hydraulic modeling analyses were conducted to identify deficiencies in the City's existing water distribution system. To evaluate the system's performance, FNI and the City worked to establish a set of criteria to determine triggers for CIP projects.

6.1 DESIGN CRITERIA

The water distribution system was analyzed for three operating conditions:

- Maximum day demands
- Peak hour demands
- Maximum day demands with fire flows

By analyzing the water system under these various operating conditions, it is possible to determine where pressure issues occur, if tanks are filling or draining properly, and if the pumping facilities are adequate to meet the required demand at acceptable pressure. Design criteria were developed and utilized to identify the need, timing, and size of CIP projects.

6.1.1. Velocity/Headloss

As specified in Subchapter D of Chapter 290, water transmission lines are required to be sized to maintain a minimum of 35 psi throughout the system during peak-hour demand conditions. As part of the water system performance analysis, FNI developed additional criteria for pipe headloss and velocity to determine if existing infrastructure is sized to meet the desired level of performance expected by the City. Water transmission lines smaller than 12 inches shall be designed for a maximum pipeline velocity of 7 fps and a maximum friction loss of 7 feet per 1,000 feet of pipeline length. Water lines with a 12-inch diameter or larger shall be designed for a maximum pipeline velocity of 5 fps and a maximum friction loss of 5 feet per 1,000 feet of pipeline length.

6.1.2. Fire Flow Pressures

When performing a fire flow analysis, TCEQ requires that a minimum residual pressure of 20 psi be maintained at the location of the fire flow demand and a pressure of 35 psi be maintained throughout the rest of the system.

6.1.3. Storage

To size ESTs, the design criteria consisted of the capacity required to provide adequate storage for peak hour demands plus emergency storage for fire protection. For ESTs, the capacity is based on meeting the greater of twice the peaking volume or peaking volume plus fire protection storage. The required capacity for emergency fire protection storage is calculated as the volume of water needed to meet a 1,500 gpm fire flow for a three-hour time period. The peaking volume is calculated as supplying 40% of peak demand for three hours. To size GSTs, the design criteria was the capacity required to provide adequate storage for eight hours of maximum day demands.

In addition to these criteria, the City must also meet the TCEQ elevated storage capacity requirement of 100 gallons per connection and the TCEQ total storage capacity requirement of 200 gallons per connection.

6.2 EXISTING STORAGE EVALUATION

The amount of elevated storage affects the required TCEQ minimum pumping capacity as discussed further in **Section 6.3**. An elevated storage capacity equal to or greater than 200 gallons per connection decreases the amount of required pumping. The City provided historical population and connection data by pressure plane that was utilized to determine the people per connection factors for each pressure plane shown in **Table 6-1**. These people per connection factors were then used to calculate existing connections by pressure plane, which are included in **Table 6-2**. The number of equivalent connections per pressure plane from the demand database was used to calculate the TCEQ minimum required storage. Comparisons of the City's existing storage by pressure plane to TCEQ requirements are shown in **Tables 6-3** and **6-4**.

Table 6-1: People per Connection by Pressure Plane

Pressure Plane	People Per Connection
Central	2.14
Dubellette	2.15
Franklin	2.38
Miller	2.38
Oakridge	2.42
West Lake	2.48
LaSalle Ranch[1]	2.21

[1]The LaSalle Ranch Pressure Plane people per connection is based on the total 2023 population and connections provided by City staff.

Table 6-2: Existing Connections by Pressure Plane

Pressure Plane	Population	Estimated Connections
Central	14,064	6,559
Dubellette	10,364	4,825
Franklin	2,955	1,242
Miller	4,933	2,076
Oakridge	1,611	667
West Lake	1,824	735
Total:	**35,751**	**16,115**

Table 6-3: TCEQ Total Storage Capacity Evaluation

Pressure Plane	Estimated Connections	Existing Total Storage (MG)	TCEQ Requirement 200 gal/conn (MG)	Meets TCEQ Total Storage Requirement?
Central	6,559	3.00	1.31	Yes
Dubellette	4,825	1.75	0.97	Yes
Franklin	1,243	1.25	0.25	Yes
Miller	2,076	1.75	0.42	Yes
Oakridge	667	0.33	0.14	Yes
West Lake	735	0.23	0.15	Yes

Table 6-4: TCEQ Elevated Storage Capacity Evaluation

Pressure Plane	Estimated Connections	Existing Elevated Storage (MG)	TCEQ Requirement 100 gal/conn (MG)	Meets TCEQ 100 gal/con Requirement?	TCEQ Requirement 200 gal/conn (MG)	Meets TCEQ 200 gal/con Requirement?
Central	6,559	2.00	0.66	Yes	1.31	Yes
Dubellette	4,825	0.75	0.48	Yes	0.97	No
Franklin	1,243	0.25	0.12	Yes	0.25	Yes
Miller	2,076	0.75	0.21	Yes	0.42	Yes
Oakridge	667	0.25	0.07	Yes	0.14	Yes
West Lake	735	0.23	0.07	Yes	0.15	Yes

6.3 EXISTING PUMPING EVALUATION

The City is also required to meet the TCEQ pumping capacity requirements presented in **Table 6-5**. The City has received an Alternative Capacity Requirement (ACR) for service pumping through the TCEQ on May 17, 2005, which is included in **Appendix D**. The ACR specifies that the City must have a total capacity of at least 1,000 gpm and firm capacity with the ability to meet a peak hour demand of 0.64

gpm/connection. Since all of the pressure planes except Dubellette meet the 200 gallons/connection of elevated storage, a firm capacity with the ability to meet a peak hour demand of 0.60 gpm/connection is required. The analysis indicates that the Franklin Pressure Plane does not have sufficient firm pumping capacity to meet TCEQ requirements. However, the City has been able to meet peak hour demands in this pressure plane with the existing capacity at the Harberger PS, and plans to request an additional ACR with the TCEQ to reflect the peak hour demands observed throughout the City to lower the requirement further.

Table 6-5: Service Pumping Capacity Evaluation

Pressure Plane	Estimated Connections	Existing Firm Pumping Capacity (MGD)	Existing Elevated Storage (gal/con)	TCEQ Peak Hourly Demand Requirement[2] (MGD)	Meets TCEQ Pumping Capacity Requirement of at least 1,000 gpm (1.44 MGD)?	Meets TCEQ Pumping Capacity Requirement for Peak Hourly Demands?
Central[1]	7,294	12.10	305	6.30	Yes	Yes
Dubellette	4,825	7.52	155	4.45	Yes	Yes
Franklin	1,243	1.05	201	1.07	No	No
Miller	2,076	4.03	361	1.79	Yes	Yes
Oakridge	667	1.60	375	0.58	Yes	Yes

[1]Includes connections for the West Lake Pressure Plane

[2]Per TCEQ requirements, pressure planes with an elevated storage capacity of at least 200 gallons/connection must meet peak hourly demands of 0.60 gpm per connection. Pressure planes with an elevated storage capacity of less than 200 gallons/connection must meet peak hourly demands of 0.64 gpm per connection.

6.4 EXISTING TREATMENT EVALUATION

The City is also required to meet TCEQ treatment capacity requirements. The City has received an Alternative Capacity Requirement (ACR) for treatment plant production capacity through the TCEQ on August 16, 2022, which is included in **Appendix D**. The ACR specifies that the City must have a total production capacity greater than 0.47 gpm/connection for the entire system. Given that there are 16,115 connections in the existing system, the treatment capacity requirement is 10.92 MGD, which the WPP exceeds with a capacity of 14.00 MGD.

6.5 EXISTING SYSTEM ANALYSIS

6.5.1. Fire Flow Analysis

The fire flow analysis is another method for evaluating a water system. Having both available fire flow and sufficient water pressure is important because it enables firefighters to respond to an emergency in one area without negatively impacting other areas of the system. The City's recommended minimum

conditions for fire flow are 1,000 gpm of available flow at each hydrant, while maintaining a pressure of 20 psi at the fire hydrant. To evaluate the fire suppression capabilities of the system, a fire flow analysis was conducted under maximum day demand conditions. For this analysis, a steady-state model run was utilized to calculate the available fire flow at each fire hydrant in the model with a pressure of 20 psi. A fire flow contouring map was also prepared to show the available fire flow throughout the distribution system. Areas with small mains (less than six inches) and dead-end mains showed low available fire flows. The majority of the City's water distribution system has an available fire flow greater than 1,000 gpm, as shown in **Figure 6-1**.

6.5.2. Maximum Day Demand Conditions Analysis

The water distribution system was analyzed under maximum day and peak hour demand conditions. A 24-hour extended period simulation (EPS) was performed for the maximum day scenario which includes the peak hour demand condition. By examining the water system under maximum day and peak hour demands, it is possible to determine where pressure issues occur, if tanks are filling or draining properly and if the pumping facilities are adequate to meet the required demand at acceptable pressures.

A color-coded pressure map was prepared to illustrate the pressures calculated at model junctions. The map helped identify potential problem areas in the system and was used to determine whether reasonable pressure ranges were maintained throughout the system. **Figure 6-2** shows the modeled minimum pressures under maximum day and peak hour demands. The minimum pressures shown on the maps represent the lowest value of the pressures experienced during the 24-hour simulation, typically occurring during the peak hour demand. **Figure 6-2** shows that a majority of the City is above the minimum required 35 psi. Some areas in the Central Pressure Plane along the border of the higher pressure planes to the west drop below 35 psi. The results also show that multiple areas of the distribution system exceed a maximum pressure of 100 psi. Plumbing codes require PRVs at connections when pressures exceed 80 psi.

In addition to documenting the minimum and maximum pressures under these demands, the existing system pipes were evaluated based on the design velocity and headloss criteria. This was done to determine the areas which are stressed under higher demands. **Figures 6-3** and **6-4** highlight the areas that exceed the design velocity and headloss criteria, respectively.

0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

0.25 MG Dubellette EST
Ground Elev. = 1,165.83'
Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

0.5 MG Newport EST
Ground Elev. = 1,172'
Overflow Elev. = 1,320'

2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
(3) - 2,610 gpm Pumps

0.5 MG West Park EST
Ground Elev. = 1,166'
Overflow Elev. = 1,257'

West Lake PS
(1) - 710 gpm Pump
(1) - 740 gpm Pump
(1) - 400 gpm Pump

0.2 MG "New" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.25 MG Oakridge EST
Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD Dr. Paul Philips Water Purification Plant

Lake Weatherford
Willow Park
Hudson Oaks
Annetta North

0 2,000 4,000
SCALE IN FEET

FIGURE 6-1
CITY OF WEATHERFORD
EXISTING WATER SYSTEM MAXIMUM DAY DEMANDS AVAILABLE FIRE FLOW

LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

AVAILABLE FIRE FLOW

- Less than 500 gpm
- 500 - 1,000 gpm
- 1,000 - 1,500 gpm
- Greater than 1,500 gpm

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0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

0.25 MG Dubellette EST
Ground Elev. = 1,165.83'
Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

0.5 MG Newport EST
Ground Elev. = 1,172'
Overflow Elev. = 1,320'

2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
(3) - 2,610 gpm Pumps

0.5 MG West Park EST
Ground Elev. = 1,166'
Overflow Elev. = 1,257'

West Lake PS
(1) - 710 gpm Pump
(1) - 740 gpm Pump
(1) - 400 gpm Pump

0.2 MG "New" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.25 MG Oakridge EST
Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD Dr. Paul Philips
Water Purification Plant

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

0 2,000 4,000
SCALE IN FEET

MINIMUM PRESSURES

- Less than 35 psi
- 35 - 40 psi
- 40 - 80 psi
- 80 - 100 psi
- Greater than 100 psi

PRESSURE PLANES

- Central
- Dubellette
- Franklin
- Miller
- Oakridge
- West Lake

FIGURE 6-2
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
MAXIMUM DAY DEMANDS
MINIMUM PRESSURES

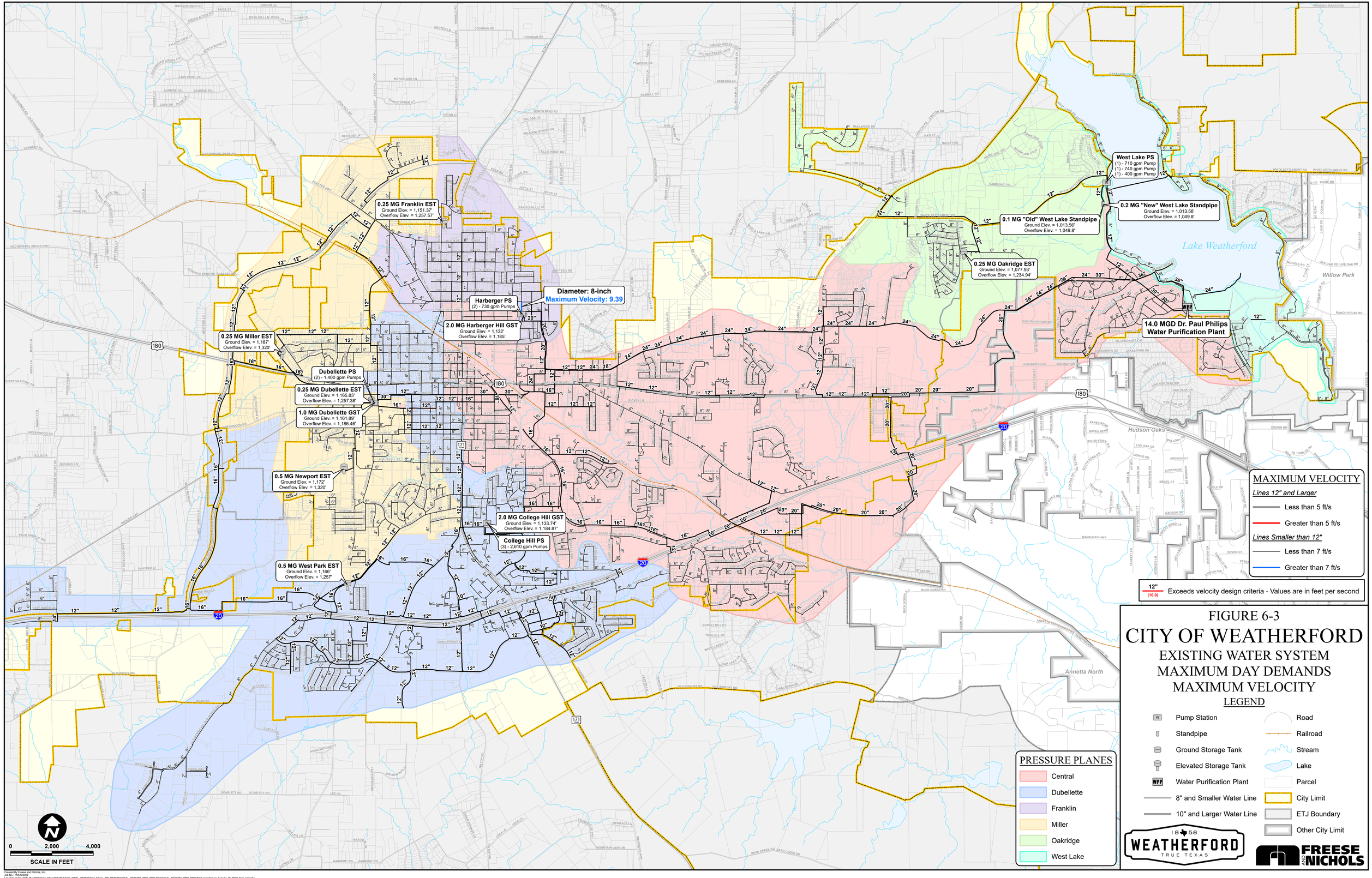
LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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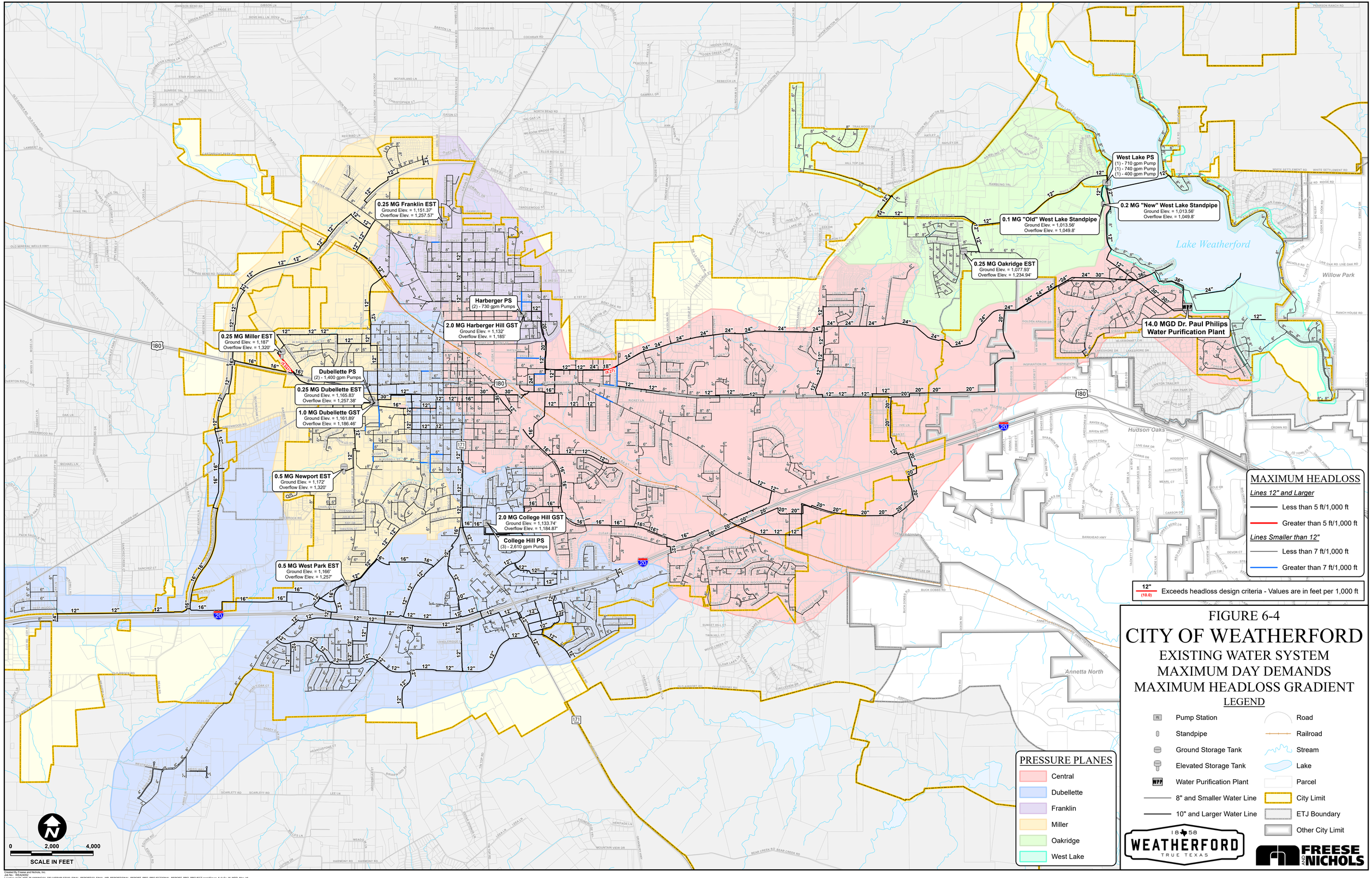


FIGURE 6-4

CITY OF WEATHERFORD

EXISTING WATER SYSTEM
MAXIMUM DAY DEMANDS
MAXIMUM HEADLOSS GRADIENT

LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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6.6 FUTURE SYSTEM ANALYSIS

Hydraulic analyses were conducted to identify deficiencies in the City's water distribution system under future demands and establish a CIP to reinforce the existing system and meet projected water demands through 2049. Various combinations of improvements and modifications were investigated to determine the most appropriate approach for meeting projected demands. Parameters used in developing the CIP included increasing system reliability, meeting required fire flows, and maintaining adequate residual pressures.

Water system improvements were developed to accommodate the anticipated growth through 2049. Challenges facing the water system include meeting storage and pumping requirements and extending service to areas of growth in the City where little infrastructure currently exists. The basis for the CIP recommendations is discussed further in this section.

6.6.1. Future Storage Evaluation

The design criteria from **Section 6.1** were applied to the model for the projected demands. Future model results show that, without additional elevated storage, the distribution system struggles to meet TCEQ elevated storage requirements. FNI recommends an additional 0.50 MG of elevated storage in the Dubellette Pressure Plane. The CIP also includes transferring the Dubellette EST to the Franklin Pressure Plane to meet TCEQ requirements, as the Franklin and Dubellette Pressure Planes share the same overflow elevation. Along with these improvements, the LaSalle Pressure Plane will ultimately require a 0.50 MG EST to service the new pressure plane. **Figures 6-5** through **6-11** show the future recommended elevated storage needs for the water distribution system by pressure plane along with regulatory requirements.

Additionally, proposed ground storage improvements include a 1.00 MG GST at the WPP and a 1.00 MG GST at the Causbie PS. A 0.15 MG GST at the LaSalle PS is also proposed, but only intended to serve the LaSalle Ranch development. **Figures 6-12** through **6-17** show the future recommended ground storage needs for the water distribution system by pressure plane.

6.6.2. Future Pumping Evaluation

The amount of required pumping in the future will need to be increased to meet demand. **Figures 6-18** through **6-23** show the future pumping capacity needs for the distribution system by pressure plane based

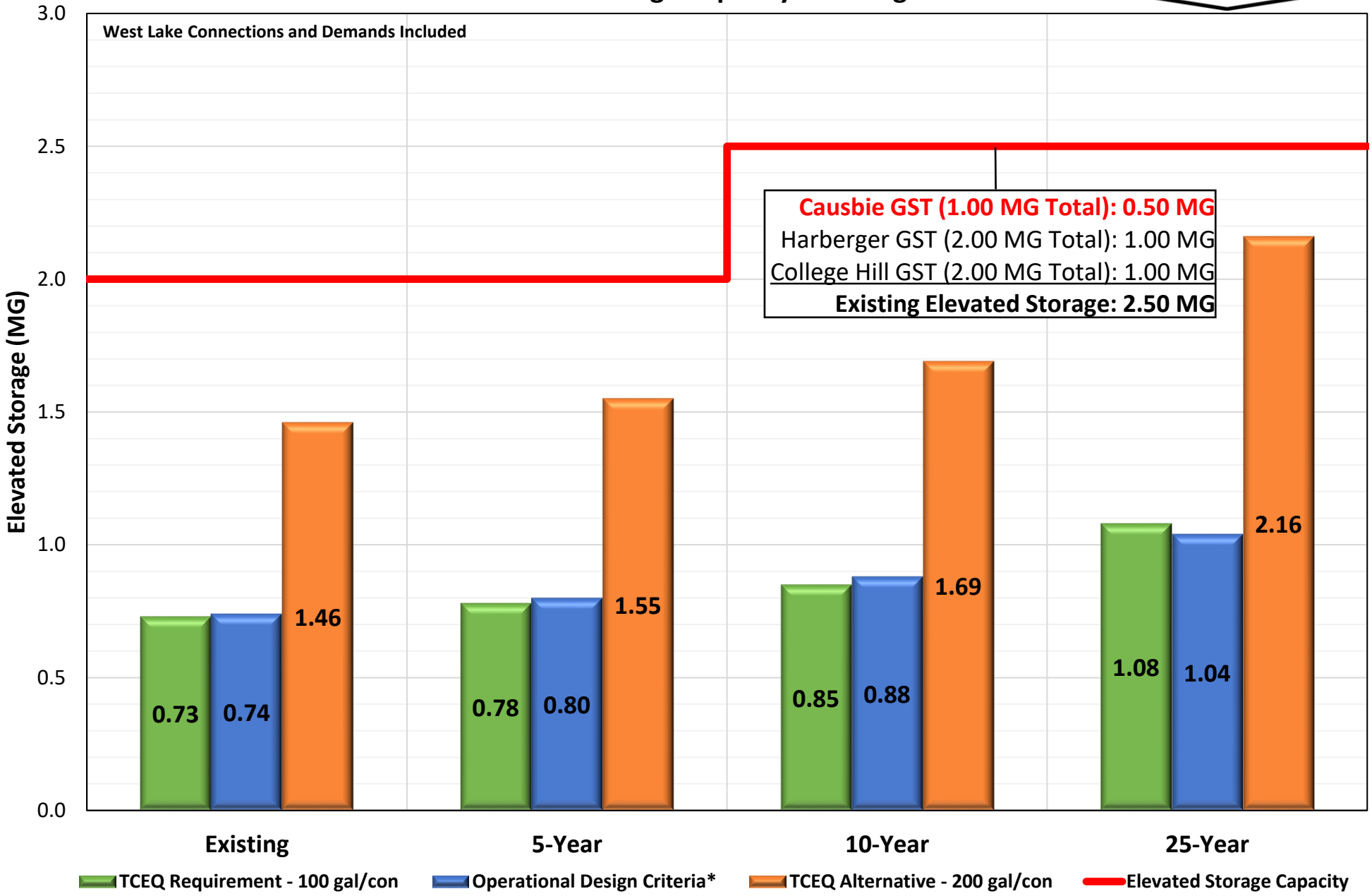
on the design criteria. The charts show the recommended improvements to meet pumping requirements through 2049, which include an expansion of the Harberger PS in the Franklin Pressure Plane, the Causbie PS in the Dubellette Pressure Plane, an expansion of the WPP HSPS #2 and a new Dubellette PS between the Dubellette GST and EST. For the LaSalle Pressure Plane, a 2.16 MGD PS is currently under design/under construction and is planned to serve the pressure plane through the twenty-five-year planning period.

6.6.3. Future Treatment Evaluation

Securing future water supply and treatment plant capacity is essential to support continued growth within the City. The water supply to the distribution system is typically based on maximum day demand conditions to make sure adequate water can be provided during the day of highest demand. FNI evaluated the City's WTP capacity to meet the future projected demands presented in **Section 4.2**. FNI developed a future supply versus demand chart to show how demands are anticipated to be met in the distribution system, shown in **Figure 6-24**.

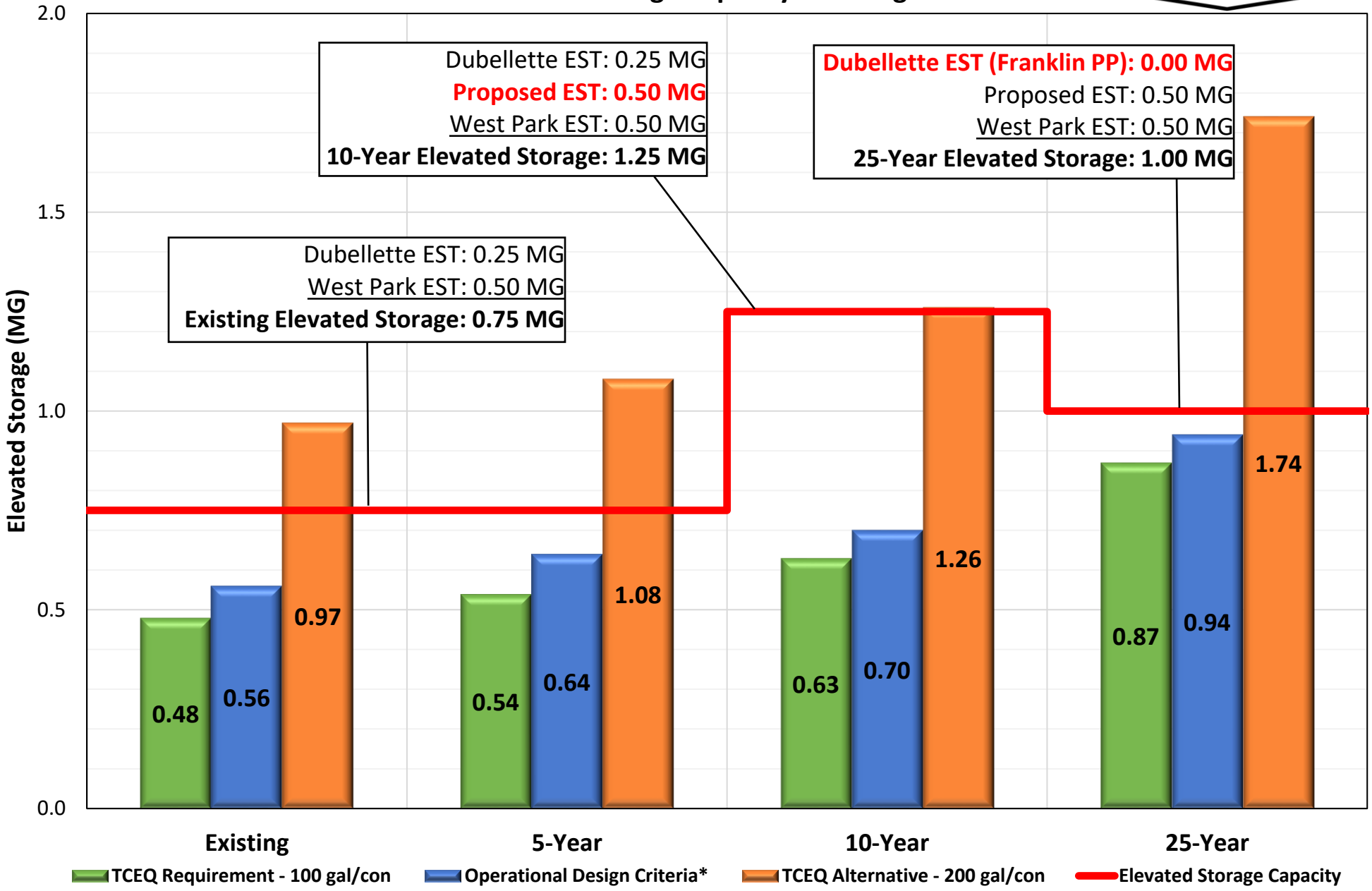
At the time of this report, the City is in the process of designing the Dr. Paul Philips Water Purification Plant Expansion, which will expand the treatment capacity to 18 MGD. FNI recommends the construction of an additional treatment expansion in the twenty-five-year planning period to 22 MGD.

Figure 6-5
Central Pressure Plane
Elevated Storage Capacity Planning



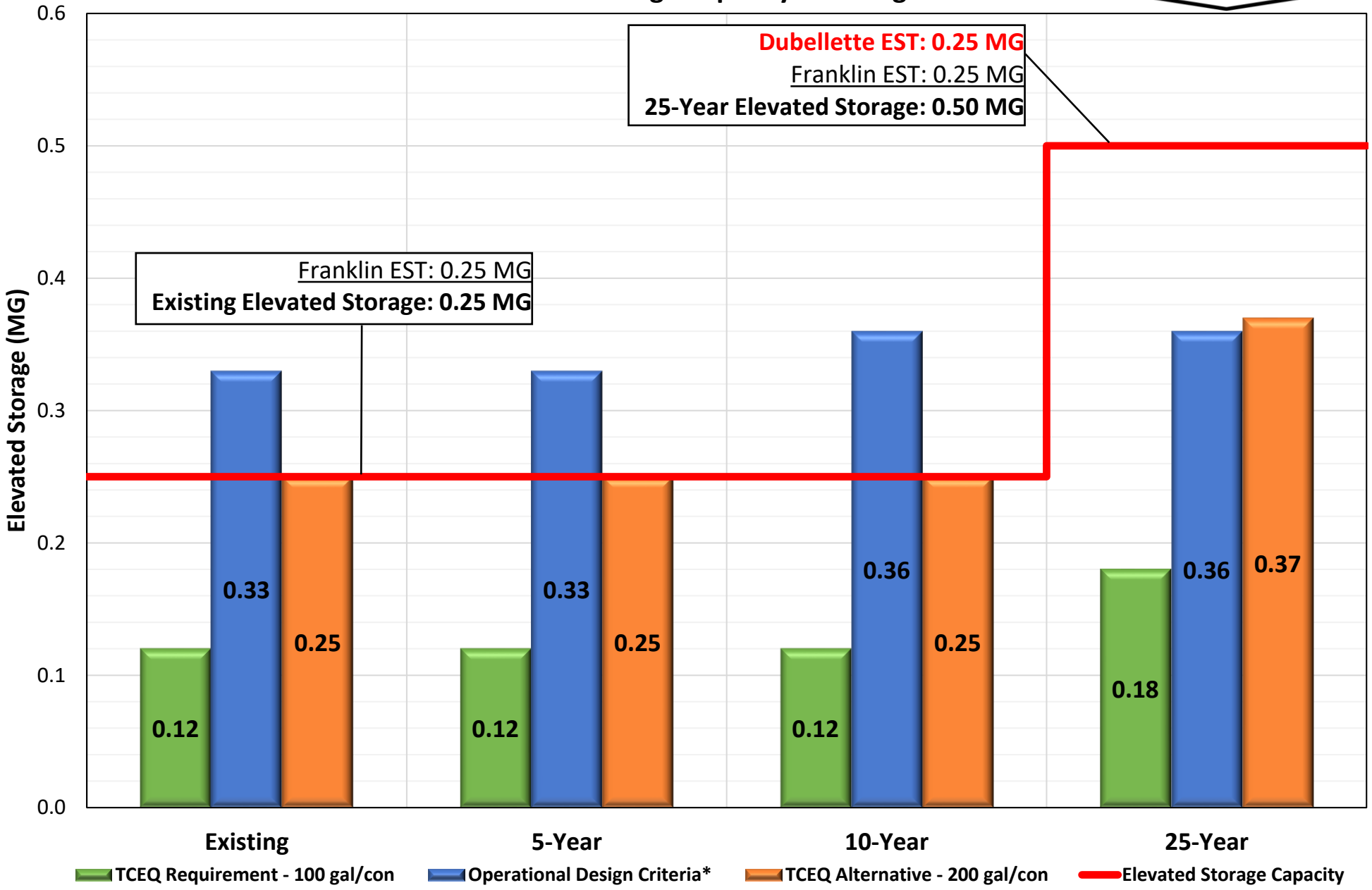
*Greater of twice the peaking volume or peaking volume plus fire volume. Peak volume is supplying peak demand for 3 hours. Fire volume is supplying 1,500 gpm for 3 hours. Operational design criteria do not represent TCEQ storage requirements.

Figure 6-6
Dubellette Pressure Plane
Elevated Storage Capacity Planning



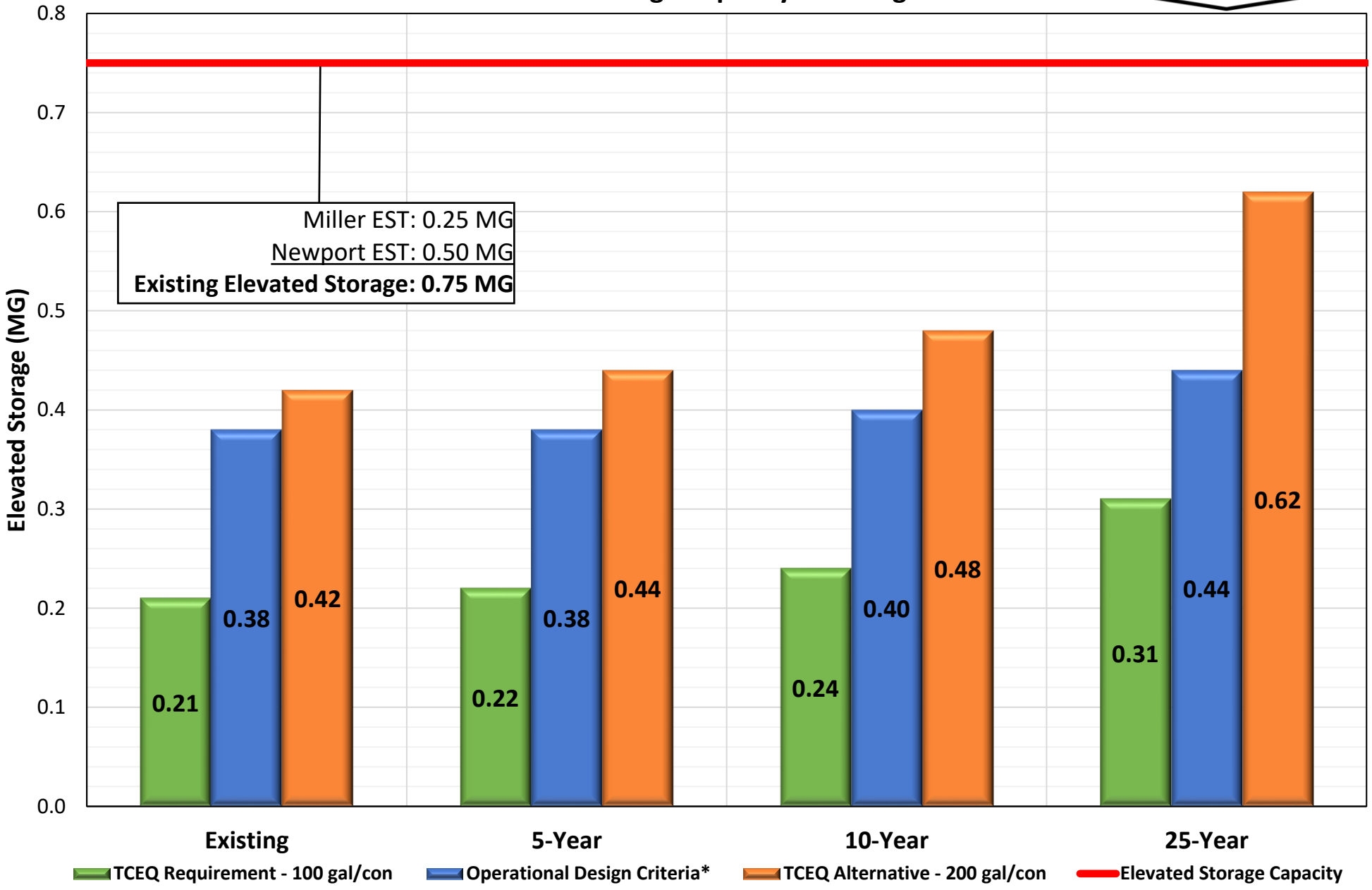
*Greater of twice the peaking volume or peaking volume plus fire volume. Peak volume is supplying peak demand for 3 hours. Fire volume is supplying 1,500 gpm for 3 hours. Operational design criteria do not represent TCEQ storage requirements.

Figure 6-7
Franklin Pressure Plane
Elevated Storage Capacity Planning



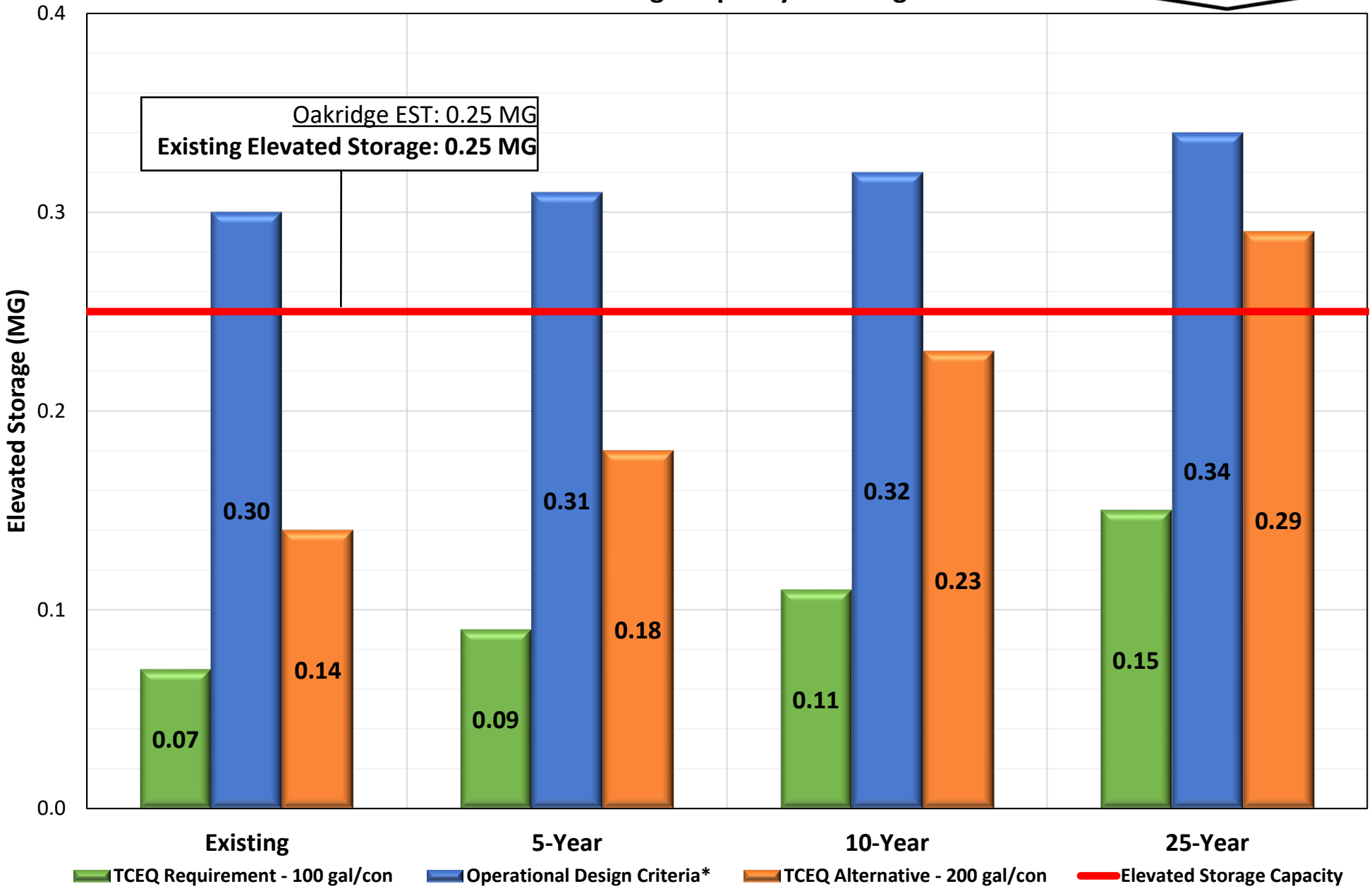
*Greater of twice the peaking volume or peaking volume plus fire volume. Peak volume is supplying peak demand for 3 hours. Fire volume is supplying 1,500 gpm for 3 hours. Operational design criteria do not represent TCEQ storage requirements.

Figure 6-8
Miller Pressure Plane
Elevated Storage Capacity Planning



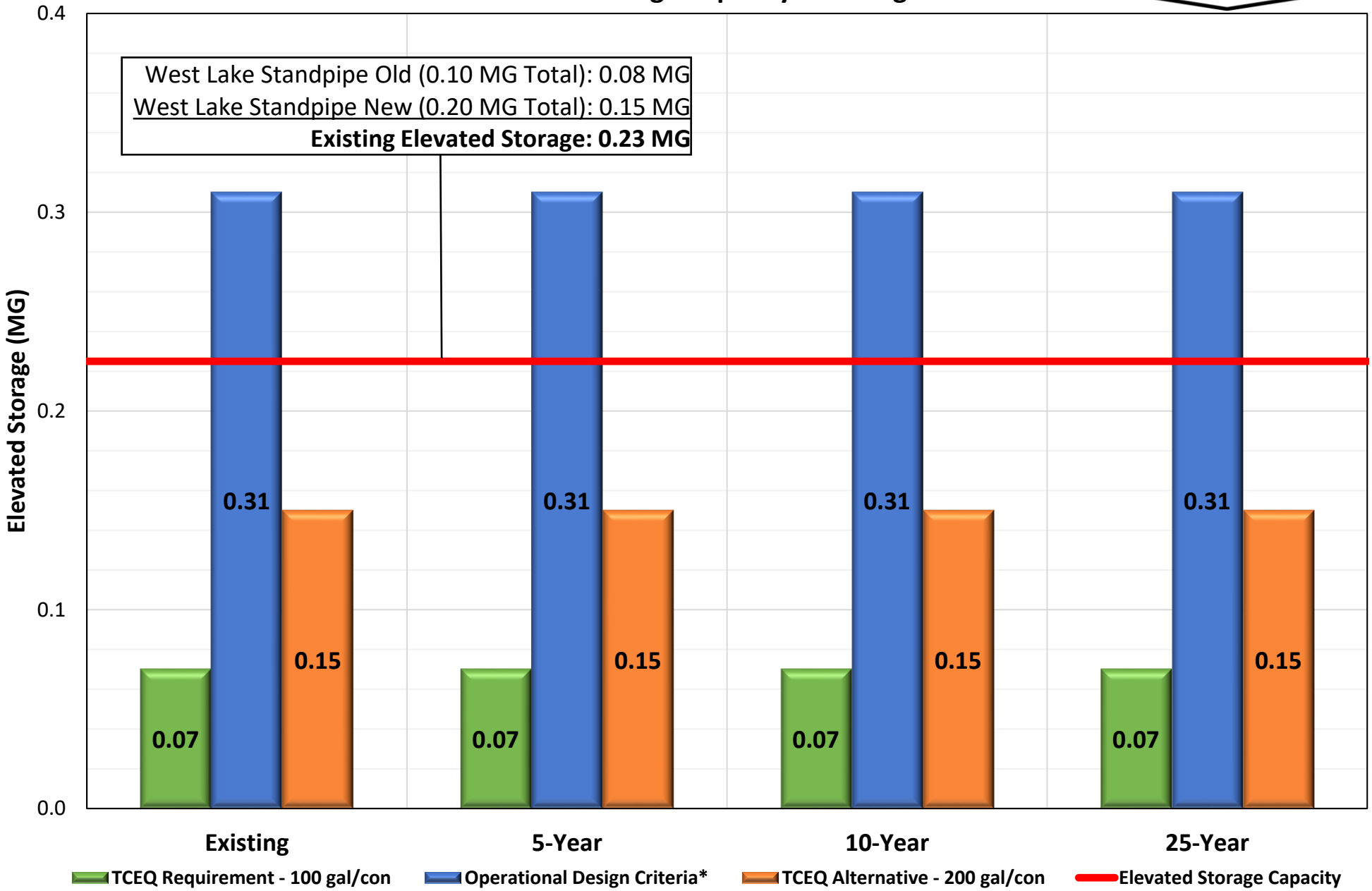
*Greater of twice the peaking volume or peaking volume plus fire volume. Peak volume is supplying peak demand for 3 hours. Fire volume is supplying 1,500 gpm for 3 hours. Operational design criteria do not represent TCEQ storage requirements

Figure 6-9
Oakridge Pressure Plane
Elevated Storage Capacity Planning



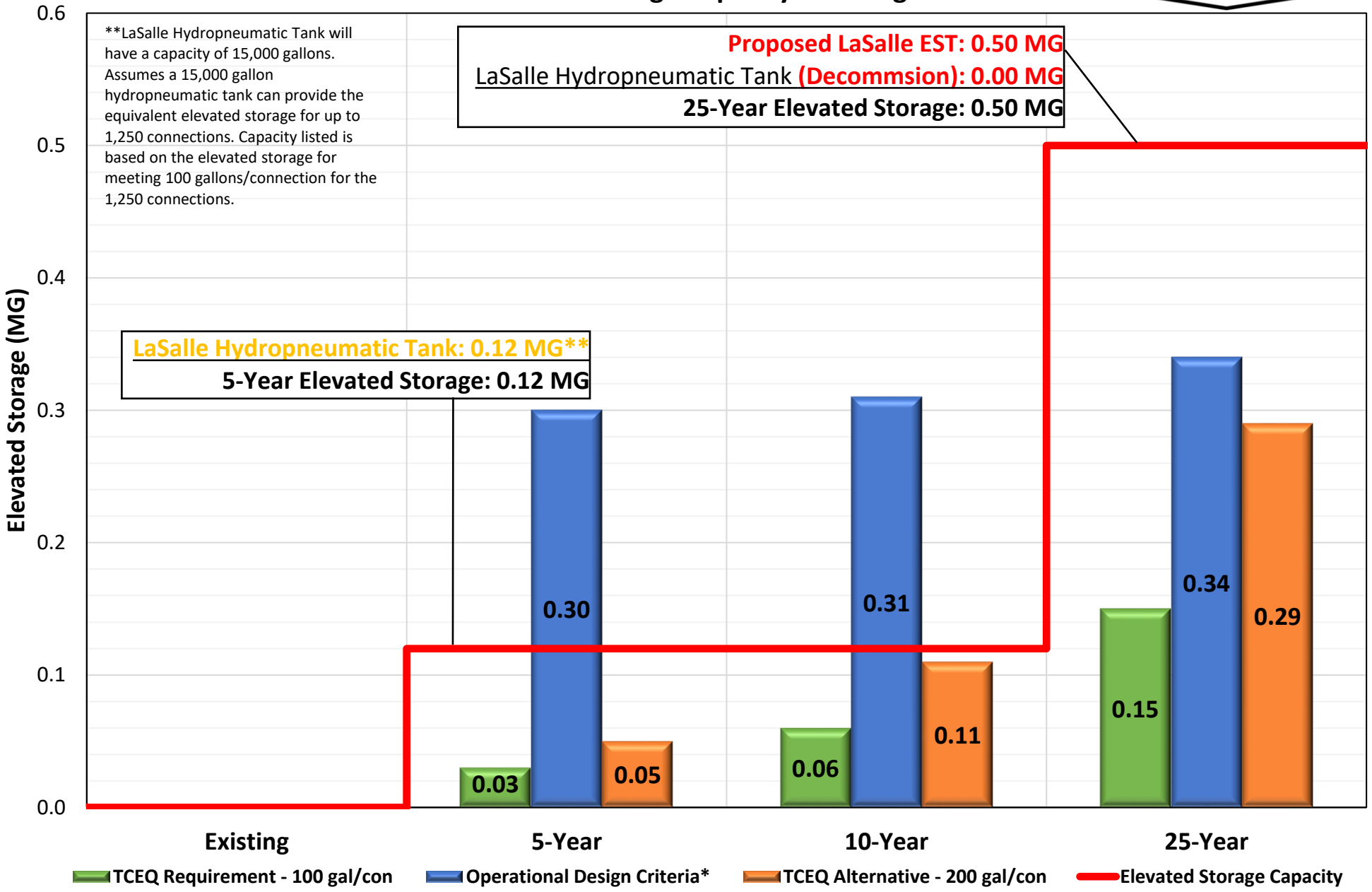
*Greater of twice the peaking volume or peaking volume plus fire volume. Peak volume is supplying peak demand for 3 hours. Fire volume is supplying 1,500 gpm for 3 hours. Operational design criteria do not represent TCEQ storage requirements.

Figure 6-10
West Lake Pressure Plane
Elevated Storage Capacity Planning



*Greater of twice the peaking volume or peaking volume plus fire volume. Peak volume is supplying peak demand for 3 hours. Fire volume is supplying 1,500 gpm for 3 hours. Operational design criteria do not represent TCEQ storage requirements.

Figure 6-11
LaSalle Pressure Plane
Elevated Storage Capacity Planning



*Greater of twice the peaking volume or peaking volume plus fire volume. Peak volume is supplying peak demand for 3 hours. Fire volume is supplying 1,500 gpm for 3 hours. Operational design criteria do not represent TCEQ storage requirements.

Figure 6-12
Central Pressure Plane
Ground Storage Capacity Planning

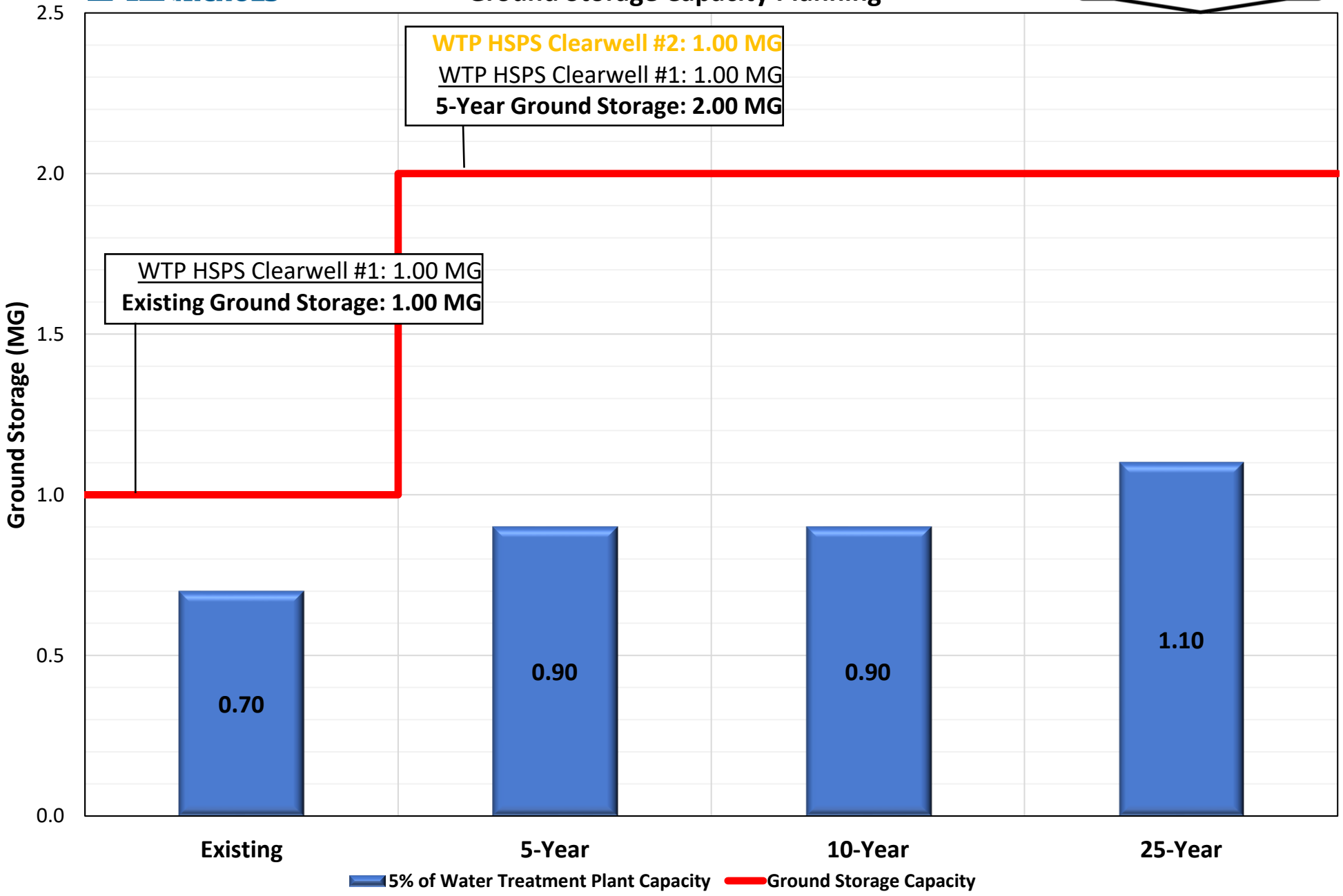


Figure 6-13
Dubellette Pressure Plane
Ground Storage Capacity Planning

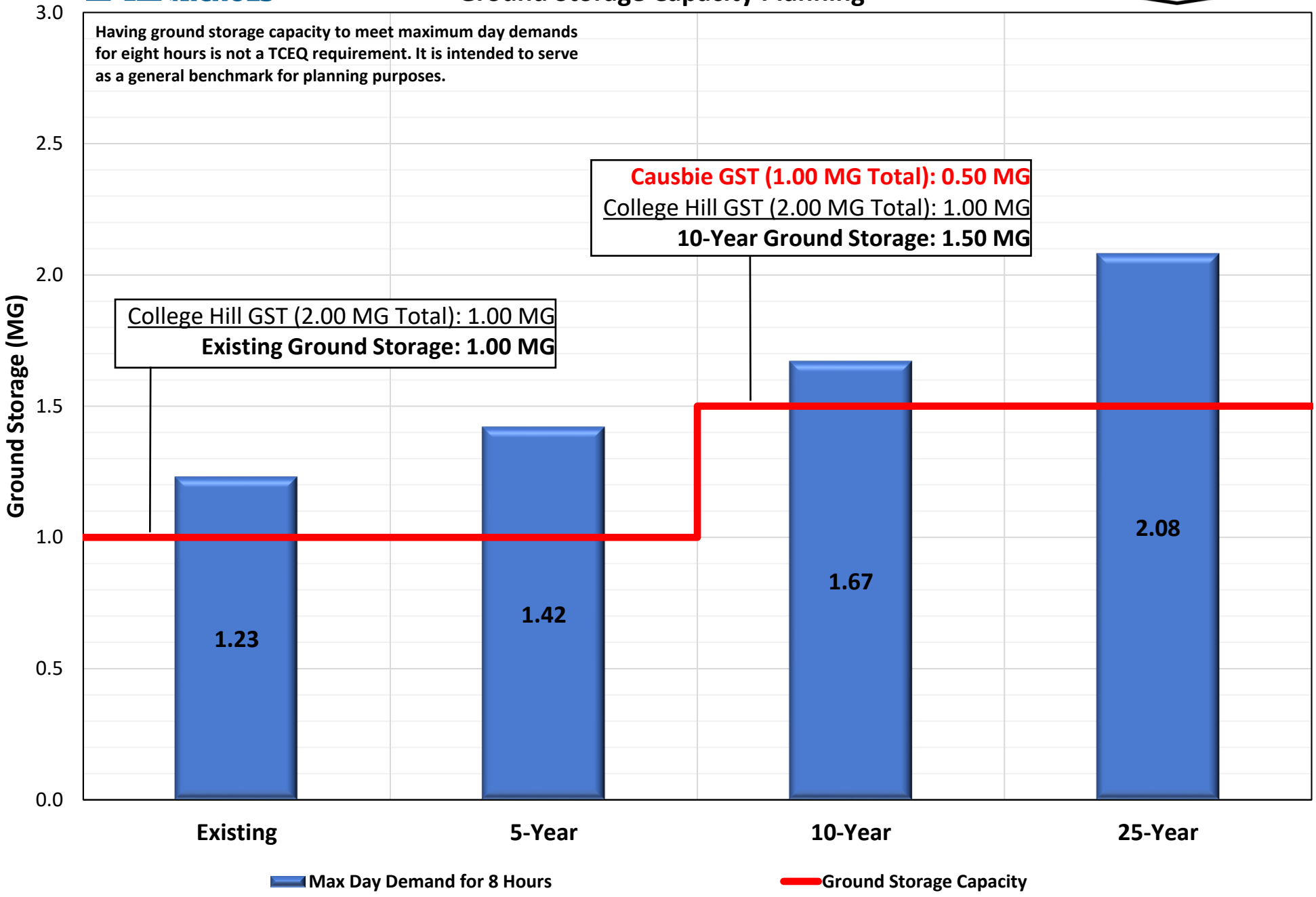


Figure 6-14
Franklin Pressure Plane
Ground Storage Capacity Planning

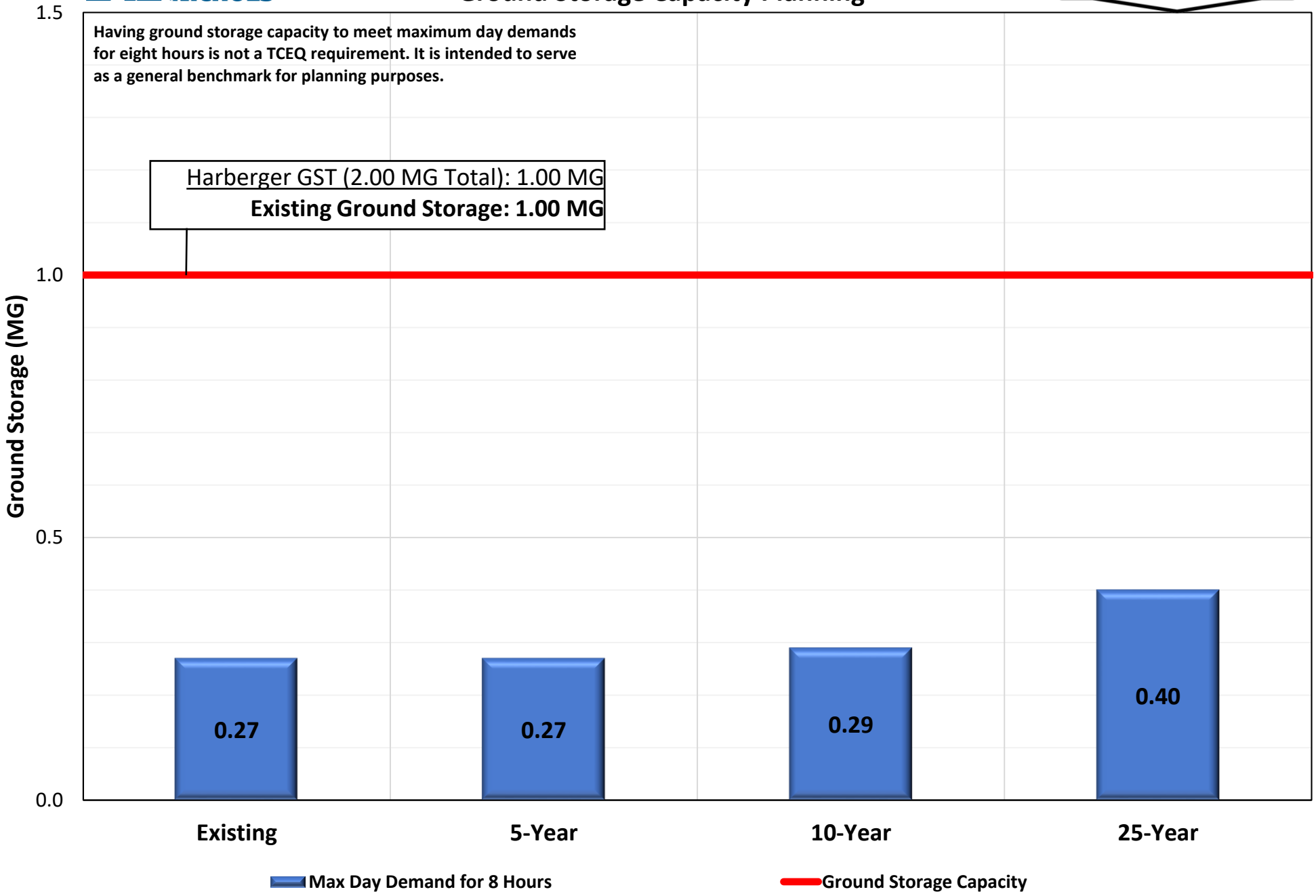


Figure 6-15
Miller Pressure Plane
Ground Storage Capacity Planning

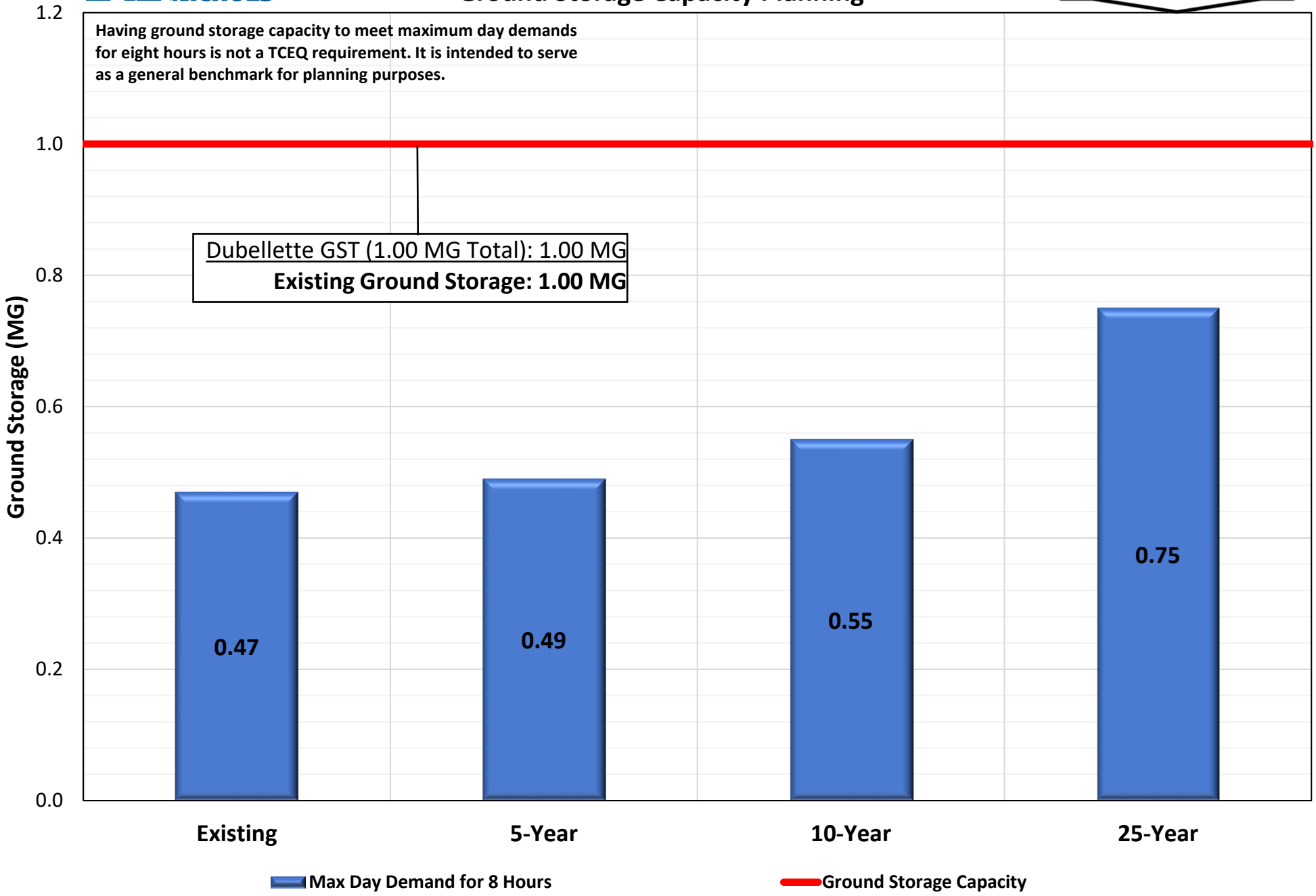


Figure 6-16
Oakridge Pressure Plane
Ground Storage Capacity Planning

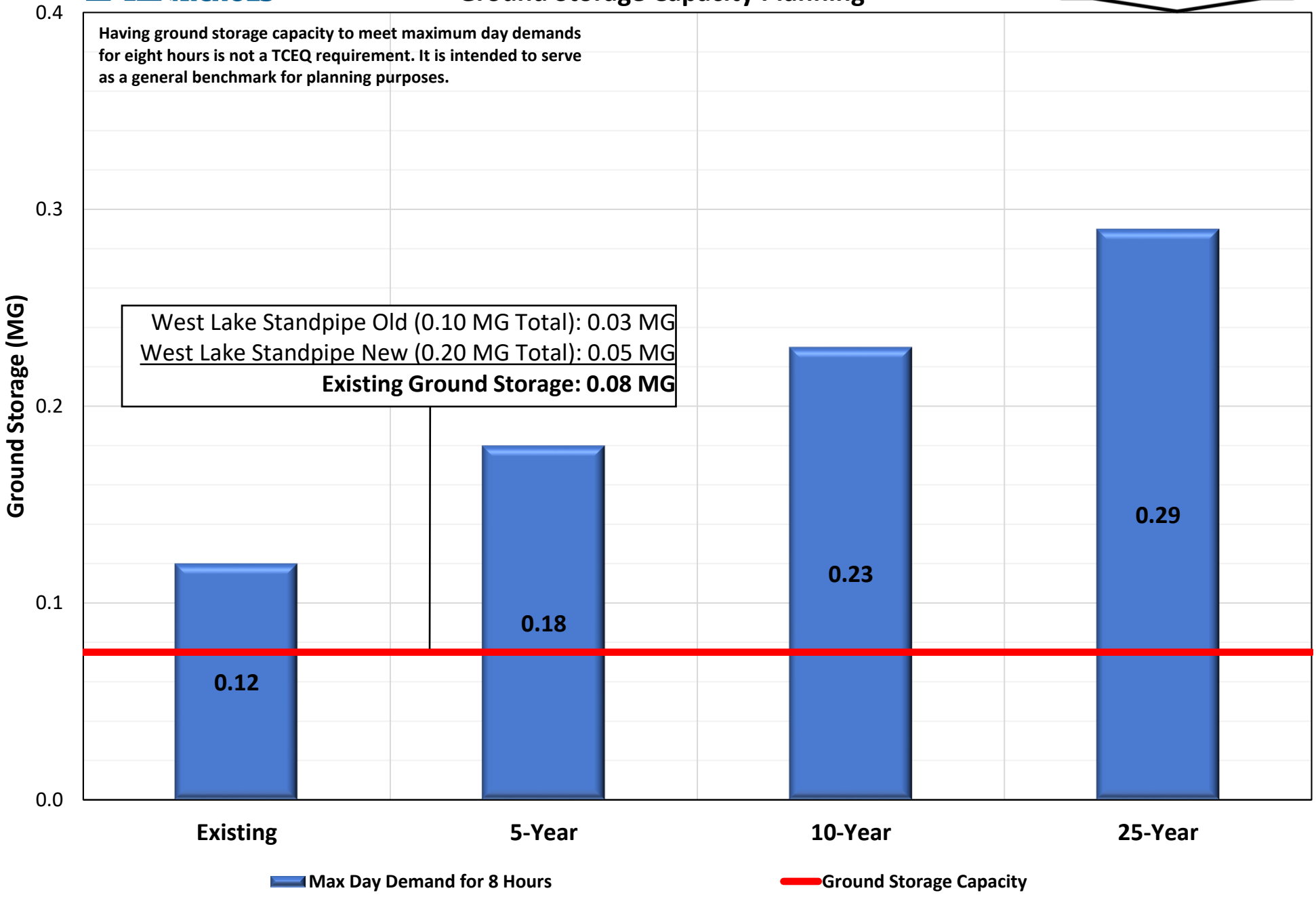


Figure 6-17
LaSalle Pressure Plane
Ground Storage Capacity Planning

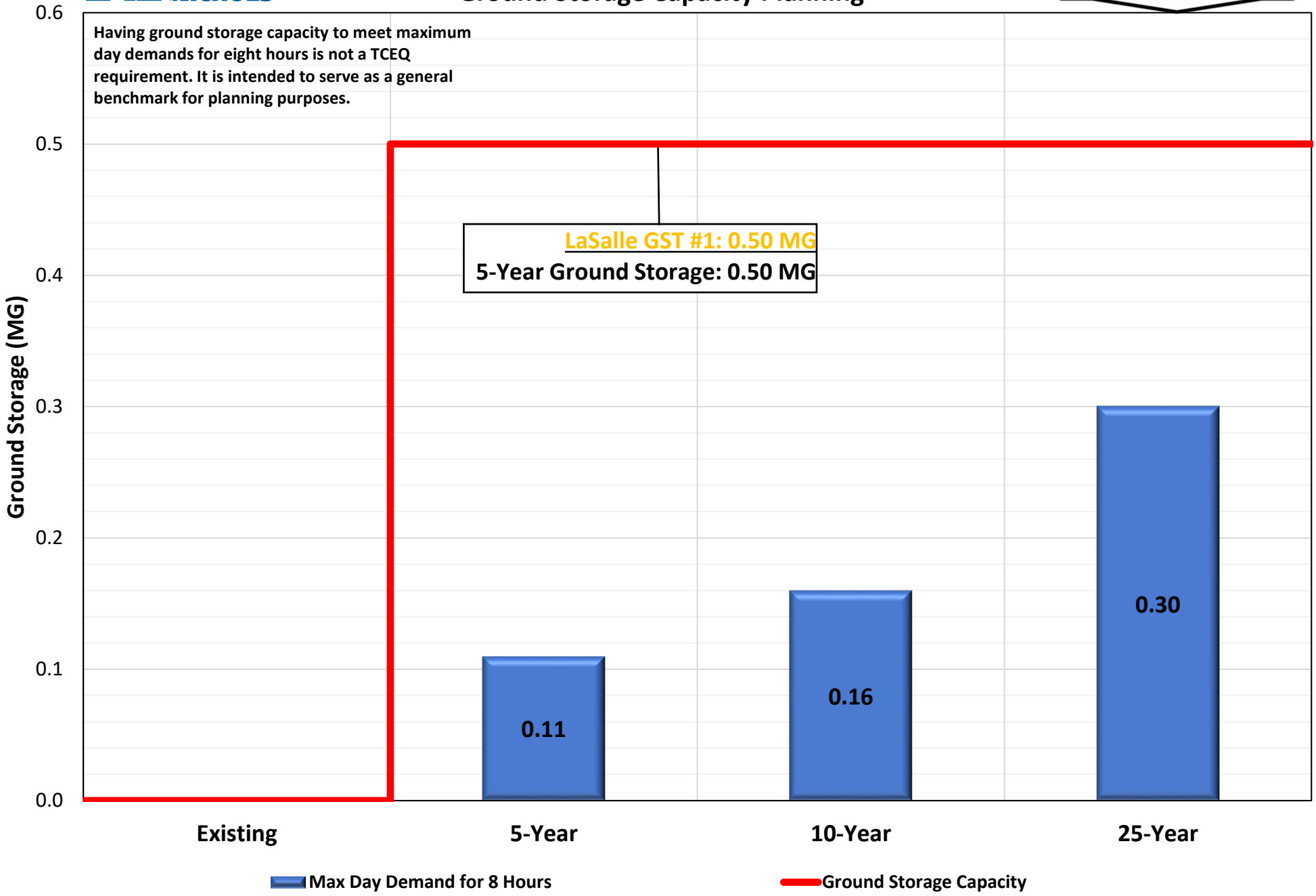
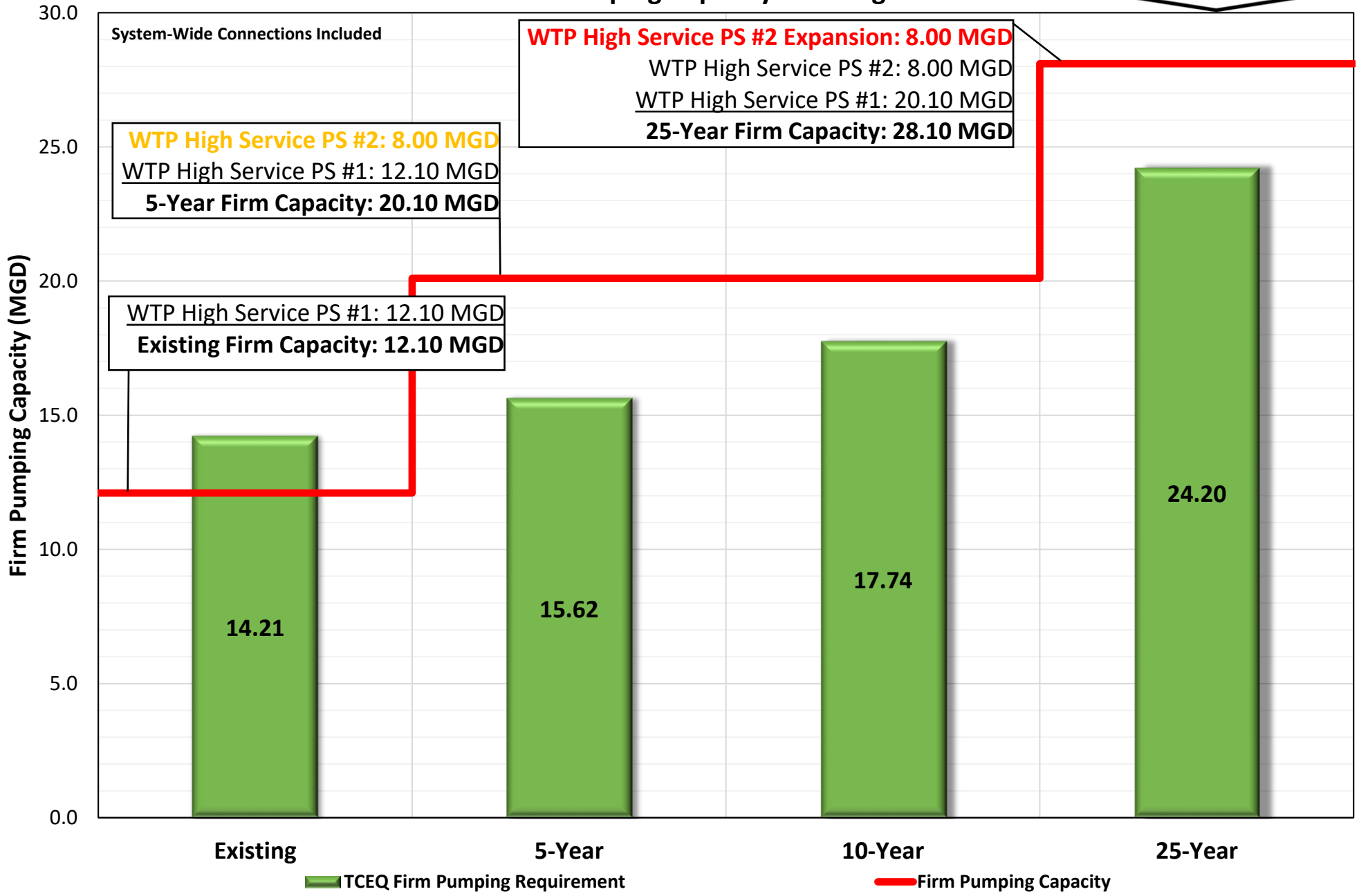
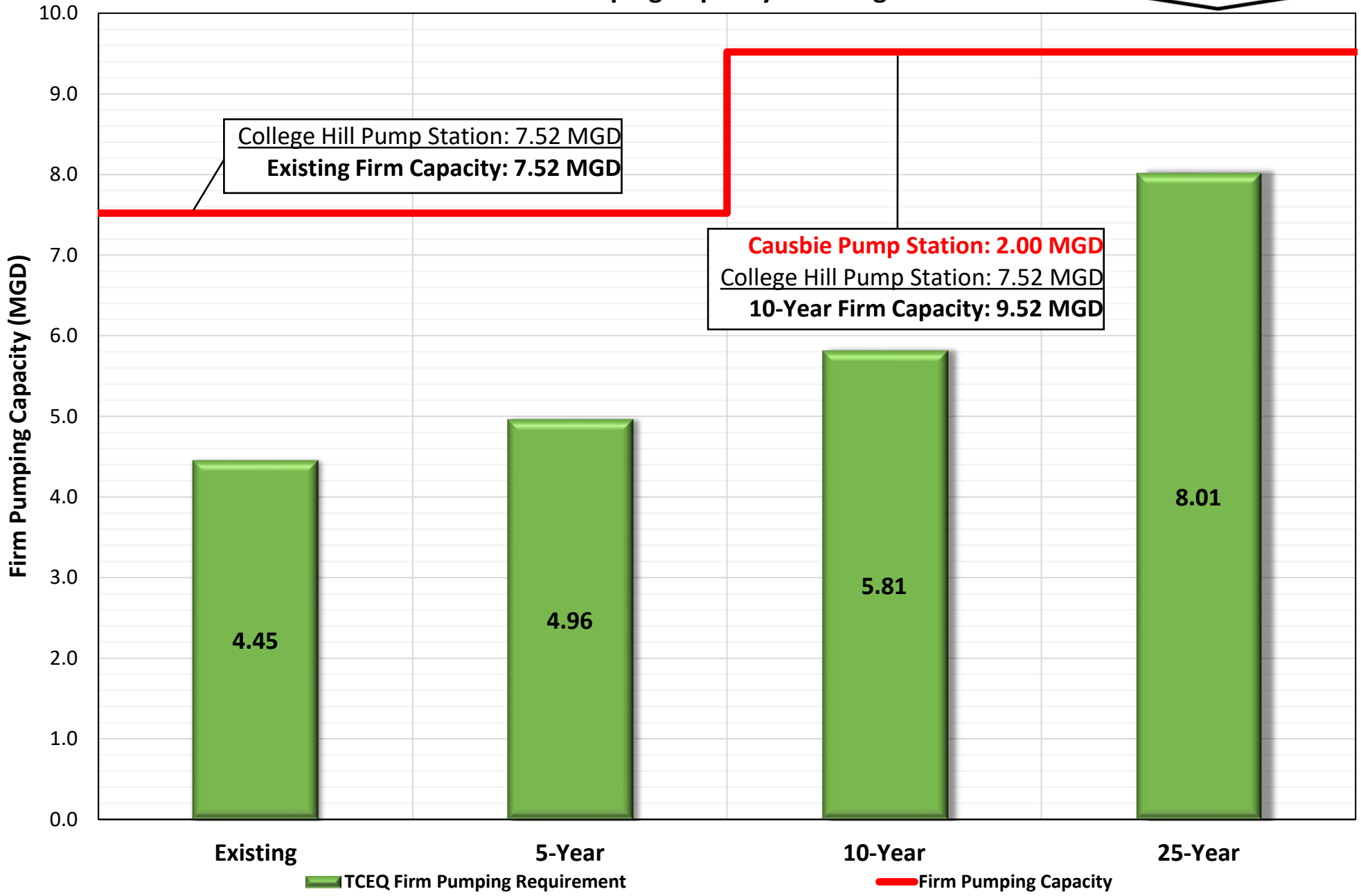


Figure 6-18
Central Pressure Plane
Firm Pumping Capacity Planning



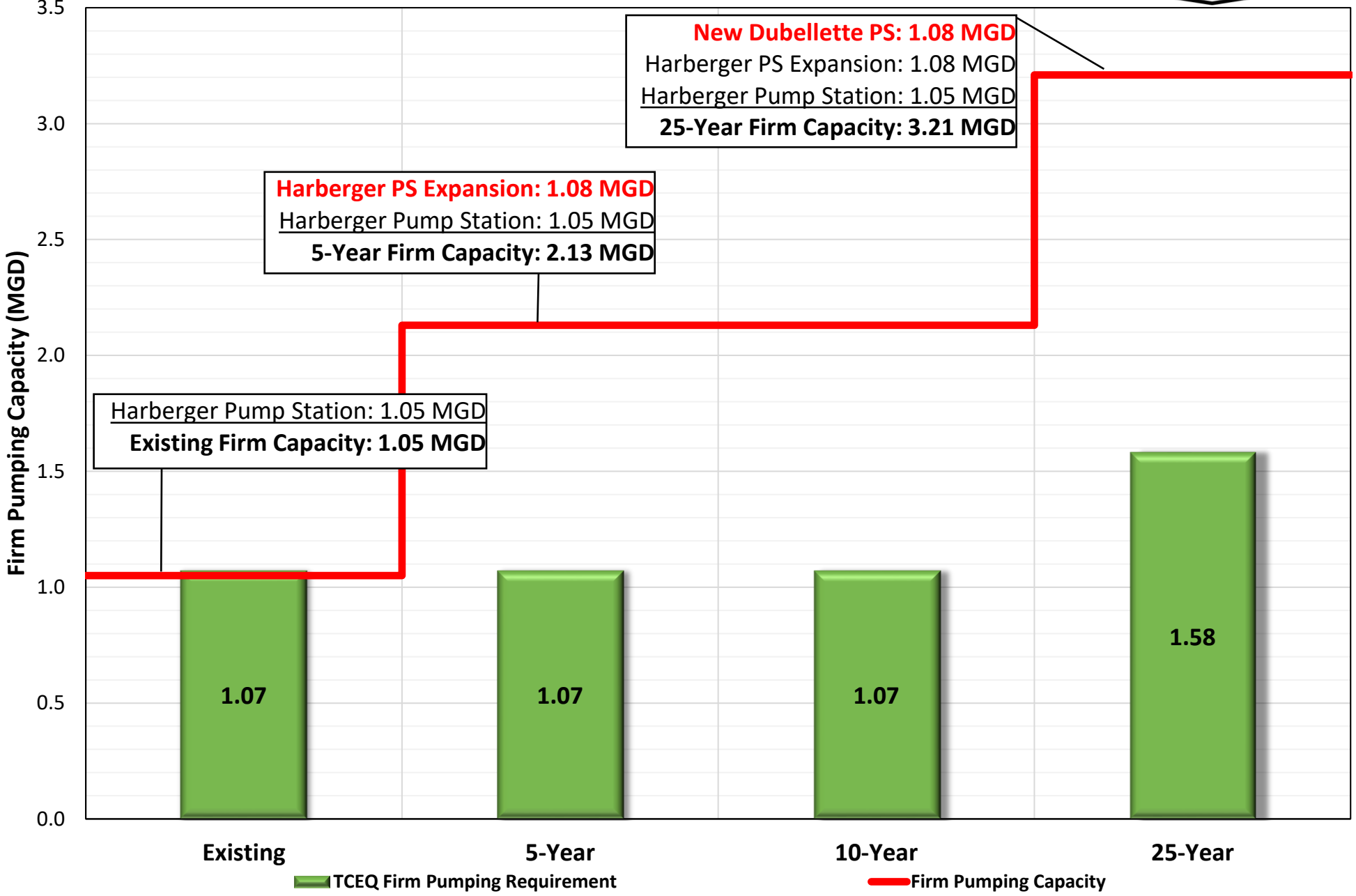
Note: Required pumping depends on available elevated storage. Meeting 200 gal/con of elevated storage requires 0.60 gpm/con of pumping. If not, the City has an ACR requiring 0.64 gpm/con.

Figure 6-19
Dubellette Pressure Plane
Firm Pumping Capacity Planning



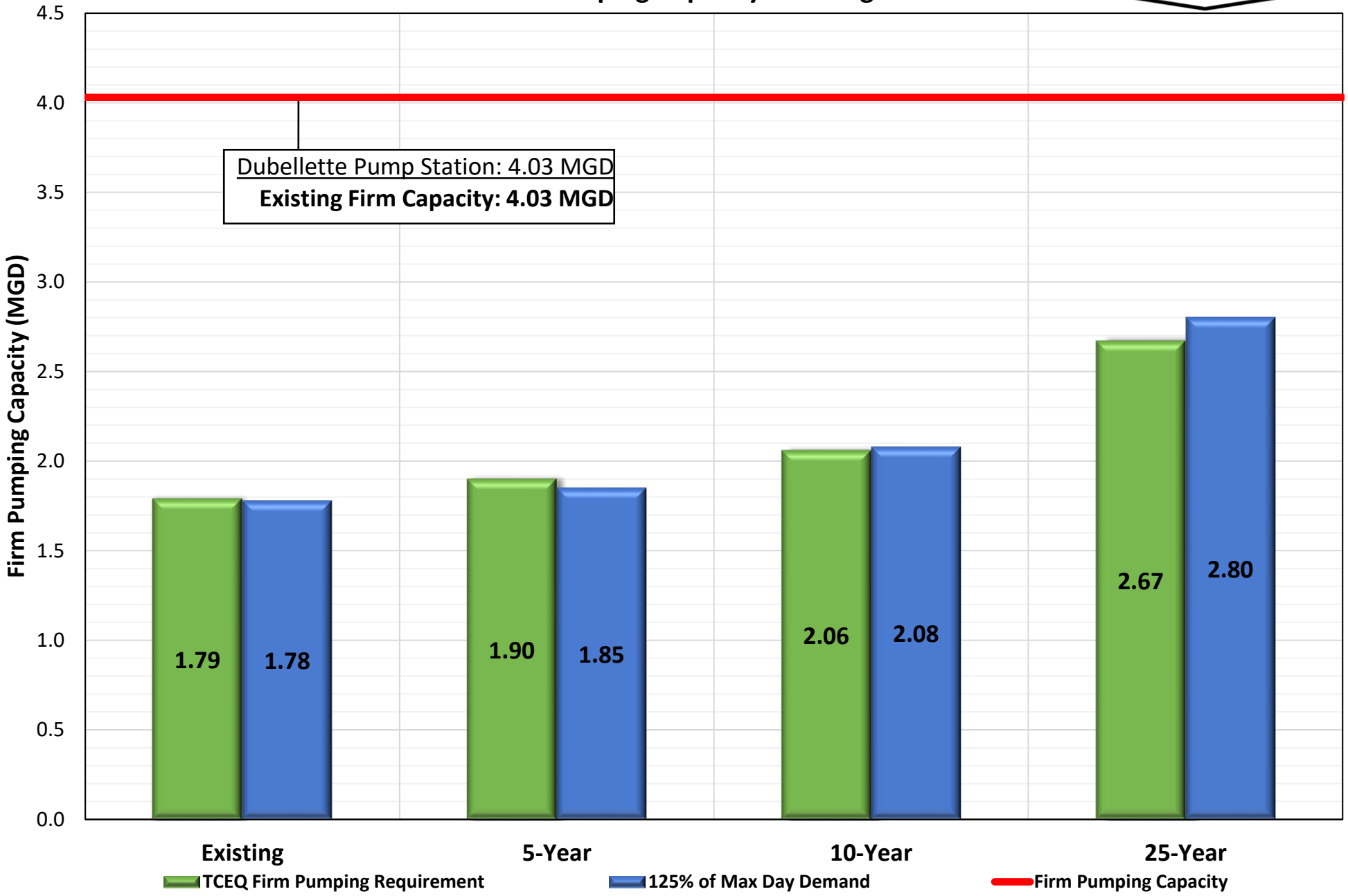
Note: Required pumping depends on available elevated storage. Meeting 200 gal/con of elevated storage requires 0.60 gpm/con of pumping. If not, the City has an ACR requiring 0.64 gpm/con.

Figure 6-20
Franklin Pressure Plane
Firm Pumping Capacity Planning



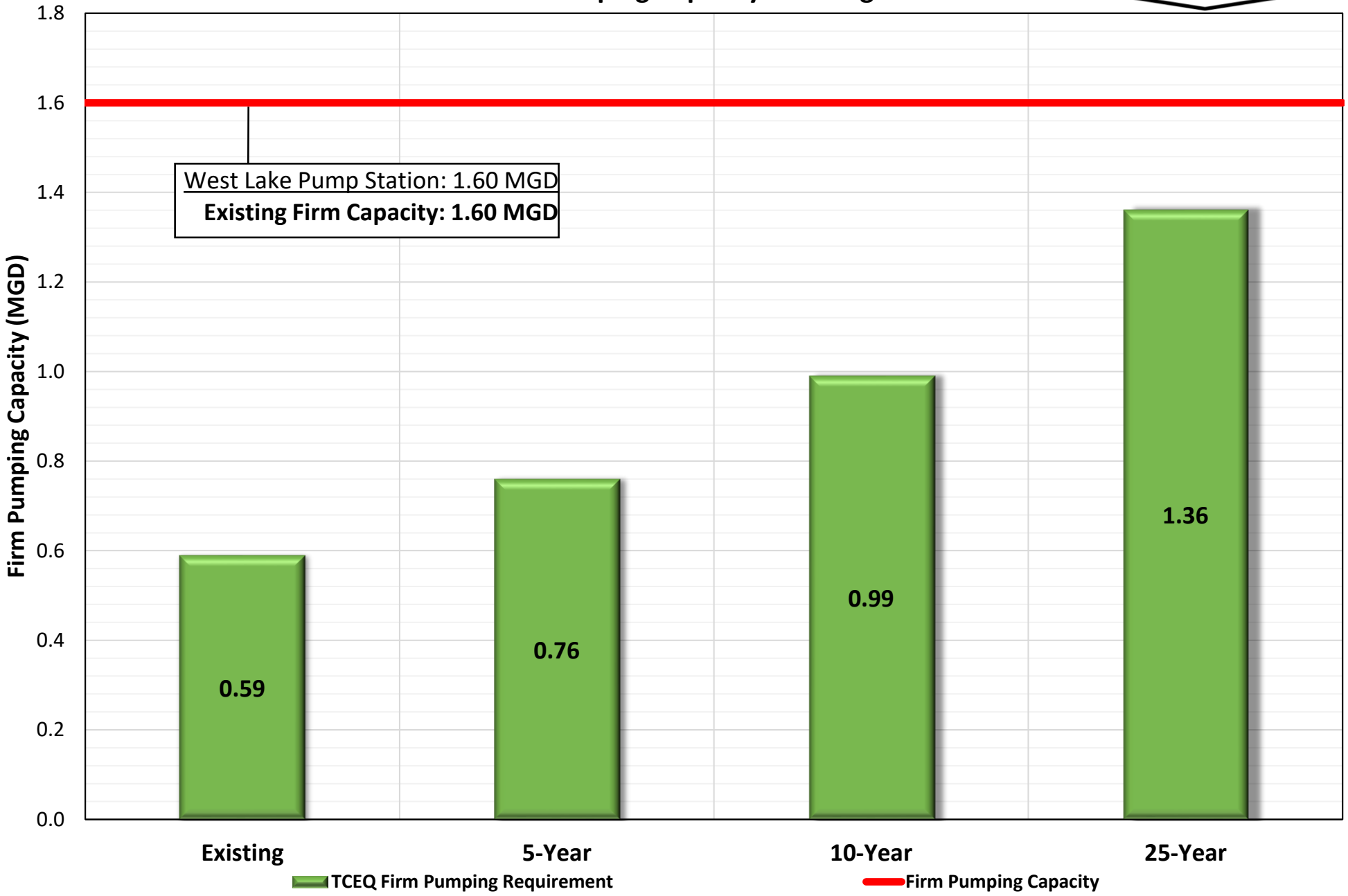
Note: Required pumping depends on available elevated storage. Meeting 200 gal/con of elevated storage requires 0.60 gpm/con of pumping. If not, the City has an ACR requiring 0.64 gpm/con.

Figure 6-21
Miller Pressure Plane
Firm Pumping Capacity Planning



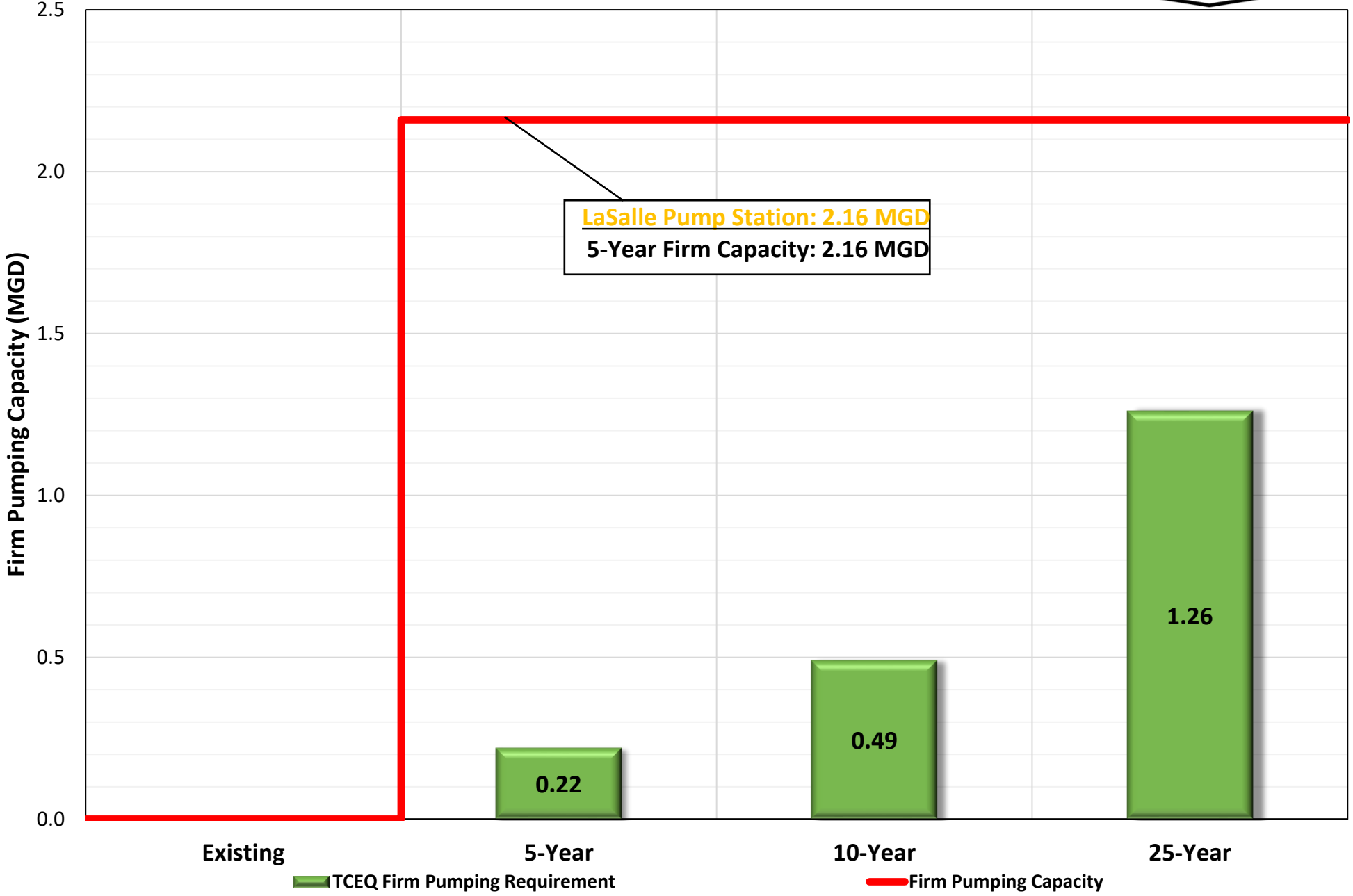
Note: Required pumping depends on available elevated storage. Meeting 200 gal/con of elevated storage requires 0.60 gpm/con of pumping. If not, the City has an ACR requiring 0.64 gpm/con.

Figure 6-22
Oakridge Pressure Plane
Firm Pumping Capacity Planning



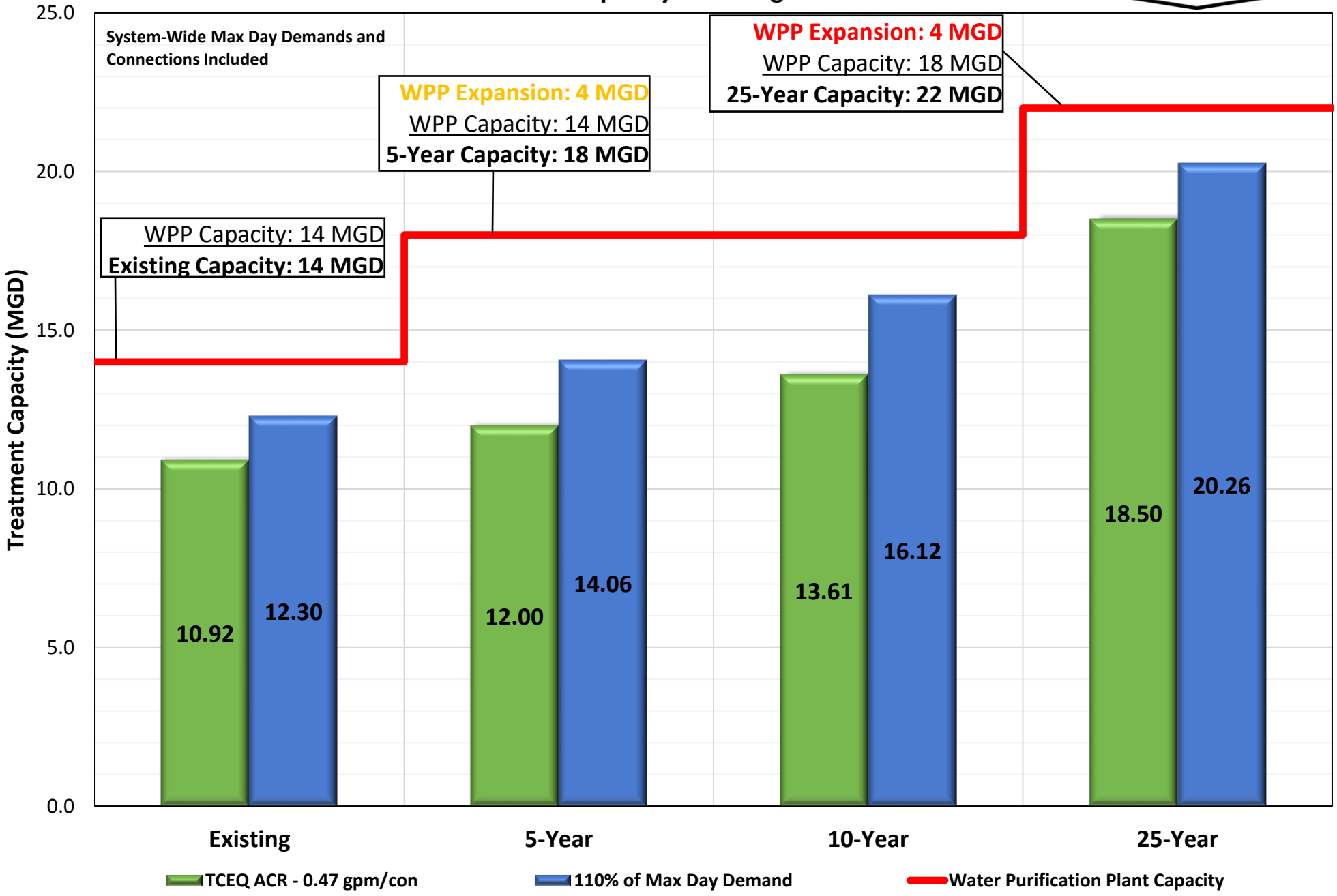
Note: Required pumping depends on available elevated storage. Meeting 200 gal/con of elevated storage requires 0.60 gpm/con of pumping. If not, the City has an ACR requiring 0.64 gpm/con.

Figure 6-23
LaSalle Pressure Plane
Firm Pumping Capacity Planning



Note: Required pumping depends on available elevated storage. Meeting 200 gal/con of elevated storage requires 0.60 gpm/con of pumping. If not, the City has an ACR requiring 0.64 gpm/con.

Figure 6-24
Water Purification Plant
Capacity Planning



7.0 WATER DISTRIBUTION SYSTEM RISK-BASED ASSESSMENT

As part of the Water and Wastewater Master Plan Update, FNI developed a risk-based assessment (RBA) for the City's water distribution system. The goal of the RBA program is to develop a more proactive approach to maintaining the City's pressurized water mains through effective rehabilitation and renewal.

FNI conducted an RBA analysis to assign condition and criticality scores to water lines owned by the City. These scores were then used to determine a risk score for each asset.

7.1 WATER MAIN CONDITION ASSESSMENT

7.1.1. Water Main Condition Parameters

The condition of the City's water mains were evaluated based on material, age, and work order history. These condition parameters are defined as follows:

- **Material:** Based on supplied GIS data or from as-built records.
- **Age:** Based on the installation year given in the GIS data or as-built records.
- **Work Order History:** Based on geocoded exports (x-y coordinates) from the City's work order database that includes the work order description and infrastructure type.

Weighting, criteria, and scoring for each parameter used in the water main condition assessment are presented in **Table 7-1**. A series of charts summarizing the water main condition assessment were developed for each parameter. The higher the score, the higher the likelihood of failure (LOF) of the asset. **Appendix E** contains a series of maps showing the distribution of scores for each parameter throughout the distribution system.

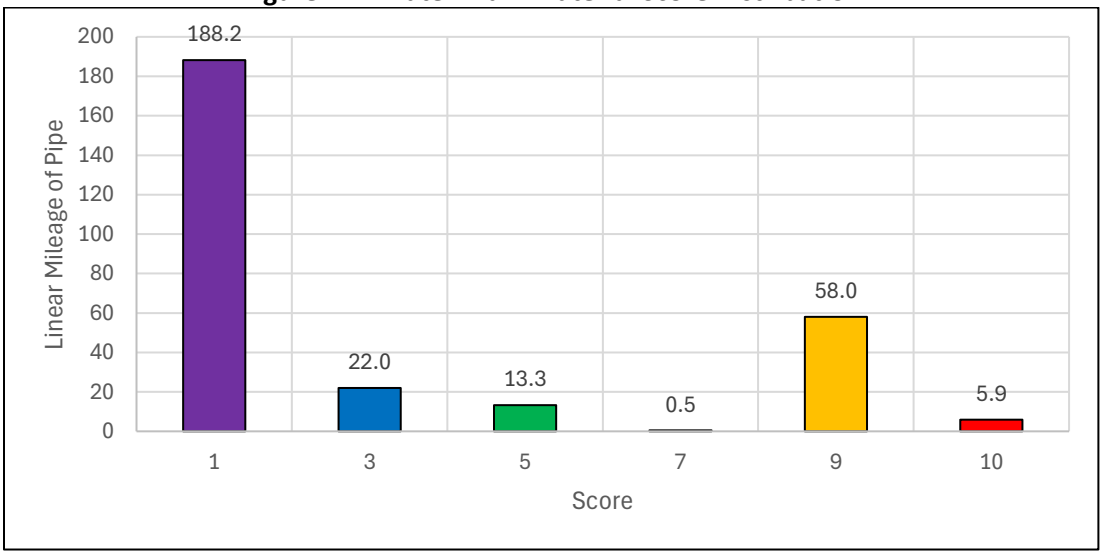
Table 7-1: Water Main Condition Assessment Parameters

Weighting	Parameter	Criteria	Score
35%	Material	AC/GALV	10
		CI	9
		CU/Steel	7
		CPP	5
		DI	3
		HDPE/POLY/PVC	1
55%	Age	Before 1950/Unknown	10
		1950 ≤ Install Date ≤ 1969	8
		1970 ≤ Install Date ≤ 1989	6
		1990 ≤ Install Date ≤ 1999	4
		2000 ≤ Install Date ≤ 2009	2
		2010 and Later	1
10%	Work Order History[1]	Two or More Work Orders	10
		One Work Order	5
		No Work Order History	1

[1]Work order data received from City staff for 2018-2023

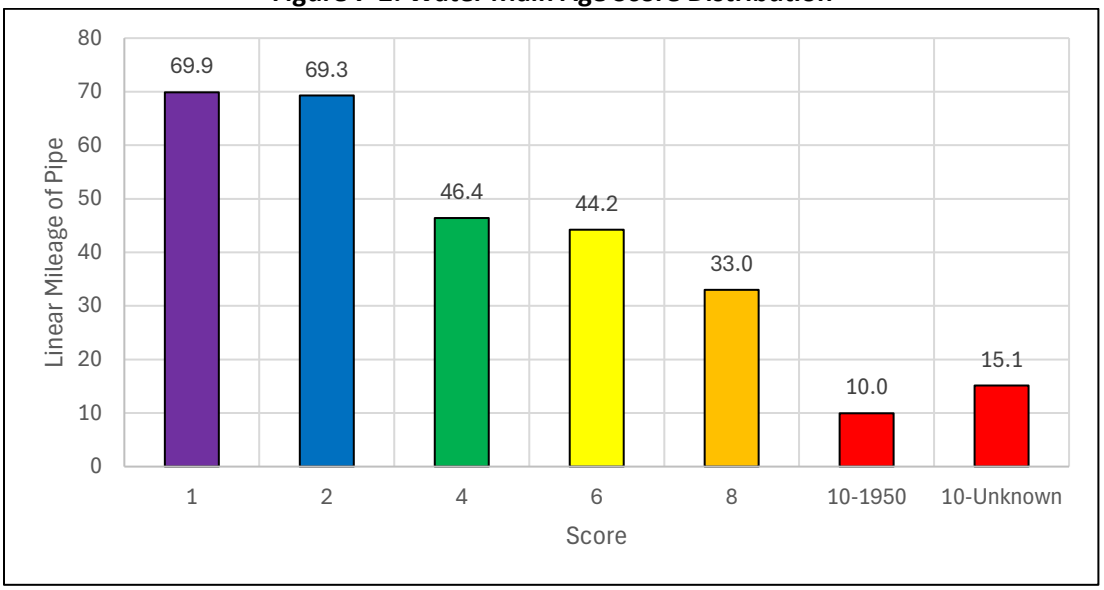
The water main score by length is summarized in **Figure 7-1**. As shown in this figure, most of the distribution system is made of HDPE, POLY, or PVC.

Figure 7-1: Water Main Material Score Distribution



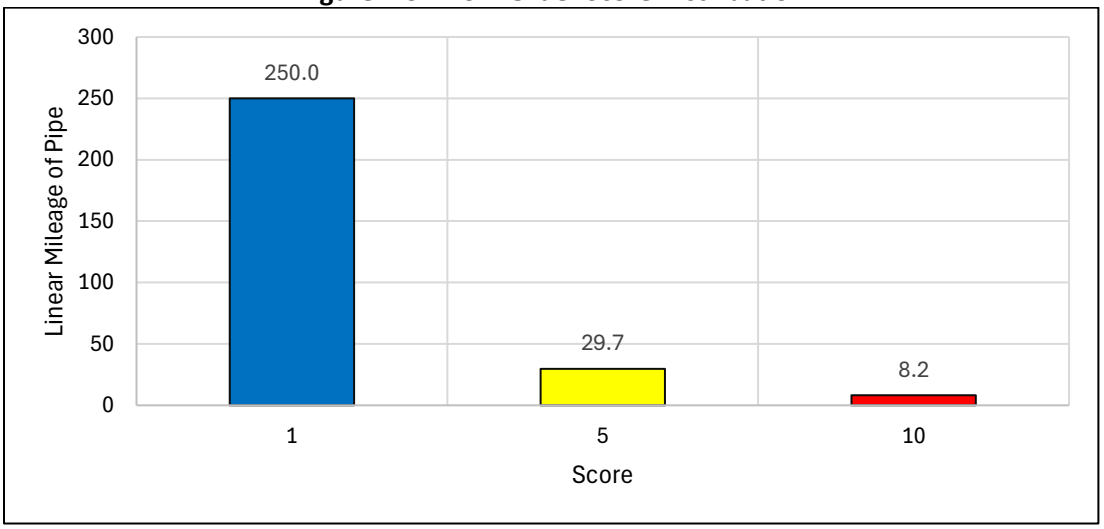
The water main age score summarized by length is presented in **Figure 7-2**. This distribution shows that approximately 48% of the distribution system is under 25 years of age. A majority of the pipe, based on linear mileage, was installed between 1990 and 2024. Pipes older than 25 years are observed primarily in the City's downtown district.

Figure 7-2: Water Main Age Score Distribution



The water main work order score by length is summarized in **Figure 7-3**. As shown in this figure, the majority of the distribution system had no work orders.

Figure 7-3: Work Order Score Distribution



7.1.2. Water Main Condition Assessment Results

Water main condition scores were calculated for each segment by totaling the weighted individual scores for each parameter to develop a LOF score. The scores were then grouped into ranges, and qualitative descriptions of Very Good to Very Poor condition were assigned. The definitions for each scoring range

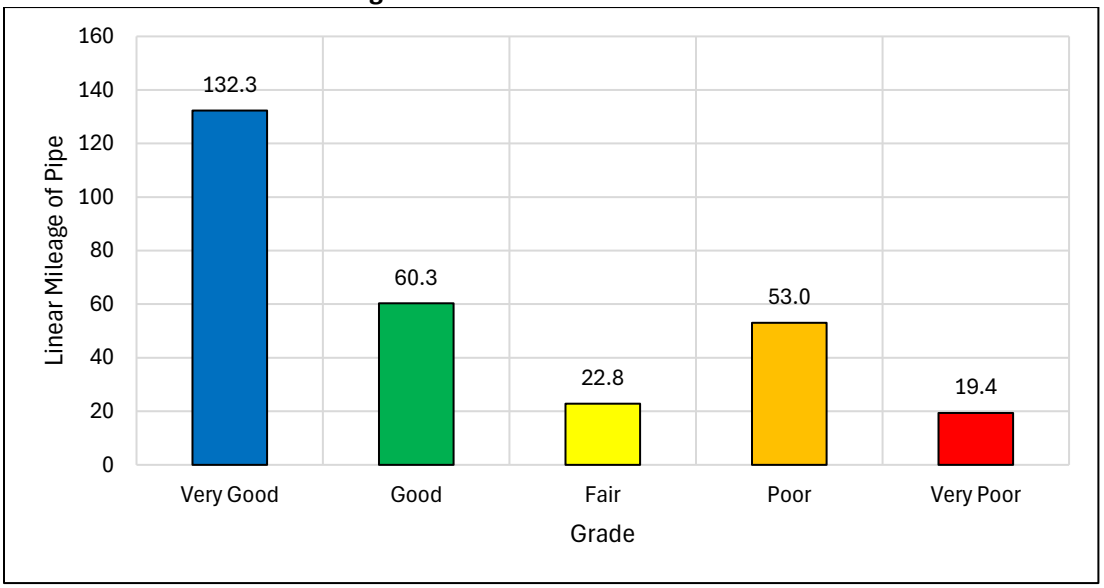
are presented in **Table 7-2**. The results of the water main condition assessment are presented in **Figures 7-4** and **7-5**.

Based on the weightings and scores, approximately 6.7% of the distribution system is estimated to be in the Very Poor category, indicating poor condition. Like the age and material distribution, these scores are primarily seen in the downtown region of the City.

Table 7-2: Water Main LOF Score Range and Results

Total LOF Score	LOF Score Range	Length (mi)	% of System
Very Low	0.0 – 2.0	132.3	46.0%
Low	2.0 – 4.0	60.3	21.0%
Medium	4.1 – 6.0	22.8	7.9%
High	6.1 – 8.0	53.0	18.4%
Very High	8.1 – 10.0	19.4	6.7%
Total		**287.8**	**100.00%**

Figure 7-4: LOF Score Distribution



0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

0.25 MG Dubellette EST
Ground Elev. = 1,165.83'
Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

0.5 MG Newport EST
Ground Elev. = 1,172'
Overflow Elev. = 1,320'

2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
(3) - 2,610 gpm Pumps

0.5 MG West Park EST
Ground Elev. = 1,166'
Overflow Elev. = 1,257'

West Lake PS
(1) - 710 gpm Pump
(1) - 740 gpm Pump
(1) - 400 gpm Pump

0.2 MG "New" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.25 MG Oakridge EST
Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD
Water Treatment Plant

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

0 2,000 4,000
SCALE IN FEET

PRESSURE PLANES
- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

CONDITION SCORE
- Very Good
- Good
- Fair
- Poor
- Very Poor

FIGURE 7-5
CITY OF WEATHERFORD
EXISTING WATER SYSTEM RISK-BASED ASSESSMENT TOTAL CONDITION SCORE (LIKELIHOOD OF FAILURE)

LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Treatment Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

1858 WEATHERFORD TRUE TEXAS

FREESE AND NICHOLS

Created By Freese and Nichols, Inc.
Job No.: WEAN002
Location: H:\W_WW_PLANNING\D01_DELIVERABLES\00_FINAL_REPORT\02_FINAL_MP_REPORT\FINAL_REPORT_PRO_PROJECT\FINAL_REPORT_PRO_PROJECT.aprx\Figure_7-05\W_RBA_LOF_ConditionScore
Updated: Wednesday, July 23, 2020 10:33 AM
User Name: DB17

7.2 WATER MAIN CRITICALITY ASSESSMENT

7.2.1. Water Main Criticality Parameters

The criticality of the City's water mains was assessed based on diameter, accessibility, potential environmental concerns, and critical customers served. The criticality parameters used for this study include:

- **Diameter:** Based on the diameter of the water line using GIS data and as-built information.
- **Resiliency:** Based on redundant water lines and looping.
- **Traffic Impact:** Highway, railroad, and arterial road crossing based on GIS data.
- **Critical Customers:** Based on proximity to critical customers identified by the City.

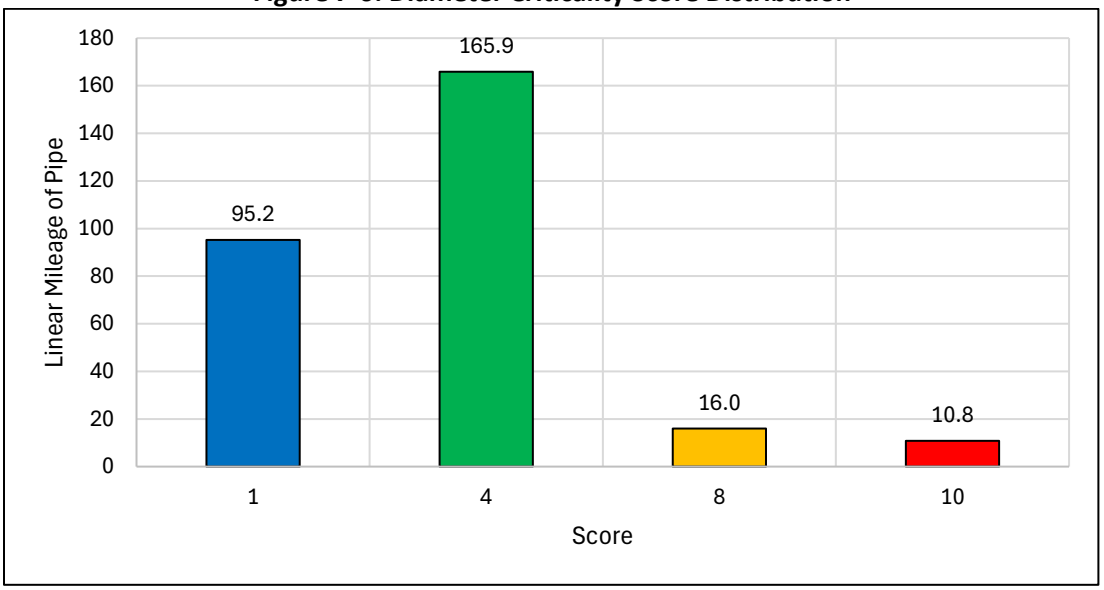
Weighting, criteria, and scoring for each parameter used in the water main criticality assessment are presented in **Table 7-3**. A series of charts summarizing the water main criticality assessment were developed for each parameter. Unlike condition, the criticality of a line rarely changes, as it is based on proximity to certain features or pipe size. **Appendix E** contains a series of maps showing the distribution of scores for each parameter throughout the distribution system.

Table 7-3: Water Main Criticality Assessment Parameters

Weighting	Parameter	Criteria	Score
35%	Diameter	24-inch and Larger	10
		14-inch to 20-inch	8
		8-inch to 12-inch	4
		Less than 8-inch	1
10%	Resiliency	Non-Redundant Pipe	10
		Redundant Pipe	1
20%	Accessibility / Traffic Impact	Within 150 Feet of Railroad	10
		Within 50 Feet of Highway	8
		Within 50 Feet of Thoroughfare	6
		Within 50 Feet of Collector	4
		Within 50 Feet of Other Road Types	2
		Outside of Traffic Impact	1
35%	Critical Customers	Hospitals/Dialysis Centers/Jail	10
		Schools	8
		Retirement Homes/Other Medical	6
		No Critical Customers	1

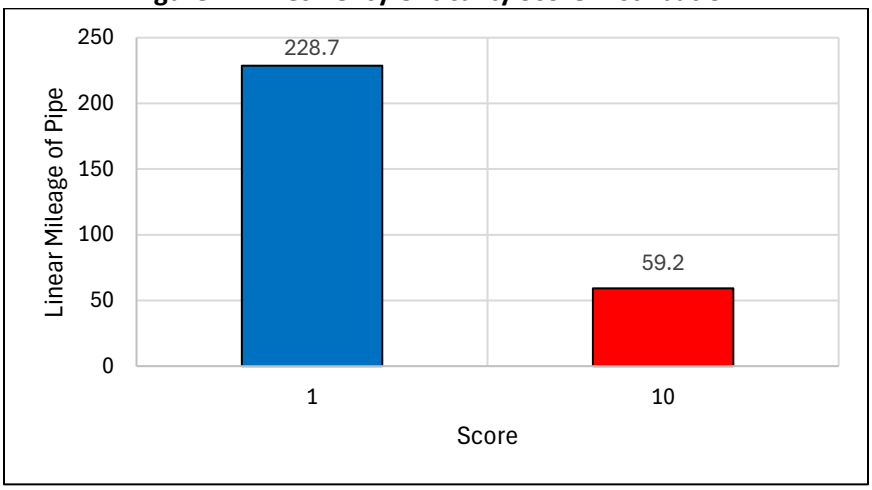
The water main diameter score by length is presented in **Figure 7-6**. Approximately 90% of the system is 12 inches and below, and approximately 4% is greater than 24 inches.

Figure 7-6: Diameter Criticality Score Distribution



The water main resiliency score by length is presented in **Figure 7-7**. As shown in this figure, a significant portion of the distribution system has redundant water lines or looping. With approximately 80% of the system being redundant.

Figure 7-7: Resiliency Criticality Score Distribution



Water main traffic impact score by length is presented in **Figure 7-8**. As shown in this figure, approximately 88% of the system is neither within 150 feet of a railroad or 50 feet of a highway or thoroughfare.

Figure 7-8: Traffic Impact Criticality Score Distribution

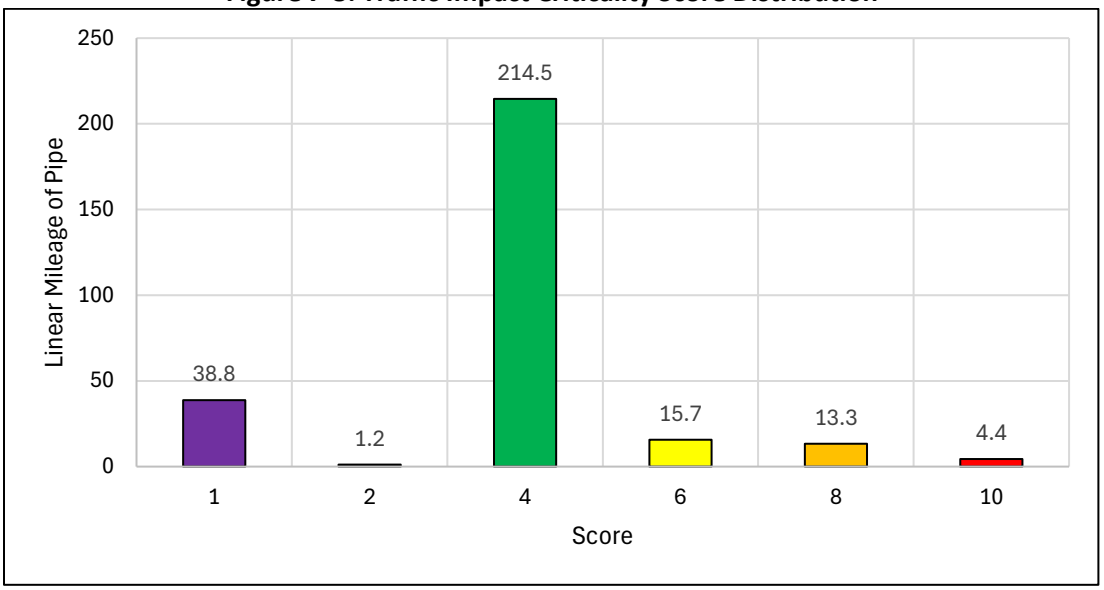
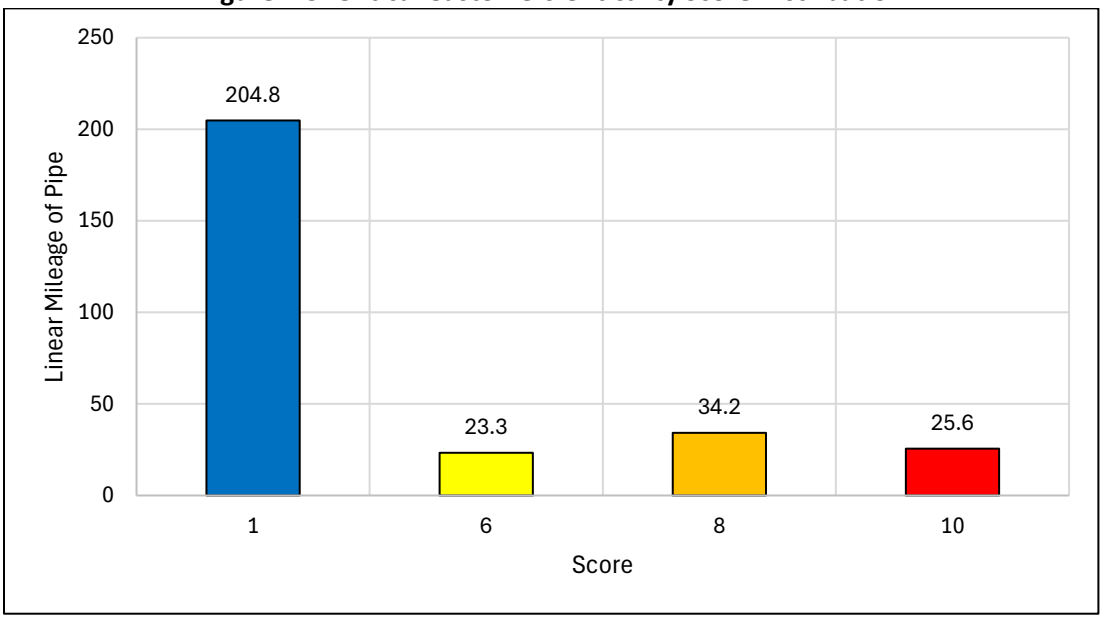


Figure 7-9 shows the water main critical customers' scores by length. Water critical customers are those that require water services to operate properly, such as major developments like medical facilities and schools.

Figure 7-9: Critical Customers Criticality Score Distribution



7.2.2. Water Main Criticality Assessment Results

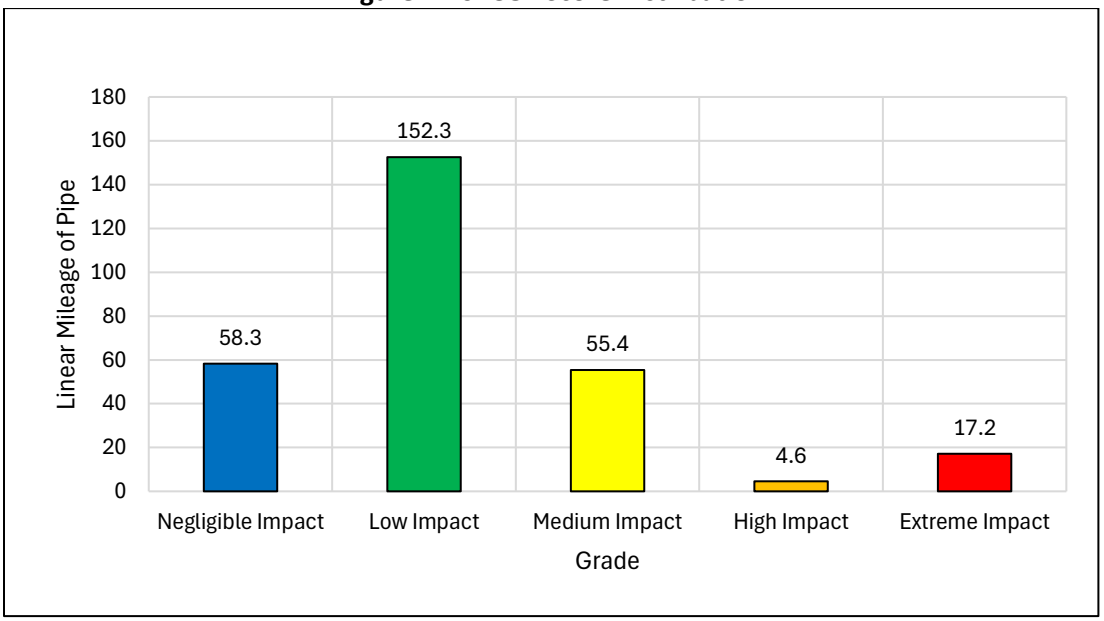
Water main criticality scores were calculated for each pipeline segment by totaling the weighted individual scores for each parameter to develop a total consequence of failure (COF) score. The scores were then grouped into ranges, and descriptive scores of Low to High Impact were assigned. The definitions for each scoring range are presented in **Table 7-4**. The results of the water main criticality assessment are presented in **Figures 7-10** and **7-11.**

Based on the weightings and scores, approximately 73.2% of the distribution system is estimated to have a negligible or low impact of failure. The areas indicating High or Extreme COF for the City are the larger diameter transmission mains.

Table 7-4: Water Main COF Score Range and Results

Total COF Score	COF Score Range	Length (mi)	% of System
Negligible Impact	0.0 – 2.0	58.3	20.2%
Low Impact	2.1 – 4.0	152.3	53.0%
Medium Impact	4.1 – 6.0	55.4	19.2%
High Impact	6.1 – 8.0	4.6	1.6%
Extreme Impact	8.1 – 10.0	17.2	6.0%
	Total	**287.8**	**100.00%**

Figure 7-10: COF Score Distribution



0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

0.25 MG Dubellette EST
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Overflow Elev. = 1,257.38'

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Overflow Elev. = 1,186.46'

0.5 MG Newport EST
Ground Elev. = 1,172'
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2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
(3) - 2,610 gpm Pumps

0.5 MG West Park EST
Ground Elev. = 1,166'
Overflow Elev. = 1,257'

West Lake PS
(1) - 710 gpm Pump
(1) - 740 gpm Pump
(1) - 400 gpm Pump

0.2 MG "New" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.25 MG Oakridge EST
Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD
Water Treatment Plant

Lake Weatherford
Willow Park
Hudson Oaks
Annetta North

0 2,000 4,000
SCALE IN FEET

PRESSURE PLANES

- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

CRITICALITY SCORE

- Negligible Impact
- Low Impact
- Medium Impact
- High Impact
- Extreme Impact

FIGURE 7-11

CITY OF WEATHERFORD

EXISTING WATER SYSTEM RISK-BASED ASSESSMENT TOTAL CRITICALITY SCORE (CONSEQUENCE OF FAILURE)

LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Treatment Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

1858 WEATHERFORD TRUE TEXAS

FREESE AND NICHOLS

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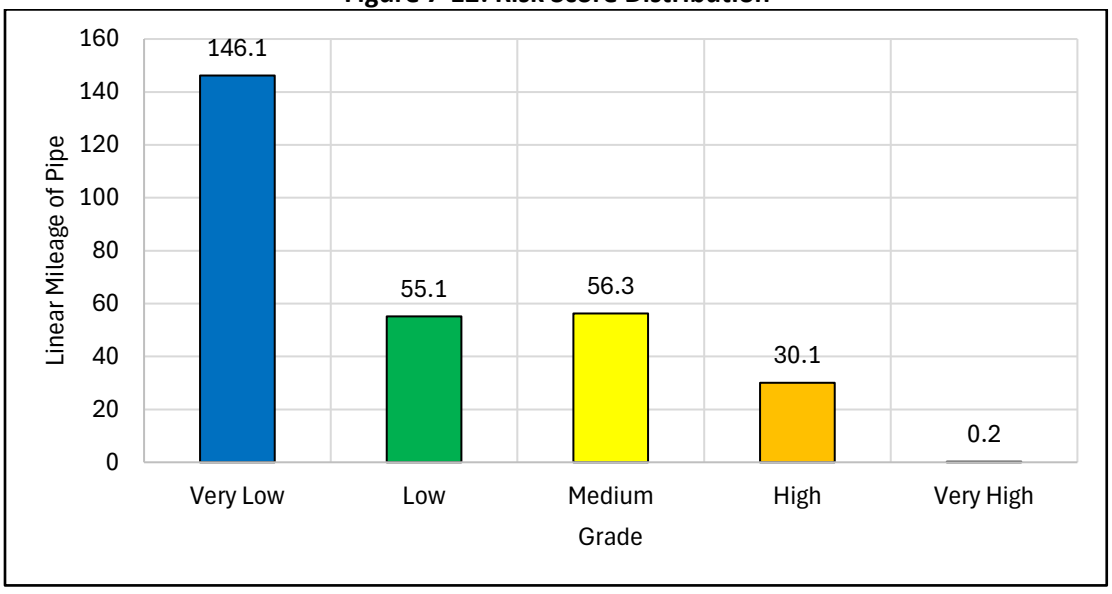
7.3 WATER MAIN TOTAL RISK SCORE

A total risk score was assigned to each water main by adding the total condition score (LOF) and criticality score (COF) after applying their respective weightings. Through discussions with City staff, the LOF scores were weighted higher than COF scores for calculating the total risk score. This analysis assumes a 70% to 30% weighting split between LOF and COF scores, respectively. The 1 to 10 risk scores were adjusted to range from 1 to 100, and then inverted so that a lower number (lowest possible of 1) represents pipes of very poor quality and extreme criticality. The water main total risk scores were then grouped into ranges, and descriptive scores of Very Low to Very High were assigned. The water main risk-based assessment results are summarized in **Table 7-5** and displayed in **Figures 7-12** and **7-13**.

Table 7-5: Water Main Risk Scoring Results

Risk Grade	Risk Score Range	Length (mi)	% of System
Very Low	100 – 80.1	146.1	50.8%
Low	80 – 60.1	55.1	19.2%
Medium	60 – 40.1	56.3	19.5%
High	40 – 20.1	30.1	10.4%
Very High	20 - 1	0.2	0.1%
	Total	287.8	100.00%

Figure 7-12: Risk Score Distribution



0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

0.25 MG Dubellette EST
Ground Elev. = 1,165.83'
Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

0.5 MG Newport EST
Ground Elev. = 1,172'
Overflow Elev. = 1,320'

2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
(3) - 2,610 gpm Pumps

0.5 MG West Park EST
Ground Elev. = 1,166'
Overflow Elev. = 1,257'

West Lake PS
(1) - 710 gpm Pump
(1) - 740 gpm Pump
(1) - 400 gpm Pump

0.2 MG "New" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.25 MG Oakridge EST
Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD
Water Treatment Plant

Lake Weatherford
Willow Park
Hudson Oaks
Annetta North

PRESSURE PLANES

- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

RISK SCORE

- Very Low
- Low
- Medium
- High
- Very High

0 2,000 4,000
SCALE IN FEET

FIGURE 7-13
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
RISK-BASED ASSESSMENT
TOTAL RISK SCORE
70% CONDITION, 30% CRITICALITY

LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Treatment Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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8.0 PUMP STATION RISK-BASED ASSESSMENT

An RBA was performed on all seven of the City's pump stations. The RBA consisted of a condition assessment and a criticality assessment. The condition assessment included a visual inspection of each pump station. The criticality, or COF, assessment included an analysis of the proximity of each pump station to critical areas, as well as the population served. Each pump station was assigned condition and criticality scoring based on the results on the assessments. The condition and criticality scores were used to assign a risk category (extreme, high, moderate, or low) to each pump station.

8.1 PUMP STATION CONDITION ASSESSMENT

FNI developed a list of electrical, structural, mechanical, and site components to be inspected at each pump station site. A condition weight factor was assigned to each component group based on the importance of the component to the overall function of the pump station. Major components in each of these categories were evaluated separately. **Table 8-1** illustrates the condition component groups, parameters, and weighting for the pump station facilities.

Table 8-1: Pump Station Condition Assessment Component Group and Weighting

Component Group	Weight Factor
Pumps and Motors	20%
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-Up Power, Cables	20%
Instrumentation and Controls – SCADA Cabinet, Pump Controls, Communications	15%
Structure – Hatches, Corrosion, Cracks, Leaking	15%
Piping and Valves	10%
Mechanical – Ventilation, Odor Control	10%
Site – Drainage, Access Drive, Security, Fencing	10%
Total Weighting	**100%**

Numerical scores were assigned to each component based on the physical condition as seen during the inspection and information provided by City staff relating to its operational performance. Each component group received a score between 1 and 5. **Table 8-2** shows the guidelines used during assignments of numerical scores for component group conditions.

Table 8-2: Scoring Guidelines for Condition Assessment for Pump Stations

Condition Rating	Description
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

Site visits of the seven pump stations were conducted by the City and FNI, and inspection scoring sheets were developed for each pump station. The inspection sheets included details of the pump station such as number of pumps, design capacity, and the condition components. Each member of the team was provided with a scoring sheet for each pump station that was to be inspected. As a group, inspectors assigned final scores to each component and recorded written comments. The condition assessment sheets for each pump station are included in **Appendix F**.

Once the site visits for all pump stations were completed, ranges were assigned for the condition scores, and categories were designated from Very Good to Very Poor as shown in **Table 8-3**. Final condition scores for each pump station are shown in **Table 8-4**. Based on the results of the condition assessment, the Raw Water Pump Station was rated in Very Poor condition.

Table 8-3: Pump Station Condition Rating

Condition Rating	Minimum	Maximum
Very Good	0.00	1.39
Good	1.40	2.49
Fair	2.50	2.99
Poor	3.00	3.39
Very Poor	3.40	5.00

Table 8-4: Pump Station Condition Results

Pump Station	Condition Score	Condition Rating
Dubellette	1.6	Good
Harberger Hill	2.8	Fair
West Lake	1.7	Good
HSPS	2.5	Fair
College Hill	2.0	Good
Raw Water PS	3.5	Very Poor
Benbrook	2.1	Good

8.2 PUMP STATION CRITICALITY ASSESSMENT

In addition to condition scores, each pump station was assigned a criticality score based on the following three categories:

- Total population served
- Critical customers served
- Resiliency/Redundancy

These categories were weighted based on input from City staff. **Table 8-5** shows the scoring parameters used and the weighting factors assigned to each pump station criticality category.

Table 8-5: Pump Station Criticality Scoring Categories and Weighting

Criticality Parameters and Weighting	
Serves Critical Customers (20%)	**Population Served (30%)**
Hospitals / Dialysis Centers / Jail = 5	> 12,000 = 5
Schools = 4	8,000 - 12,000 = 4
Retirement Homes / Other Medical = 3	4,000 - 8,000 = 3
Other = 2	1,000 - 4,000 = 2
No Critical Customers = 1	≤ 1,000 = 1
Resiliency/Redundancy (50%)	
Served Pressure Plane Does Not Have Redundant Feed = 5	
Served Pressure Plane Has Redundant Feed = 1	

GIS tools were utilized to determine the critical customers served by each pump station. The hydraulic model was used to determine the existing population served by each pump station. Resiliency/Redundancy was determined based on the City's ability to transfer water from the Miller Pressure Plane to either the Franklin or Dubellette Pressure Planes. The two raw water pump stations also provide redundancy for each other.

Similar to the condition scores, the criticality scores were grouped in categories from Negligible to Extreme Impact. **Table 8-6** shows the scores associated with rating categories of the criticality assessment. The criticality scores for the pump stations are shown in **Table 8-7**.

Table 8-6: Pump Station Criticality Scoring Range

Criticality Rating	Minimum	Maximum
Negligible Impact	0.00	1.49
Low Impact	1.50	1.99
Medium Impact	2.00	2.99
High Impact	3.00	3.49
Extreme Impact	3.50	5.00

Table 8-7: Pump Station Criticality Scoring Results

Pump Station	Criticality Score	Criticality Rating
Dubellette	4.2	Extreme Impact
Harberger Hill	1.9	Low Impact
West Lake	3.9	Extreme Impact
HSPS	5.0	Extreme Impact
College Hill	2.5	Medium Impact
Raw Water PS	3.0	High Impact
Benbrook	3.0	High Impact

8.3 PUMP STATION RISK ASSESSMENT

FNI utilized the results of the condition and criticality assessments to develop an RBA of the seven pump stations the City currently operates. Risk scores were determined by comparing the condition and criticality results within an overall risk matrix. Each pump station's risk was determined by its location in the risk matrix shown in **Table 8-8**.

Table 8-8: Pump Station Risk Scoring Matrix

		Condition				
		Very Good	Good	Fair	Poor	Very Poor
Criticality	Negligible Impact	-	-	-	-	-
	Low Impact	-	-	Harberger Hill	-	-
	Medium Impact	-	College Hill	-	-	-
	High Impact	-	Benbrook	-	-	Raw Water PS
	Extreme Impact	-	Dubellette, West Lake	HSPS	-	-

9.0 WATER DISTRIBUTION SYSTEM CAPITAL IMPROVEMENT PLAN

The goal of a CIP is to address existing deficiencies in the system, as well as provide capacity for future demand of the water distribution system. Upon completion of the water model representing existing and future demand conditions, the capital improvement projects were analyzed and phased into the planning period in which they are hydraulically necessary. The purpose of each improvement is discussed in this section. **Table 9-1** summarizes the cost of the water distribution system CIP. **Figure 9-1** illustrates the proposed CIP projects.

Table 9-1: Water Capital Improvements Plan Cost Summary

Project Number	Project Name	Cost
5-Year Projects		
1	Center Point Road 12-inch Water Line Extension	$2,840,500
2	I-20 West 12-inch Water Line Replacement and Extension	$2,048,200
3	Ric Williamson South Loop 12-inch Water Line Extension Phase 1	$5,062,100
4	Old Brock Road 12-inch Water Line Extension	$7,169,400
5	LaSalle 12/16-inch Water Line Extension Phase 1	$5,897,800
6	7th Street/Franklin Street 12-inch Water Line Replacement	$847,700
7	Ric Williamson Northwest 12-inch Water Line Extension	$560,700
8	Harberger Pump Station Expansion	$1,291,700
9	Ric Williamson North Loop 24-inch Water Line Extension Phase 1	$14,105,400
10	Ric Williamson North Loop 24-inch Water Line Extension Phase 2	$9,239,100
5-Year Total		**$49,062,600**
10-Year Projects		
11	Suzanne Trail 24-inch Water Line Extension	$4,440,200
12	Ric Williamson North Loop 20-inch Water Line Extension	$2,952,700
13	0.50 MG Patriot EST and 12-inch Water Line Extension	$10,039,000
14	College Park Drive 24-inch Water Line Replacement	$5,000,800
15	Santa Fe Drive 12-inch Water Line Extension	$586,100
16	Clear Lake Road 16-inch Water Line Extension	$8,207,600
17	Causbie Pump Station and 1.00 MG GST	$12,707,500
10-Year Total		**$43,933,900**

Table 9-1: Water Capital Improvements Plan Cost Summary - Continued

Project Number	Project Name	Cost
25-Year Projects		
18	High Service Pump Station #2 and Water Purification Plant Expansions	$20,930,000
19	1st Street 12-inch Water Line Replacement	$2,257,500
20	New Dubellette Pump Station	$5,651,100
21	Ric Williamson North Loop 12-inch Water Line Extension Phase 1	$2,436,900
22	Northwest Miller Pressure Plane 12-inch Water Line Extensions	$3,909,500
23	Ric Williamson South Loop 12-inch Water Line Extension Phase 2	$2,990,000
24	Old Dennis Road 12-inch Water Line Replacement	$1,308,200
25	Ric Williamson North Loop 12-inch Water Line Replacement and Extension Phase 2	$6,174,400
26	0.50 MG LaSalle EST and Hydropneumatic Tank Decommission	$7,848,800
27	LaSalle 12/16-inch Water Line Extension Phase 2	$8,185,200
	25-Year Total	**$61,691,600**
	CIP Total	**$154,688,100**

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Proposed Transfer from Dubellette/Miller to Franklin PP

Dubellette PS
(2) - 1,400 gpm Pumps

0.25 MG Dubellette EST
Ground Elev. = 1,165.83'
Overflow Elev. = 1,257.38'
(Transfer to Franklin PP)

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

New Dubellette PS
(2) - 750 gpm Pumps

0.5 MG Newport EST
Ground Elev. = 1,172'
Overflow Elev. = 1,320'

College Hill PS
(3) - 2,610 gpm Pumps

2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

0.5 MG West Park EST
Ground Elev. = 1,166'
Overflow Elev. = 1,257'

Miller to Franklin Pressure Reducing Valve

Miller to Franklin Pressure Reducing Valve

Transfer from Franklin to Miller PP

0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Replace Existing 6/8-inch Water Lines

Replace Existing 4/6/8-inch Water Lines

Harberger PS
(2) - 730 gpm Pumps
(1) - 750 gpm Pump

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

Franklin to Central Pressure Reducing Valve

Replace Existing 16-inch Water Lines

Causbie PS
(2) - 1,400 gpm Pumps

1.00 MG Causbie GST
Overflow Elev. = 1,184.87'

0.50 MG Patriot EST
Overflow Elev. = 1,257'

Parallel Existing 24-inch Water Lines

Replace Existing 8-inch Water Lines

0.25 MG Oakridge EST
Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

West Lake PS
(1) - 710 gpm Pump
(1) - 740 gpm Pump
(1) - 400 gpm Pump

0.2 MG "New" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

HSPS #1
(4) - 2,800 gpm Pumps
HSPS #2
(2) - 2,800 gpm Pumps
(2) - 2,800 gpm Pumps

1.0 MG Clearwell #1
1.0 MG Clearwell #2

14.0 MGD Dr. Paul Philips Water Purification Plant
Expand to 18.0 MGD
Expand to 22.0 MGD

0.50 MG LaSalle EST
Overflow Elev. = 1,235'

LaSalle PS
(3) - 750 gpm Pumps

0.50 LaSalle GST
Overflow Elev. = 1,165'

LaSalle Hydropneumatic Tank
Capacity = 15,000 gal
Decommission

Lake Weatherford

Willow Park

Hudson Oaks

PRESSURE PLANES

- Central
- Dubellette
- Franklin
- Miller
- Oakridge
- West Lake
- LaSalle Ranch
- Transfer to Franklin
- Transfer to Miller

PROPOSED IMPROVEMENTS

5-Year Proposed Improvements
- Pump Station
- Water Line

10-Year Proposed Improvements
- Ground Storage Tank
- Elevated Storage Tank
- Pump Station
- Pressure Reducing Valve
- Water Line

25-Year Proposed Improvements
- Elevated Storage Tank
- Pump Station
- Pressure Reducing Valve
- Water Line

The timing of projects shown is subject to change based on development patterns. The utility alignments shown in this figure are for illustration purposes only and do not set the alignments. The alignment of each utility will be determined at the time of the engineering design.

0 2,400 4,800
SCALE IN FEET

FIGURE 9-1
CITY OF WEATHERFORD
WATER SYSTEM
CAPITAL IMPROVEMENTS PLAN

LEGEND

Under Design/Construction
- Ground Storage Tank
- Pump Station
- Water Purification Plant
- Pressure Reducing Valve
- Water Line

Existing Water System
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- Pump Station
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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9.1 FIVE-YEAR CAPITAL IMPROVEMENT PLAN

The Five-Year CIP contains 10 projects, with an estimated total cost of $49,062,600. **Appendix G** contains a detailed summary of each project, highlighting drivers, locations and cost. These projects were selected to be part of the short-term CIP because they address system needs to support existing infrastructure and projected short-term development.

Project #1: Center Point Road 12-inch Water Line Extension

This project consists of the construction of a 12-inch water line from the existing 20-inch line along Center Point Road, looping back to the existing 12-inch line along Fort Worth Highway. This project extends water service to proposed developments that are projected in the five-year planning period.

Project #2: I-20 West 12-inch Water Line Replacement and Extension

This project consists of the construction of a 12-inch water line replacing the existing 8-inch line along I-20, beginning at the existing 12-inch line along East Bankhead Drive. This project also consists of extending a 12-inch line to the proposed 12-inch line from Project #1. This project extends water service to proposed developments that are projected in the five-year planning period.

Project #3: Ric Williamson South Loop 12-inch Water Line Extension Phase 1

This project consists of the construction of a 12-inch water line extending south along the future Ric Williamson South Loop from the existing 16-inch line at the intersection of I-20 and Ric Williamson Memorial Highway. The line turns west to run along Old Brock Road and Dean Road to the existing 8-inch line along Old Dennis Road. This project extends water service to proposed developments that are projected in the five-year planning period. This project also improves transmission capacity to the southwestern portion of the Dubellette Pressure Plane.

Project #4: Old Brock Road 12-inch Water Line Extension

This project consists of the construction of a 12-inch water line along Old Brock Road, Dennis Road, and the I-20 Frontage Road from Project #3 to the existing 14-inch line that crosses I-20 from Roark Lane. This project extends water service to proposed developments that are projected in the five-year planning period. This project also improves transmission capacity to the southwestern portion of the Dubellette Pressure Plane.

Project #5: LaSalle 12/16-inch Water Line Extension Phase 1

This project consists of the construction of a 16-inch water line along Pearson Ranch Road from the LaSalle Pump Station to the northern extents of the LaSalle Development. This project also consists of extending a 12-inch water line east along the southern boundary of the LaSalle Development, approximately 2,700 feet from the LaSalle PS. This project extends water service to proposed developments that are projected in the five-year planning period and will establish the LaSalle Pressure Plane distribution system.

Project #6: 7th Street/Franklin Street 12-inch Water Line Replacement

This project consists of the construction of a 12-inch water line replacing the existing 6/8-inch water lines along Franklin Street and 7th Street from the Franklin Elevated Storage Tank to the existing 12-inch line along Main Street. This project improves transmission capacity and reduces existing hydraulic restrictions from the Harberger Pump Station to the Franklin Elevated Storage Tank.

Project #7: Ric Williamson Northwest 12-inch Water Line Extension

This project consists of the construction of a 12-inch water line along Ric Williamson Memorial Highway from the existing 12-inch water line at the intersection of Ric Williamson Memorial Highway and Berkley Drive to the under-design/construction 12-inch line at the intersection of Ric Williamson Memorial Highway and Dartmouth Drive. This project improves transmission capacity and reduces existing hydraulic restrictions to the northern portion of the Miller Pressure Plane, and it is associated with transferring the existing residential development west of North Main Street from the Franklin Pressure Plane to the Miller Pressure Plane.

Project #8: Harberger Pump Station Expansion

This project consists of expanding the Harberger Pump Station with one 750 gpm pump. This project increases the firm pumping capacity of the Harberger Pump Station to meet the TCEQ 0.64 gpm/connection alternative pumping capacity requirement for the Franklin Pressure Plane.

Project #9: Ric Williamson North Loop 24-inch Water Line Extension Phase 1

This project consists of the construction of a 24-inch water line along the Ric Williamson Memorial Highway North Loop from the existing 24-inch line along Meadowview Road to approximately 15,000 feet west. This project will help establish the City's third major transmission main to convey water to the western portion of the Central Pressure Plane. The north loop transmission main improves transmission

capacity from the City's WPP and provides overall system resiliency.

Project #10: Ric Williamson North Loop 24-inch Water Line Extension Phase 2

This project consists of the construction of a 24-inch water line along the Ric Williamson Memorial Highway North Loop and Upper Denton Road from the existing 20-inch water line at the intersection of Front Street and Tremont Street to the proposed 24-inch line from Project #9. This project will help establish the City's third major transmission main to convey water to the western portion of the Central Pressure Plane. The north loop transmission main improves transmission capacity from the City's WPP and provides overall system resiliency.

9.2 TEN-YEAR CAPITAL IMPROVEMENT PLAN

The Ten-Year CIP contains seven projects, with an estimated total cost of $43,933,900. **Appendix G** contains a one-page summary of each project highlighting drivers, location and cost.

Project #11: Suzanne Trail 24-inch Water Line Extension

This project consists of the construction of a 24-inch line paralleling the existing 24-inch line along Suzanne Trail from the intersection of Suzanne Trail and North Oakridge Drive to the proposed 24-inch line from Project #9. This project will help establish the City's third major transmission main to convey water to the western portion of the Central Pressure Plane. This project reduces the existing hydraulic restriction from the existing 36-inch line from the WPP to the Ric Williamson Memorial Highway.

Project #12: Ric Williamson North Loop 20-inch Water Line Extension

This project consists of the construction of a 20-inch water line along Ric Williamson Memorial Highway from the existing 20-inch line at the intersection of the Ric Williamson Memorial Highway and Fort Worth Highway to the proposed 24-inch line from Project #9. This project will help establish the City's third major transmission main to convey water to the western portion of the Central Pressure Plane. This project reduces the existing hydraulic restriction from the existing 36-inch line from the WPP to the Ric Williamson Memorial Highway.

Project #13: 0.50 MG Patriot EST and 12-inch Water Line Extension

This project consists of the construction of a 0.50 MG Elevated Storage Tank on Patriot Drive in the Dubellette Pressure Plane. This project also consists of a 12-inch water line from the under-design/construction 12-inch line along Tin Top Road to the existing 12-inch line along Bethel Road. This project increases the elevated storage capacity of the Dubellette Pressure Plane to meet the TCEQ 100 gallons/connection requirement. This water line will also extend water service to proposed developments.

Project #14: College Park Drive 24-inch Water Line Replacement

This project consists of the construction of a 24-inch water line replacing the existing 16-inch line from the College Hill Pump Station along College Park Drive to the existing 16-inch line along Santa Fe Drive. This project will reduce existing hydraulic restrictions from the Central Pressure Plane to the College Hill Pump Station.

Project #15: Santa Fe Drive 12-inch Water Line Extension

The project consists of the construction of a 12-inch water line along Santa Fe Drive from East Lee Avenue to the Holland Lake Trail, tying into existing 12-inch lines at both ends. This project will loop two of the City's major transmission mains, improving system resiliency and reducing existing hydraulic restrictions in the Central Pressure Plane.

Project #16: Clear Lake Road 16-inch Water Line Extension

This project consists of the construction of a 16-inch water line from Causbie Road east to Clear Lake Road and then north to the existing 20-inch line along I-20. This project will extend the Central Pressure Plane distribution system to the proposed Causbie Pump Station and Ground Storage Tank.

Project #17: Causbie Pump Station and 1.00 MG GST

This project consists of the construction of a 1.00 MG Ground Storage Tank and 2,800 gpm Pump Station along Causbie Road. This project increases the firm pumping capacity to the Dubellette Pressure Plane to meet the TCEQ 0.64 gpm/connection alternative pumping capacity requirement. This project also provides additional water supply to the Dubellette Pressure Plane.

9.3 TWENTY-FIVE-YEAR CAPITAL IMPROVEMENT PLAN

The Twenty-Five-Year CIP contains 10 projects, with an estimated total cost of $61,691,600. **Appendix G** contains a one-page summary of each project highlighting drivers, location and cost.

Project #18: High Service Pump Station #2 and Water Purification Plant Expansions

This project consists of adding two 2,800 gpm pumps to the High Service Pump Station #2 and a 4.00 MGD expansion of the Dr. Paul Philips Water Purification Plant. This project increases the firm pumping capacity of the High Service Pump Station #2 to meet the TCEQ 0.64 gpm/connection alternative pumping capacity requirement. This project also increases the WPP capacity to meet the TCEQ 0.47 gpm/connection alternative treatment capacity requirement.

Project #19: 1st Street 12-inch Water Line Replacement

This project consists of the construction of a 12-inch water line replacing the existing 4/6/8-inch lines along 1st Street from the intersection of 1st Street and Main Street to the existing 12-inch line along Bowie Drive. This project will enable the City to transfer the northern portion of the Dubellette Pressure Plane to the Franklin Pressure Plane.

Project #20: New Dubellette Pump Station

This project consists of the construction of a new pump station with two 750 gpm pumps near the Dubellette Ground Storage and Elevated Storage Tanks. This project will enable the Dubellette Elevated Storage Tank to serve the Franklin Pressure Plane after it is transferred from the Dubellette Pressure Plane.

Project #21: Ric Williamson North Loop 12-inch Water Line Extension Phase 1

This project consists of the construction of a 12-inch water line along the Ric Williamson Memorial Highway from the intersection of Ric Williamson Memorial Highway and Tanglewood Street to the proposed 24-inch line from Project #10. This project extends water service to proposed developments along the Ric Williamson Memorial Highway in the Central Pressure Plane.

Project #22: Northwest Miller Pressure Plane 12-inch Water Line Extensions

This project consists of the construction of 12-inch water lines looping through the northwest portion of the Miller Pressure Plane connecting to the existing 12-inch lines along Ric Williamson Memorial Highway, Vine Street, and the Union Pacific Railroad. This project will extend water service to proposed developments in the Miller Pressure Plane and improve transmission capacity to the northern portion of the Miller Pressure Plane.

Project #23: Ric Williamson South Loop 12-inch Water Line Extension Phase 2

This project consists of the construction of a 12-inch water line extending from the proposed 12-inch line along Old Dennis Road from Project #3 to the proposed 12-inch line along Bethel Road from Project #13. This project will extend water service to proposed developments in the Dubellette Pressure Plane.

Project #24: Old Dennis Road 12-inch Water Line Replacement

This project consists of the construction of a 12-inch water line replacing the 6/8-inch lines along Old Dennis Road from BB Fielder Drive to the proposed 12-inch line from Project #3. This project will reduce hydraulic restrictions in the Dubellette Pressure Plane to serve future developments.

Project #25: Ric Williamson North Loop 12-inch Water Line Replacement and Extension Phase 2

This project consists of constructing a 12-inch water line along Ric Williamson Memorial Highway from the under design/under construction 12-inch line to the proposed 12-inch line from Project #21. This project also consists of a 12-inch water line along Main Street to the existing 12-inch line at the intersection of 7th Street and Main Street, as well as a 12-inch water line looping back to the under-design/construction 12-inch line at the intersection of 2nd Street and King Street. This project will extend the Miller Pressure Plane distribution system.

Project #26: 0.50 MG LaSalle EST and Hydropneumatic Tank Decommission

This project consists of the construction of a 0.50 MG Elevated Storage Tank along Pearson Ranch Road. This project also consists of decommissioning the LaSalle Hydropneumatic Tank along the southern extents of the LaSalle Development. This project increases the elevated storage capacity of the LaSalle Pressure Plane to meet the TCEQ 100 gallons/connection requirement.

Project #27: LaSalle 12/16-inch Water Line Extension Phase 2

This project consists of the construction of a 12-inch water line from the LaSalle Pump Station and loops around the western extents of the LaSalle Pressure Plane to the proposed 12-inch water line from Project #5, and then a 16-inch water line to the proposed LaSalle Elevated Storage Tank from Project #26. This project extends water service to proposed developments that are projected in the LaSalle Pressure Plane.

10.0 EXISTING WASTEWATER COLLECTION SYSTEM

The City's wastewater service area covers approximately 30 square miles. Within the service area, there are approximately 225 miles of sewer lines owned and operated by the City, which includes 200 miles of gravity mains and 25 miles of force mains. The wastewater lines range from 6 inches to 24 inches in diameter and convey wastewater flow to a WWTP in the center of the City with an average day permitted capacity of 4.5 MGD. More than 71% of the collection system piping is PVC and approximately 28% of the collection system is clay pipe, and the collection system ranges in age from less than one year to over 100 years old with a median age of approximately 28 years old. The wastewater collection system is primarily a gravity flow system that follows the major drainage features of the service area, and consists of four sewer basins: the Sanchez Creek, Town Creek, Willow Creek and Lake Basins. The existing wastewater collection system is shown in **Figure 10-1**.

Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.0 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Hudson Oaks #3 LS

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

0 1,900 3,800
SCALE IN FEET

FIGURE 10-1
CITY OF WEATHERFORD
EXISTING WASTEWATER SYSTEM

LEGEND

- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- 50-ft Contour
- 10-ft Contour
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

WATERSHEDS

- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

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10.1 LIFT STATIONS

There are currently 23 lift stations in the wastewater collection system which pump wastewater flow into gravity sewers. These lift stations are required because of local topographic constraints or to pump flows across sewer basins. **Table 10-1** is a list of the lift stations.

Table 10-1: Lift Stations

Lift Station Number	Address	Number of Pumps	Wet Well Size	Firm Capacity (MGD)	Total Capacity (MGD)
1	1200 N. Bowie	2	7’ X 22’	0.40	0.79
3	900 BLK. E. Second	2	8’ X 19.5’	0.72	1.44
4	653 Ethan	2	8’ X 8’ X 12.5’	0.43	0.86
5	501 E. Eighth	2	5’ X 15.2’	0.14	0.29
6	2800 Bethel Road	2	10’ X 21’	1.01	2.02
8	2607 Tin Top Road	2	8’ X 28.5’	1.22	2.45
9	2050 I-20 E.	2	6’ X 22.7’	0.62	1.31
10	1550 Oak Tree Lane	2	5’ X 12’	0.18	0.35
11	1523 E. Lake	2	6’ X 12’	0.20	0.40
12	114 W. Lake	2	6’ X 16’	0.65	1.30
13	3611 Foothills	2	8’ X 8’ X 23’	0.41	0.86
14	601 W. Lake	3	30’ X 23’	1.73	2.60
15	2620 Suzanne Trail	2	17’ X 8’ X 9’	1.01	2.02
16	2440 Scotts Meadow	2	8’ X 29.7’	0.50	1.01
17	325 Sherry Trail	3	20’ X 16’ X 10’	4.00	6.05
18	110 BLK. Reata Circuit	2	8’ X 17.5’	0.56	1.48
19	1100 Terry Trail	2	5’ X 19.5’	0.14	0.29
20	691 Centerpoint	2	6’ X 28.6’	0.72	1.44
21	59L Crown Road	2	8’ X 19’	0.26	0.51
22	204 Pleasant View	2	8’ X 11.2’	0.43	0.86
23	1723 N. Main	2	6’ X 10.2’	0.14	0.29
24	1823 Sandpiper	2	6’ X 9.5’	0.14	0.29
25	1224 I-20 W.	2	10’ X 32’	0.68	1.37

11.0 WASTEWATER FLOW MONITORING

Flow monitoring data is used to examine the existing dry and wet weather flows, evaluate the effects of rainfall on the wastewater collection system and calibrate a hydraulic model to evaluate the capacity of the system to transport peak flows. Flow monitoring is typically performed during spring and fall seasons when the chances of rainfall are greatest.

11.1 FIELD TESTING

Dry and wet weather system responses within the collection system service area were evaluated by installing temporary flow meters in strategic locations to observe and document existing flow conditions. Rainfall data was simultaneously collected with rain gauges. A total of 12 flow meters and two rain gauges were used for this study.

The first consideration for flow meter placement was to monitor the five locations where monitoring was conducted in the previous master plan. For the additional meters, consideration was given to areas of known or suspected capacity issues. Evenly distributed gravity main linear footage among the flow meter basins was a desired outcome during the planning process. **Figure 11-1** presents the locations of the meters and rain gauges. **Figure 11-2** presents the general connectivity of the temporary flow meter locations and how they relate to the overall system. One-meter location, WTH-04, was moved on 5/14/2024 and reinstalled as WTH-04M on 5/15/2024 due to access complications. The location of each flow monitoring site and a comparison of GIS information provided by the City and measured pipe diameters are listed in **Table 11-1**. Site investigation forms with more detailed location information for the flow monitors and rain gauges are included with the subconsultant Advanced Drainage System's (ADS) report in **Appendix H**.

The 12 temporary flow monitors and two temporary rain gauges collected data in the City's collection system between 4/1/2024 and 7/8/2024 for a total monitoring period of 99 days, and they collected data in five-minute time step intervals. Hydrographs (flow vs. time) and flow depth (depth in pipe vs. time) plots for each flow monitor site as well as diurnal patterns showing the weekday and weekend flow patterns for each flow monitor site are also provided in the flow monitoring report in **Appendix H**.

Table 11-1: Flow Monitoring Locations

Meter Basin	City Manhole GIS ID	Measured Pipe Diameter (inches)	GIS Diameter (inches)
WTH-01	1849	12.25	12
WTH-02	678	17.50	18
WTH-03	1611	17.75	18
WTH-04	81096	16.50	18
WTH-04M	1202	14.50	15
WTH-05	4573	24.00	24
WTH-06	N/A	12.00	12
WTH-07	30254	17.62	18
WTH-08	451	11.75	12
WTH-09	36658	**14.38**	**12**
WTH-10	15456	12.00	12
WTH-11	4115	11.00	12
WTH-12	11442	12.00	12

Red text identifies discrepancies between field-measured pipe diameters and GIS data.

Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

WTH-10
Pipe Diameter: 12"

WTH-07
Pipe Diameter: 18"

WTH-06
Pipe Diameter: 12"

WTH-08
Pipe Diameter: 12"

WTH-09
Pipe Diameter: 12"

WTH-03
Pipe Diameter: 18"

WTH-02
Pipe Diameter: 18"

WTH-01
Pipe Diameter: 12"

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

WTH-04M
Pipe Diameter: 15"

WTH-05
Pipe Diameter: 24"

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.0 MGD

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lake Weatherford

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Hudson Oaks #3 LS

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Willow Park

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Hudson Oaks

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

WTH-12
Pipe Diameter: 12"

WTH-11
Pipe Diameter: 12"

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Annetta North

WASTEWATER LINES
BY FLOW METER BASIN

- Not Metered
- WTH-01
- WTH-02
- WTH-03
- WTH-04M
- WTH-05
- WTH-06
- WTH-07
- WTH-08
- WTH-09
- WTH-10
- WTH-11
- WTH-12

FM Basin	Gravity Main Linear Footage
WTH-01	107,900
WTH-02	27,072
WTH-03	48,925
WTH-04M	63,937
WTH-05	108,588
WTH-06	31,339
WTH-07	115,941
WTH-08	111,434
WTH-09	50,866
WTH-10	117,428
WTH-11	31,416
WTH-12	95,070
Unmetered	150,761
Total	**1,060,676**

FIGURE 11-1

CITY OF WEATHERFORD

EXISTING WASTEWATER SYSTEM FLOW METER LOCATIONS

LEGEND

- Flow Meter
- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

0 1,900 3,800

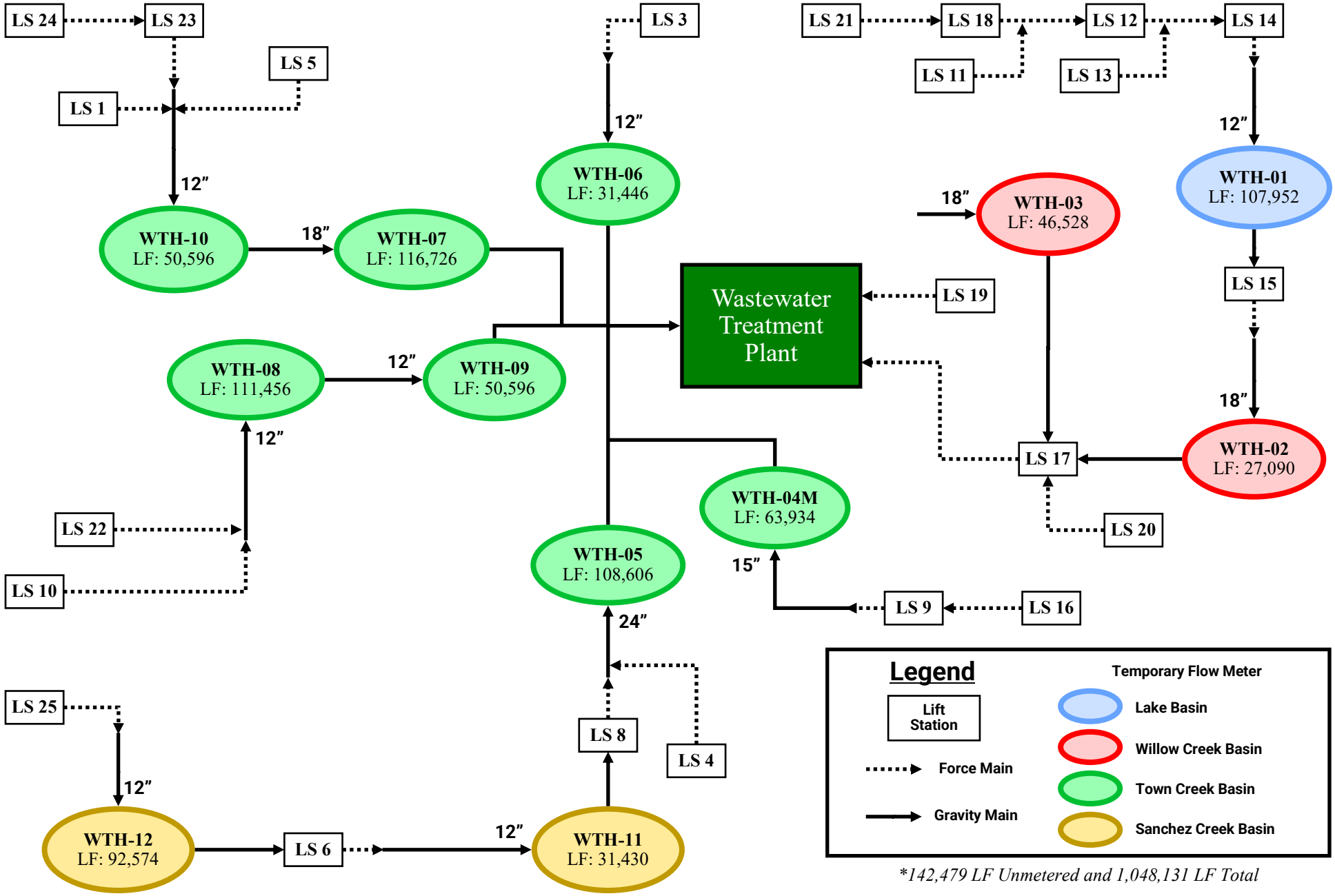
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WEATHERFORD TRUE TEXAS

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Figure 11-2
City of Weatherford
Temporary Flow Monitoring Schematic



*142,479 LF Unmetered and 1,048,131 LF Total

11.2 FLOW METER AND RAIN GAUGE DATA EVALUATION

11.2.1. Rainfall Data Evaluation

All storm events observed during the flow monitoring period had a maximum return frequency of one year or less. The typical design storm event used in Dallas-Fort Worth is the five-year, six-hour storm. Per the NOAA Atlas 14 Point Precipitation Frequency Estimates for Texas, the depth of rainfall for a five-year, six-hour storm is approximately 3.65 inches. The storm durations and total rainfall amounts for the three largest rainfall events are given in **Table 11-2**. The five-minute rainfall intensities are plotted with the flow monitor data on the hydrographs and depth plots in **Appendix H**.

Table 11-2: Largest Rainfall Event Data from Flow Monitoring Period

Rainfall Event	Rain Gauge 1 Rainfall Total (in)	Rain Gauge 2 Rainfall Total (in)	Return Frequency[1] (yr)	Duration (hr)
4/20/2024	2.46	2.91	1 year	12
4/28/2024	1.44	1.91	<1 year	3
5/28/2024	1.67	1.18	<1 year	96

[1]Determined based on depth-duration-frequency data available from the National Weather Service

The observed rainfall and the associated measured flow responses from the May 28, 2024 rainfall event were used to calibrate the hydraulic model to observed wet weather conditions.

11.2.2. Wastewater Flow Rates and Peaking Factors

Dry weather flow conditions are characterized by evaluating flow meter data observed during normal conditions, excluding wet weather events and the periods associated with their recovery. The average and maximum dry weather flow rates were determined from the dry weather diurnal pattern for each flow monitor location and summarized in **Table 11-3**.

The resulting dry weather peaking factor (PF_D) is also provided. The peak wet weather flow rate for each flow meter location is also provided, along with the corresponding wet weather peaking factor (PF_W). Wet weather peaking factors above 4.0 are considered excessive.

Table 11-3: Dry Weather and Wet Weather Flow Rates

Flow Meter ID	Average Dry Weather Flow (MGD)	Max Dry Weather Flow (MGD)	Peak Wet Weather Flow (MGD)	Dry Weather Peaking Factor - PF_D Max Dry Flow / Avg Dry Flow	Wet Weather Peaking Factor - PF_W Peak Wet Flow / Avg Dry Flow
WTH-01	0.37	0.51	1.27	1.40	3.45
WTH-02	0.48	0.65	1.48	1.36	3.12
WTH-03	0.12	0.17	0.24	1.45	1.99
WTH-04	0.25	0.33	0.71	1.33	2.88
WTH-04M	0.22	0.27	0.35	1.22	1.57
WTH-05	0.88	1.13	2.19	1.27	2.47
WTH-06	0.09	0.12	0.25	1.29	2.70
WTH-07	0.43	0.57	1.84	1.33	**4.29**
WTH-08	0.36	0.43	1.32	1.21	3.68
WTH-09	0.67	0.78	1.66	1.15	2.47
WTH-10	0.19	0.25	2.10	1.37	**11.32**
WTH-11	0.47	0.63	1.17	1.36	2.50
WTH-12	0.24	0.31	0.73	1.30	3.08

Red *text identifies peaking factors larger than 4.0*

11.2.3. Wastewater Depth to Diameter (d/D) Ratios

The maximum flow depths during dry weather and wet weather flows, their corresponding depth of flow-to-pipe diameter (d/D) ratios, and the manhole depths at each flow monitoring site are provided in **Table 11-4**. Capacity issues in wastewater can be identified using a system's d/D ratios. The dry weather d/D ratios at all flow monitor locations indicate adequate capacity in the system to convey dry weather flows. A value greater than 100% indicates surcharging in the line. The wet weather d/D ratios show that three of the flow monitor locations surcharged, indicating a hydraulic grade line (HGL) above the pipe and insufficient capacity to convey observed maximum wet weather flows.

The surcharging observed at flow meters WTH-09 and WTH-10 can be attributed to a backup in the main trunk flowing to the WWTP under peak wet weather conditions. The City currently has plans under design to expand the gravity main to 36-inch from Eureka Street to South Denton Street, and the CIP includes future projects to expand the pipes further upstream. These upgrades are intended to eliminate surcharging and enhance the capacity of the system to accommodate the increased demand anticipated from the redevelopment and future growth along the interceptor.

Table 11-4: Dry Weather and Wet Weather Depth to Diameter Ratios

Flow Meter Basin	Field-Verified Pipe Diameter (in)	Max Dry Depth (in)	Max Dry Depth to Diameter Ratio d/D	Max Wet Depth (in)	Max Wet Depth to Diameter Ratio d/D
WTH-01	12.25	2.11	17%	3.81	31%
WTH-02	17.50	2.20	13%	3.36	19%
WTH-03	17.75	3.25	18%	7.56	43%
WTH-04	16.50	7.79	47%	35.01	**212%**
WTH-04M	14.50	2.85	20%	7.11	49%
WTH-05	24.00	3.43	14%	4.97	21%
WTH-06	12.00	2.94	25%	3.98	33%
WTH-07	17.62	4.17	24%	10.42	59%
WTH-08	11.75	2.81	24%	6.91	59%
WTH-09	14.38	4.13	29%	52.88	**368%**
WTH-10	12.00	6.63	55%	14.04	**117%**
WTH-11	11.00	5.36	49%	9.33	85%
WTH-12	12.00	2.40	20%	3.77	31%

Red *text identifies surcharging pipes*

11.2.4. Inflow and Infiltration (I/I) Analysis

During wet weather events, significant amounts of extraneous water can enter a sewer system. A comparison of flow monitor data from dry weather and wet weather periods can be used to quantify I/I. For this study, ADS conducted a rainfall-derived inflow and infiltration (RDII) analysis of the City's system in response to a projected 2-inch storm event. This event has a high total rainfall depth compared to the storms observed during the flow monitoring period.

ADS performed a wet weather analysis to study the wastewater system's flow response to this rain event and calculated the discrete volume of RDII per flow meter basin. This was accomplished by subtracting the flows during average dry days within the field-testing period from the flows during the projected 2-inch storm event, then any RDII from upstream flow meter basins was subtracted. Using this method, the discrete volume of RDII for the storm event was calculated for each flow meter basin.

Each flow meter basin's discrete RDII was calculated as a volume in MG, which was then divided by the linear footage of gravity mains in that flow meter basin and inches of rainfall to calculate the RDII as gal/LF/in to normalize the results across the flow meter basins. The results of this RDII analysis are

presented in **Table 11-5** and shown in **Figure 11-3**. Normalized RDII less than or equal to 5.0 gallons/LF/inch was classified as Low, levels between 5.0 and 10.0 gallons/LF/inch were classified as Intermediate, and levels greater than 10.0 gallons/LF/inch were classified as High. WTH-02 is the only flow meter basin that showed excessive RDII.

Table 11-5: Summary of RDII by Wastewater Flow Meter Basin for a 2-inch Storm Event

Flow Meter Basin	Normalized RDII (gal/LF/in)	Normalized I/I Rating
WTH-01	7.60	Intermediate
WTH-02	34.70	High
WTH-03	1.29	Low
WTH-04	3.60	Low
WTH-04M	1.88	Low
WTH-05	2.67	Low
WTH-06	2.86	Low
WTH-07	6.34	Intermediate
WTH-08	6.91	Intermediate
WTH-09	8.89	Intermediate
WTH-10	2.47	Low
WTH-11	7.32	Intermediate
WTH-12	2.27	Low

WTH-10
(2.47)

WTH-07
(6.34)

WTH-09
(8.89)

WTH-08
(6.91)

WTH-12
(2.27)

WTH-11
(7.32)

WTH-06
(2.86)

WTH-03
(1.29)

WTH-05
(2.67)

WTH-04M
(1.88)

WTH-02
(34.70)

WTH-01
(7.60)

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

0 1,900 3,800
SCALE IN FEET

NORMALIZED RDII
(gal/LF)
- 0.0 - 5.0
- 5.0 - 10.0
- Greater than 10.0
- Not Metered

FIGURE 11-3
CITY OF WEATHERFORD
NORMALIZED RDII RANKING BY FLOW METER BASIN

LEGEND
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

1858 WEATHERFORD TRUE TEXAS

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11.3 FLOW METER DATA QUALITY

The flow monitor and rain gauge data provided information that was utilized in the wastewater hydraulic modeling and calibration. The accuracy of the data directly corresponds to the accuracy of the model calibration which impacts the wastewater CIP development. The five-minute data collected from the temporary flow monitors was suitable for calibrating the hydraulic model for dry conditions. The period from 4/1/2024 to 7/8/2024 provided consistent, dry weather flow data from all 12 flow meter sites. For wet weather conditions, data from the two rain gauges was collected and was suitable to calibrate the wastewater collection system.

12.0 WASTEWATER FLOWS

To determine locations where future wastewater system improvements are necessary, existing and future wastewater load projections were developed using historical flow data and existing and future population projections.

12.1 HISTORICAL WASTEWATER FLOWS

The City provided historical average day and maximum day WWTP flow data from January 2015 through December 2023. The City currently provides sewer services to Hudson Oaks, so the City's average day flow was calculated by subtracting the Hudson Oaks average day flow from the total average day flow reported in the WWTP flow data. However, the City expects to no longer provide sewer services to Hudson Oaks within the next few years, so they are not included in the wastewater flow projections. The historical residential per capita flow calculated was based on the available WWTP flow data and ranges from 50 to 60 gpcd with an average of 56 gpcd. The historical non-residential flow ranges from 427 to 560 gpad with an average of 494 gpad. As summarized in **Appendix A**, design criteria for wastewater flow projections were determined using data from the historical wastewater flow summary.

12.2 PROJECTED WASTEWATER FLOWS

As summarized in **Appendix A**, FNI developed design criteria for wastewater flow projections which is shown in **Table 12-1**. The projected wastewater flows by watershed are summarized in **Table 12-2**.

Table 12-1: Wastewater Flow Design Criteria

Criteria	
Residential Average Day Per Capita Flow (gpcd)	65[1]
Non-Residential Average Day Per Acre Flow (gpad)	550[1]
Existing Peak Wet Weather to Average Day Flow Peaking Factor	3.8[2]
Future Peak Wet Weather to Average Day Flow Peaking Factor	4.0

[1]Flow estimates are based on wet weather conditions.

[2]Peaking factor for each flow meter basin developed from 2024 Weatherford Flow Monitoring Report.

Table 12-2: Wastewater Flow Projections

Year	Watershed	Population	Non-Residential Acreage	Average Day Flow (MGD)	Peak Wet Weather Flow (MGD)
2024	Lake	2,356	3.72	0.16	0.54
	Sanchez Creek	5,120	636.65	0.68	1.96
	Town Creek	20,622	1,230.20	2.01	8.41
	Willow Creek	5,595	275.45	0.52	1.75
	Total	**33,693**	**2,146.02**	**3.37**	**12.66**
2029	Lake	2,360	3.72	0.16	0.54
	Sanchez Creek	6,041	820.74	0.84	2.60
	Town Creek	21,565	1,237.39	2.08	8.67
	Willow Creek	6,650	476.82	0.70	2.47
	Total	**36,616**	**2,538.67**	**3.78**	**14.28**
2034	Lake	2,366	3.72	0.16	0.54
	Sanchez Creek	7,732	1,110.48	1.11	3.69
	Town Creek	22,799	1,282.84	2.18	9.08
	Willow Creek	8,166	604.83	0.87	3.15
	Total	**41,063**	**3,001.87**	**4.32**	**16.46**
2049	Lake	2,379	3.72	0.16	0.54
	Sanchez Creek	14,660	1,202.15	1.61	5.69
	Town Creek	24,942	1,427.23	2.40	9.95
	Willow Creek	12,627	638.24	1.18	4.39
	Total	**54,608**	**3,271.34**	**5.35**	**20.57**

13.0 WASTEWATER MODEL DEVELOPMENT AND CALIBRATION

The City's GIS data was imported into InfoWorks Integrated Catchment Modeling (ICM) hydraulic modeling software by Autodesk. InfoWorks ICM combines a relational database with geographic analysis to provide a single environment that integrates asset planning with hydraulic modeling. The software makes use of engineering equations and mathematical algorithms to determine the flows and velocities that would occur in a collection system under a specified set of conditions. This software was used to create an EPS hydraulic model.

This hydraulic model was then used to evaluate the impact of wastewater flow generation on the collection system over time; this functionality allows the user to model and evaluate system performance over time due to changing flow characteristics from both domestic and variable wet weather field conditions. These conditions include various I/I flow rates throughout the system in response to varying weather and environmental conditions, allowing more accurate modeling results.

13.1 MODEL SUMMARY

The City's GIS provided the basis for constructing the hydraulic model of the wastewater collection system. The model consists of approximately 4,363 links and 4,348 nodes, including 23 LSs, and is an all-pipes model. The pipes range in size from 6 to 24 inches. The hydraulic model was used to evaluate the adequacy of the existing system and to develop system improvements required to meet future growth conditions in the City.

13.2 NETWORK DEVELOPMENT

13.2.1. GIS Integration

The GIS geodatabase contains spatial and attribute information for the pipes and nodes within the collection system, which originated from the previous *2015 Wastewater Master Plan*, as-built records, and field verification. Nodes were imported to the model using the unique identifier, the asset ID field, created by the City to link the model to the GIS. Attributes imported for the nodes in the model include rim elevation and user-defined fields such as date constructed, station number, construction project name, and sheet number.

Pipes were imported to the model and assigned a model ID based on the upstream manhole ID. InfoWorks ICM assigns the pipe ID as the upstream manhole ID and then adds a numeric suffix. The asset ID field was populated with the unique identifier created by the City to link the model to the GIS. Attributes imported to the pipes in the model include diameter, material, upstream and downstream invert elevations, and user-defined fields such as project name. For pipes where invert data was absent, the invert elevations were interpolated between two known elevations or, when no upstream elevation was available for interpolation, a minimum slope sufficient to allow a velocity greater than two feet per second when flowing at full capacity, as required by the TCEQ, was assumed.

13.2.2. Model Node Types

Two types of nodes within the ICM model were utilized to represent the collection system: manhole, and storage nodes. The function of each node type is explained below.

- **Manhole**: The manhole node type is the most abundant node type within the model. This type of node allows the user to define a shaft and chamber storage volume to represent the volume of flow that can be stored within an actual manhole. The City's wastewater model has approximately 4,223 manholes.
- **Storage**: Storage nodes allow the user to define a storage shape using level and plan area pairs. This type of node represents wet wells at LSs. The City's wastewater model has 23 storage nodes.

13.2.3. Subcatchments

The InfoWorks ICM modeling software uses subcatchments to store hydraulic loading parameters such as population, commercial flow, topology, and contributing area. Subcatchments are a critical component of the model as they are responsible for storing key components that dictate the amount of flow that enters the collection system. Subcatchments can be defined by any polygon that represents any area within the sewer service area. The City's hydraulic model utilizes the City's parcels to define the subcatchments. Each parcel was assigned a subbasin to be used for populating the hydraulic loading parameters. Each parcel was spatially joined to the upstream manhole of the wastewater line the parcel should drain to.

13.2.4. Topology

Network topology is the mapping of elements (links, nodes, etc.) of a network, especially the physical and spatial interconnections between nodes. In InfoWorks ICM, a node defines the first or last vertex of a line. Two lines that are connected will share a node to create a topology. Correct topology ensures accurate flow direction and pipe connectivity. Proper connectivity was established by utilizing the following InfoWorks tools:

- **Upstream/Downstream Network Trace**: This tool addresses possible errors with disconnected pipes and wrong flow direction by tracing a path from any node or link in the network to the upstream/downstream extents of the network.
- **Pipe Direction Trace**: This tool traces upstream from a chosen pipe and tests the direction of a selection of links in relation to the chosen downstream pipe. As a result of the test, links that are potentially drawn in the wrong direction are selected and highlighted to be evaluated.
- **Connectivity Trace**: This tool ensures the model network is fully connected by identifying any physically separate sub-networks within the model.
- **Intermediate Paths Trace**: This trace selects all paths between two selected nodes, which ensures that nodes in separate basins are not mistakenly connected in the model.
- **Proximity Trace**: This tool identifies nodes within a specified distance from another pipe but not connected to it. If the node should be connected to a given pipe, this tool can help identify a connectivity problem.

13.2.5. Data Flagging

InfoWorks ICM allows data flagging for all model elements. Data flagging provides documentation of source data and helps to establish an appropriate confidence level in modeled information. A data flagging scheme was developed to be used in the model development phase. The following elements are flagged in the model:

- Node ID
- Asset ID
- Diameter
- Upstream Invert
- Downstream Invert

Table 13-1 presents the ID, description and color of each data flag.

Table 13-1: Data Flags

Flag ID	Description
ADD	Manually Added
AS	As-Built
AUTO	Generated During Import
CIP	Capital Improvement Project
CON	Connectivity – Orphaned Nodes
GIS	Imported from GIS
IN	Inferred
ISO	Connectivity – Isolated Line
MM	Modeler Modification
OLD	Old Model
PROX	Connectivity - Proximity

13.3 COLLECTION SYSTEM MODEL CALIBRATION

Model calibration is the process of rectifying parameters within the InfoWorks ICM sewer model until the model generates and conveys flow in the same manner as was observed during the flow monitoring period. A properly calibrated model produces results reflective of the flow, depth and velocity data obtained during flow monitoring. The flow monitoring data, along with the rainfall data, were the key components utilized to establish per capita flow rates and RDII parameters.

13.3.1. Model Calibration Assumptions

There are aspects of the model-building effort where assumptions are necessary to populate the required fields in the model database. These assumptions were based on industry standards. As a result, the model contains a significant quantity of physical data that requires inferred and/or assumed data to populate the required data fields, such as pipe roughness, shape, and invert elevation. These fields should be updated as data is collected in the future. Prior to the calibration process, each pipe was given an assumed top and bottom Manning's roughness factor of 0.013, and each pipe was assumed to be circular with equal height and width.

The limitation of using recorded flow and rainfall data is that each discrete flow meter basin is assumed to possess the same homogeneous characteristics as all other discrete flow meter basins. Although the population may be distributed throughout a flow meter basin, with some manholes assigned a higher concentration of population than others, the per capita rate of wastewater production and daily diurnal patterns are the same for each person located in each flow meter basin. Likewise, manholes within a flow

meter basin, although having different discrete drainage areas and thus contributing differing volumes of I/I, will all be characterized as having the same I/I response parameters.

Although care is taken to appropriately assign population and a discrete drainage area to each manhole in a flow meter basin, individual sources of atypical wastewater production or specific locations of uncharacteristic I/I will not be identified through modeling. Individual sources of atypical wastewater production or specific locations of uncharacteristic I/I should be identified through field investigation efforts and should not be expected to be identified solely from the hydraulic model results.

13.3.2. Dry Weather Calibration

The first step in model calibration is selecting a dry weather (no rain) period from the field-collected (observed) flow monitoring data. A dry weather flow period is defined as a period in which no effect from I/I was observed. The four-day period of June 20 to June 24, 2024, was selected for dry weather model calibration. The flow on these days represented observed flow unaffected by rainfall from preceding days. Diurnal patterns for each flow meter basin were loaded into the model, based on the patterns observed during the flow monitoring period. The dry weather wastewater flows were then factored, as necessary, until the aggregate flows in each flow meter basin closely matched the observed flow monitoring data. Although the dry weather model calibration results indicate a good correlation between modeled and observed data, several flow monitors were impacted by upstream lift stations. Lift stations can create hydraulic effects that are difficult to recreate in the hydraulic modeling software. Additionally, City staff indicated that Lift Station #15 experienced major operational deficiencies during the flow monitoring period. **Table 13-2** provides a summary of the average dry weather modeled and recorded flow at each flow meter. Calibration plots demonstrating the dry weather model calibration results are provided in **Appendix I** and show the accuracy with which the modeled flow patterns matched the observed flow.

Table 13-2: Dry Weather Calibration Summary

Flow Meter Basin	Average Modeled Flow (MGD)	Average Observed Flow (MGD)	Modeled – Observed Difference (MGD)
WTH-01	0.40	0.34	0.06
WTH-02	0.60	0.38	0.22
WTH-03	0.13	0.11	0.02
WTH-04M	0.23	0.32	-0.10
WTH-05	1.00	0.90	0.10
WTH-06	0.13	0.06	0.06
WTH-07	0.51	0.46	0.06
WTH-08	0.39	0.35	0.04
WTH-09	0.71	0.65	0.05
WTH-10	0.21	0.21	0.00
WTH-11	0.59	0.48	0.11
WTH-12	0.31	0.24	0.07
Average			**0.07**

13.3.3. Wet Weather Calibration

The four-day period starting with the May 28, 2024 rain event and ending on June 1, 2024 was selected for wet weather calibration to calibrate to the largest rain event following the relocation of flow meter WTH-04. The wet weather calibration extends over multiple days following the rain event to verify that the model captured the peak flow event and returns to normal flow recorded during the flow monitoring.

The RTK hydrograph method was utilized to model additional flows that entered the wastewater system during the observed calibration rainfall event. This method utilizes three hydrographs that each contain three parameters that are modified to achieve calibration: the flow of water into the system (R), the time to peak flow (T), and the ratio of time until normalization of flow to time to peak (K). The combination of the three component hydrographs forms the total response (additional I/I) that is observed in the wastewater system. The RTK parameters and the component hydrographs are illustrated in **Figures 13-1** and **13-2**.

R1, T1, and K1 represent the fast response associated with inflow experienced at the beginning of a storm; these values typically have the most effect on the modeled response. R2, T2, and K2 represent the medium response associated with a combination of some I/I experienced toward the end of a storm; these values typically reflect the way that the system reacts as a storm begins to come to an end and the inflow begins to slow while some of the groundwater starts seeping through cracks in the pipe. R3, T3, and K3 represent the slow response associated with I/I experienced after a storm event has passed; these values reflect the way that the system reacts as a storm has come to an end and water enters the system through cracks in the sewer lines.

Figure 13-1: RTK Parameters

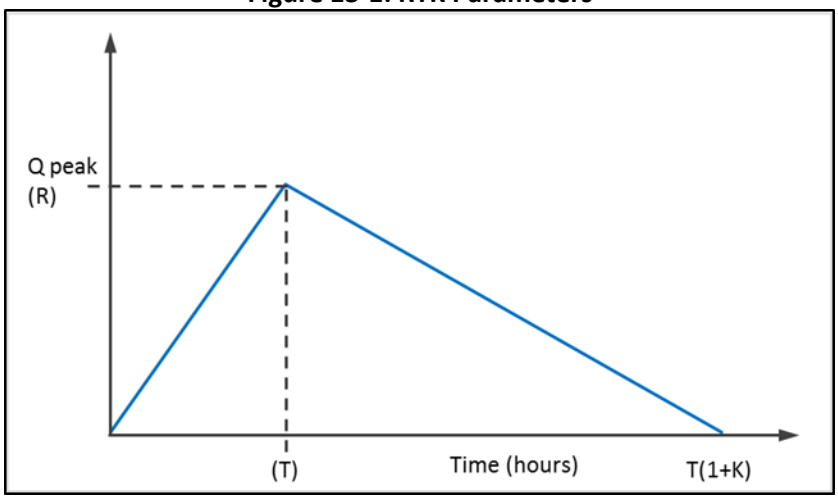
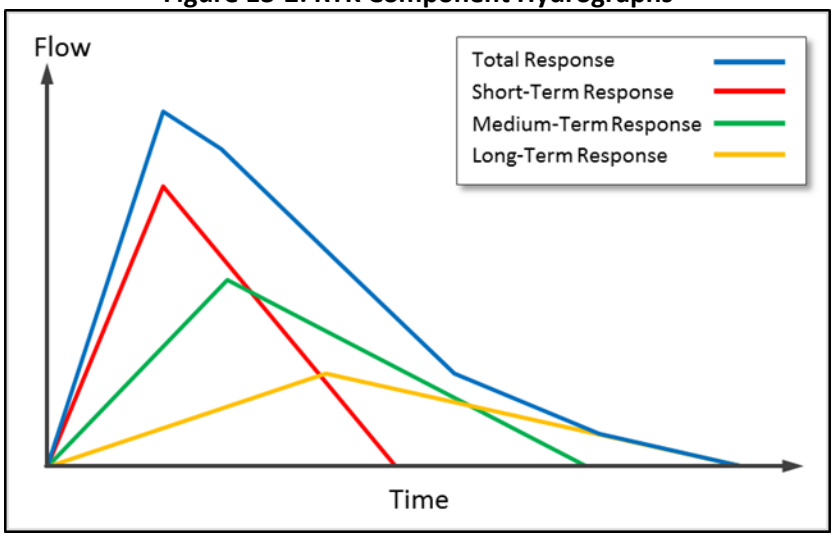


Figure 13-2: RTK Component Hydrographs



Separate RTK hydrographs were developed for each flow meter basin to account for the different land uses, soil properties, amounts of impervious cover and condition of the wastewater lines. The RTK hydrographs were applied to each of the subcatchments in the model. The observed rainfall hyetographs (rainfall vs. time bar chart) measured during the calibration rainfall events were then applied to the model. The model calculates the I/I that enters the wastewater system using the values in the RTK hydrographs and the contributing area of each subcatchment. These values were adjusted until the modeled wet weather flows closely matched the observed wet weather flows.

Table 13-3 provides a summary of the wet weather average modeled and recorded flow at each flow meter. From discussions with the City, it has been determined that the significant difference between modeled and observed flows at WTH-10 is potentially due to an existing sinkhole on Wheeler Street that impacted the wastewater line upstream of the flow meter during the flow monitoring period. Similar to the dry weather calibration results, the number of lift stations within the City's collection system can create hydraulic effects that are difficult to recreate in the hydraulic modeling software. The operational deficiencies experienced at Lift Station #15 during the flow monitoring period, in addition to the chain of grinder pumps around Lake Weatherford, may have impacted the observed flows at WTH-01 and WTH-02. Excluding these flow meters from the calculation, the average difference between modeled and observed peak flows decreases from 0.47 MGD to 0.07 MGD. Calibration plots demonstrating the wet weather model calibration results are provided in **Appendix I**. The dry and wet weather calibration results provide a high level of confidence that the model closely matches real-world conditions and is suitable for use in hydraulic analyses and CIP development.

Table 13-3: Wet Weather Calibration Summary

Flow Meter ID	Modeled Maximum Flow (MGD)	Observed Maximum Flow (MGD)	Modeled – Observed Difference (MGD)
WTH-01	2.07	1.02	1.05
WTH-02	1.92	1.07	0.85
WTH-03	0.25	0.23	0.02
WTH-04M	0.56	0.55	0.01
WTH-05	2.36	1.91	0.46
WTH-06	0.39	0.24	0.14
WTH-07	1.89	2.00	-0.10
WTH-08	1.40	1.52	-0.12
WTH-09	1.97	2.08	-0.11
WTH-10	1.43	3.84	-2.41
WTH-11	1.83	1.64	0.19
WTH-12	1.05	0.88	0.17
		Average	**0.47**

14.0 WASTEWATER COLLECTION SYSTEM ANALYSIS AND HYDRAULIC MODELING

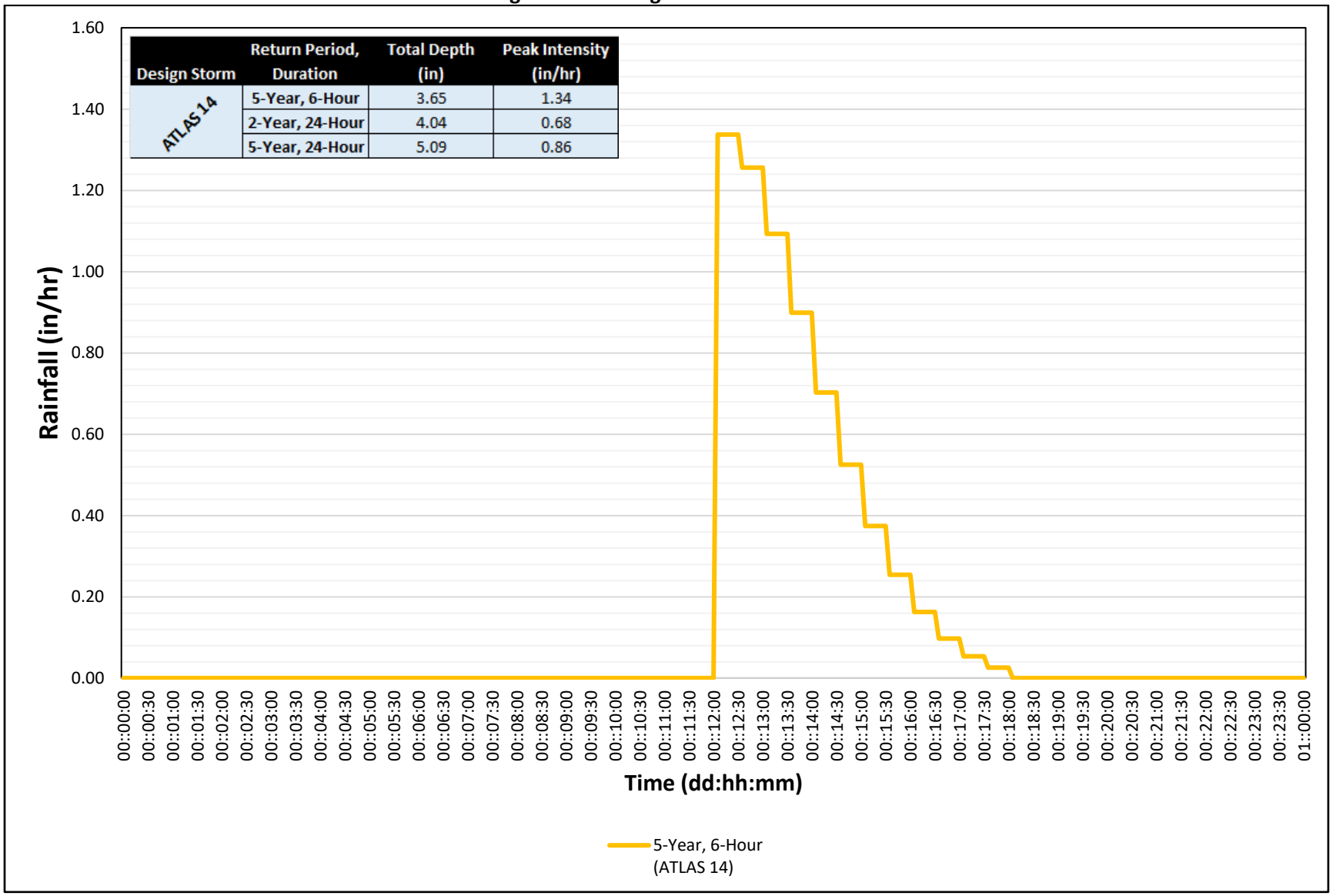
14.1 DESIGN STORM

One of the major components of a wastewater master plan is understanding how a collection system reacts to wet weather events. I/I can lead to bottlenecks in the system and sanitary sewer overflows (SSOs). To evaluate the system holistically, a common storm event must be selected as the basis for evaluation moving forward; this is referred to as a "design storm." Regulatory agencies, such as the Environmental Protection Agency and TCEQ, allow regulated entities to select the design storm. A regulated entity must demonstrate that they have selected a design storm that addresses wet weather overflows for their collection system. The size of the design storm has a direct effect on the size of the required CIP projects as larger storm events will create more inflow and cause more problems in the system. Thus, the entity must select a design storm that is large enough to stress the system and shows potential hydraulic limitations and overflows, yet, at the same time, be realistic enough that the model is not over-predicting the consequences based on storm events that are overly conservative and unlikely to occur.

Design storms are primarily defined by their duration and return period. The duration is the amount of time a rain event occurs, ranging from five minutes to several days; common durations are six, 12, and 24 hours. The return period is a measurement of the likelihood a particular event will occur. For example, a five-year return period has a 20% chance of occurring at any time. To protect public health, a design storm needs to be selected with a reasonable duration and return period that illustrate areas exhibiting wet weather SSOs.

For rainfall distribution, FNI utilized the five-year, six-hour design storm from the NOAA Atlas 14 publication. Atlas 14 refers to NOAA's publication titled "Precipitation-Frequency Atlas of the United States." It is part of a series aimed at providing updated precipitation frequency estimates for various durations and return periods across different geographical locations in the United States. The hyetograph for the evaluated design storm is presented in **Figure 14-1**.

Figure 14-1: Design Storm Evaluation



14.2 EXISTING WASTEWATER SYSTEM ANALYSES

Following model calibration for both dry and wet weather storm events, the next step in the master planning process is to use the wastewater system model to evaluate the existing system and make recommendations to address deficiencies and short-term needs.

14.2.1. Design Criteria Determination

In evaluating the existing system, FNI analyzed the collection system by applying the chosen design storm to identify system deficiencies and determine where the HGL is within three feet below the top of the manhole rim. The design storm selected in **Section 14.1** was chosen to be representative of peak wet weather conditions and is consistent with what other large utilities in Texas are using for wastewater system capacity planning.

The "three feet below the top of the manhole rim" design criterion maximizes the utilization of existing system storage. Maximizing the use of existing system storage affords the collection system the ability to attenuate (dampen) the effects of wet weather peak flow conditions. As a result, system improvement recommendations are minimized by requiring a reduced quantity of improved sewer segments with smaller diameter piping. Using this design criterion, pipe flow restrictions (bottlenecks) are not viewed as hydraulic problem areas, provided the HGL meets the criterion. Bottlenecking promotes the collection system by utilizing available system storage.

In addition, the "surcharged state" of each wastewater line was evaluated to identify the source of the elevated HGL. As defined within the hydraulic model, the surcharged state indicates whether the flow rate in a line has exceeded the capacity of the line to the extent that water levels rise within the manholes. A surcharged state of less than 1.0 indicates the line is not surcharged. A surcharged state equal to 1.0 indicates that the line has surcharged, and the hydraulic gradient is less than or equal to the gradient of the pipe. This indicates the line is surcharging due to downstream restrictions. A surcharged state equal to 2.0 indicates that the line has surcharged, and the hydraulic gradient is greater than the gradient of the pipe. This indicates the line is surcharging due to insufficient capacity. **Figure 14-2** gives a visual representation of the surcharged states. There are no intermediate surcharged state levels between 1.0 and 2.0.

Figure 14-2: Surcharged State Definition Profiles

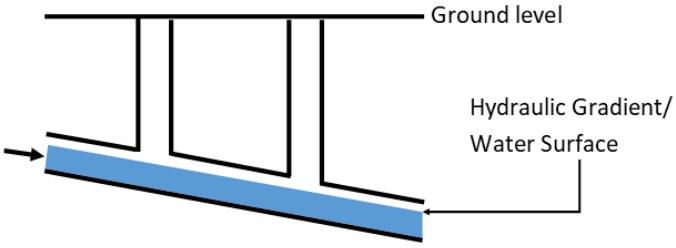
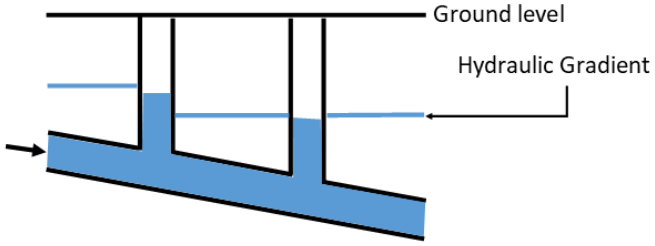
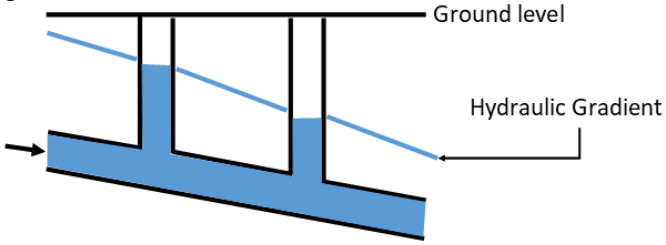
Value	Description
< 1.00	Pipe is not surcharged. Surcharge State is calculated as the ratio of water depth to pipe height. 
1.00	Water level at the upstream and/or downstream end of the pipe has reached the upper limit of the pipe height. Hydraulic gradient is less than or equal to pipe gradient. 
2.00	Water level at the upstream and/or downstream end of the pipe is greater than the pipe height. Hydraulic gradient is greater than pipe gradient. 

Figure 14-3 shows the surcharged state for every modeled pipe in the system utilizing the five-year, six-hour Atlas 14 design storm. The sewer interceptors highlighted red are overloaded during existing peak wet weather events and should be priority areas in the short-term CIP. The lines highlighted in blue could potentially surcharge and overflow due to downstream restrictions. As a result, many lines that tie into these large interceptors could become backed up and surcharged. Manholes highlighted in red are potential SSOs during existing peak wet weather events. Manholes highlighted in yellow indicate potential surcharging within three feet of the manhole rim.

Short-term CIP projects will focus on areas that show surcharging with yellow or red manholes. These surcharged conditions are believed to be partially due to capacity restrictions downstream in the collection system in the larger lines. This is substantiated by the observed data of extended depths during wet weather conditions at these locations.

14.2.2. Existing System Analysis Results

The immediate areas of concern based on **Figure 14-3** are upstream of the WWTP along the 15/18-inch gravity main in the Town Creek Basin, near LS #6, #8 and #15. These areas show surcharging pipe segments as well as the potential for SSOs. The existing wastewater flow through the existing 15/18-inch interceptor along Town Creek exceeds the capacity of the line, resulting in the system backing up and causing additional issues upstream. The City has already begun designing an upsized line in this area, the Weatherford Town Creek Interceptor, so this project will not be recommended in the CIP. Likewise, the City has also begun designing an expansion of LS #8 to a capacity of 5 MGD, with projects around this expansion being recommended in the CIP.

Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.0 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Hudson Oaks #3 LS

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Lake Weatherford
Willow Park
Hudson Oaks
Annetta North

0 1,900 3,800
SCALE IN FEET

WATERSHEDS
- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

MODEL RESULTS
- Lift Station Over Capacity

Manholes
- Surcharge Level > 3' from MH Rim
- Surcharge Level < 3' from MH Rim
- Overflow

Model Lines
- No Surcharge
- Surcharge Due to Downstream Restriction
- Exceeds Capacity

FIGURE 14-3

CITY OF WEATHERFORD

EXISTING WASTEWATER SYSTEM WET WEATHER MODEL RESULTS

LEGEND

- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- 50-ft Contour
- 10-ft Contour
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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User Name: DB5T

14.3 FUTURE WASTEWATER SYSTEM ANALYSES

Hydraulic analyses were conducted to identify deficiencies in the City's wastewater collection system and to establish a CIP to reinforce the existing system and convey projected wastewater flows through the twenty-five-year planning period. Various combinations of improvements and modifications were investigated to determine the most appropriate approach for conveying projected flows.

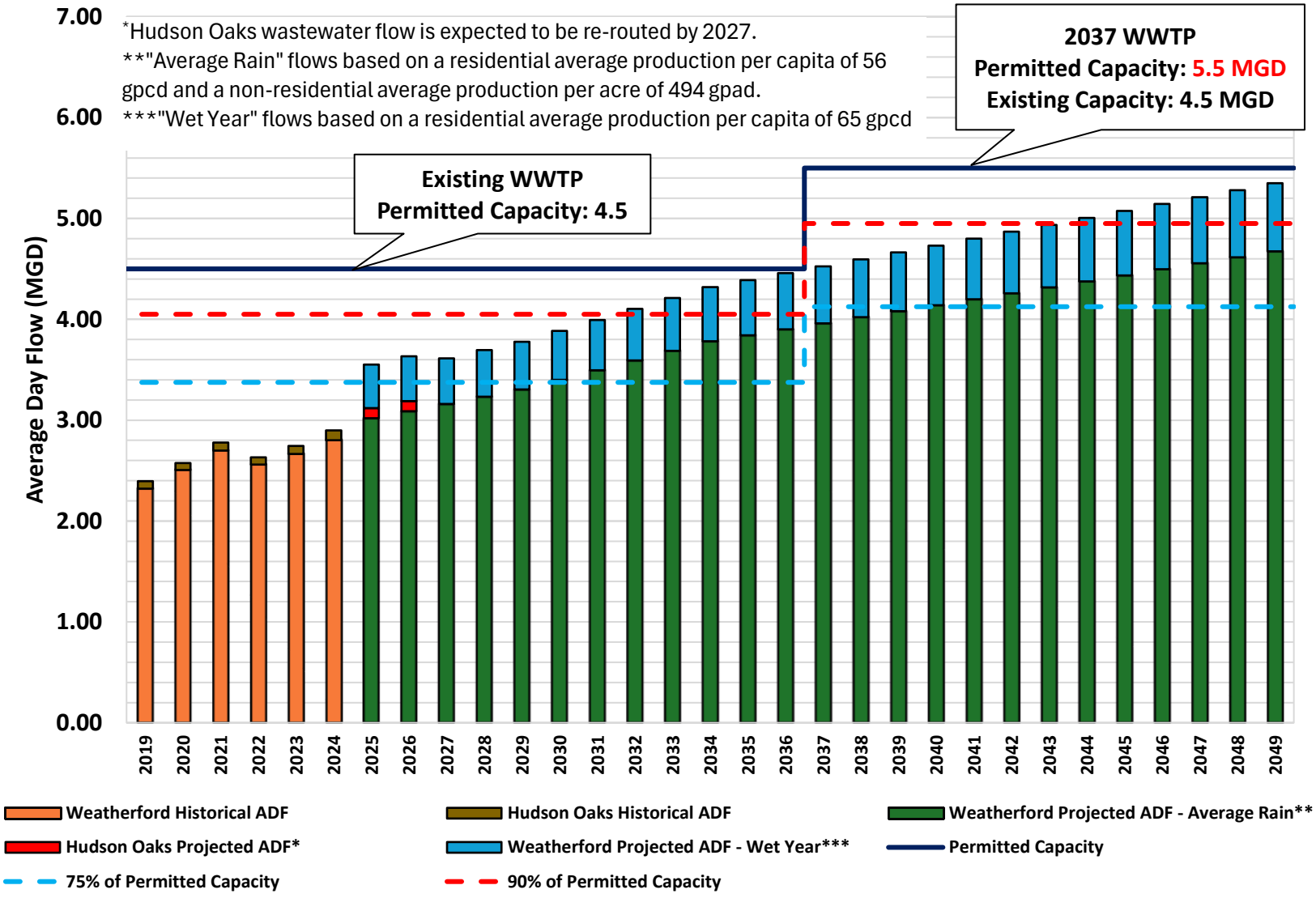
Wastewater system improvements were developed to accommodate the anticipated growth through the twenty-five-year planning period. The following analyses, which result from modeling and/or evaluating the collection system, provide observations and recommendations that serve as the basis for the CIP recommendations.

14.3.1. Wastewater Treatment Plant Capacity Evaluation

A major component of a wastewater system is the treatment of wastewater flow. There is currently one WWTP owned and operated by the City within the City's wastewater collection system as discussed in **Section 10.0**. The capacity of the WWTP versus projected flows was evaluated to determine the timing of recommended capacity improvements. The basis for the capacity evaluation is the TCEQ "75/90" rule. If the average daily flow to the WWTP exceeds 75% of the permitted capacity for three consecutive months, the utility must begin planning improvements to the WWTP. The utility should be constructing improvements to the WWTP when average daily flows reach 90% of the permitted capacity. The existing WWTP has a permitted average day capacity of 4.5 MGD.

Based on the conservative master planning flow projections, the WWTP may require an expansion to 6.0 MGD by 2037. **Figure 14-4** shows the projected average daily flow and the timing of the recommended expansion at the WWTP. The timing of the recommended expansion is driven by future growth and may be expedited or delayed based on growth in the City. It should be noted, the 2024 average day flow (3.37 MGD) projected in this Master Plan Report meets 75% of the WWTP capacity. However, the actual average day flow observed in 2024 was approximately 2.90 MGD. The average day flow projections used in this report are conservative and reflect years with high rainfall. The TCEQ "75/90" rule can only be triggered by three consecutive months of observed data and not master planning projections. The master planning projections serve as a general guide for when flows could potentially increase high enough to require WWTP improvements.

Figure 14-4: WWTP Average Day Capacity Evaluation



15.0 WASTEWATER COLLECTION SYSTEM RISK-BASED ASSESSMENT

As part of the Water and Wastewater Master Plan Update, FNI developed an RBA for the City's wastewater collection system. The goal of the RBA program is to develop a more proactive approach to maintaining the City's wastewater gravity lines through effective rehabilitation and renewal. Proactive asset rehabilitation and renewal planning requires an understanding of the current and expected future condition of system assets as those assets age and deteriorate over time. Categorizing wastewater lines according to their probability of failure (a function of the asset condition) and the potential consequence of failure (a function of the size, type of asset, and location in the system) forms the basis of a risk-based prioritization of asset renewal needs. An asset's condition is represented by the LOF Condition parameters and scoring are based on a combination of physical and operational data, which are used to develop an estimate of the assumed condition of each line. An asset's criticality is generally defined as the measure of the COF of an asset through loss of service, regulatory impact, and/or public impact. Accordingly, social, environmental, and economic parameters should all be used to judge the consequence of asset failure.

FNI conducted an RBA analysis to assign condition and criticality scores to wastewater gravity lines owned by the City. Once the risk of each asset was determined, a high-level decision process was used to assign a specific action to each asset to help identify renewal projects that improve the reliability of the wastewater collection system.

15.1 GRAVITY MAIN CONDITION ASSESSMENT

15.1.1. Gravity Main Condition Parameters

The condition of the City's gravity mains were evaluated based on material, age, and work order history. These condition parameters are defined as follows:

- **Material:** Based on supplied GIS data or as-built records
- **Age:** Based on the installation year given in the GIS or as built
- **Work Order History:** Based on geocoded exports (x-y coordinates) from the City's work order database that includes the work order description, infrastructure type, and cost

Weighting, criteria, and scoring for each parameter used in the gravity main condition assessment are presented in **Table 15-1**. A series of charts summarizing the gravity main condition assessment were developed for each parameter. The higher the score, the higher the likelihood of failure of the asset.

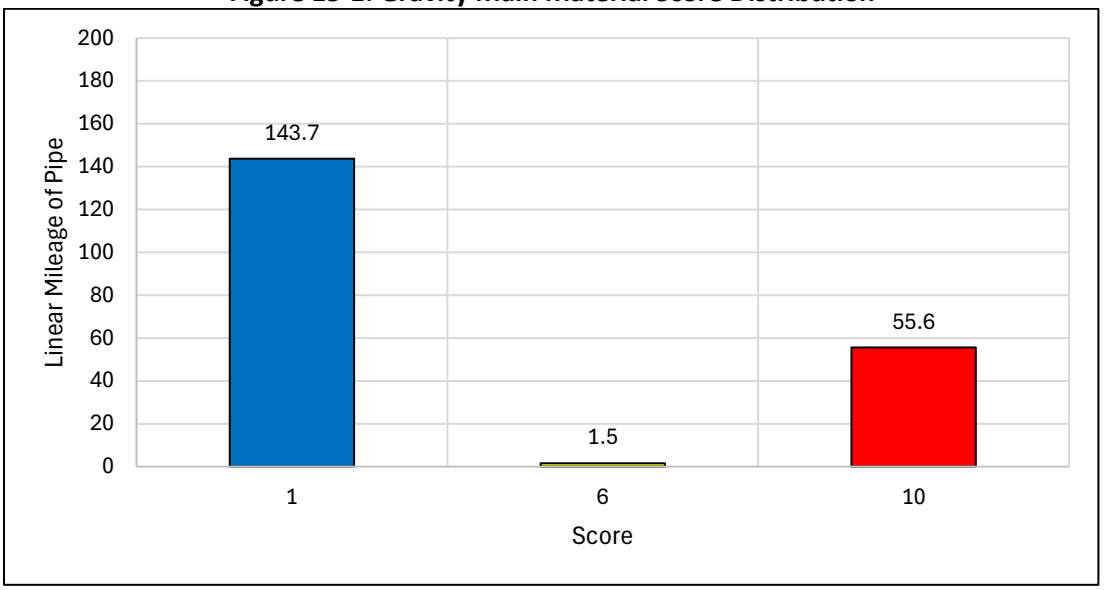
Appendix J contains a series of maps showing the distribution of scores for each parameter throughout the collection system.

Table 15-1: Gravity Main Condition Assessment Parameters

Weighting	Parameter	Criteria	Score
35%	Material	Clay/Unknown	10
		CIP/CIPP/Conc/DI/Steel	6
		PVC/HDPE	1
55%	Age	Before 1950/Unknown	10
		1950 ≤ Install Date ≤ 1969	8
		1970 ≤ Install Date ≤ 1989	6
		1990 ≤ Install Date ≤ 1999	4
		2000 ≤ Install Date ≤ 2009	2
		2010 and Later	1
10%	Work Order History	Two or More Work Orders	10
		One Work Order	5
		No Work Order History	1

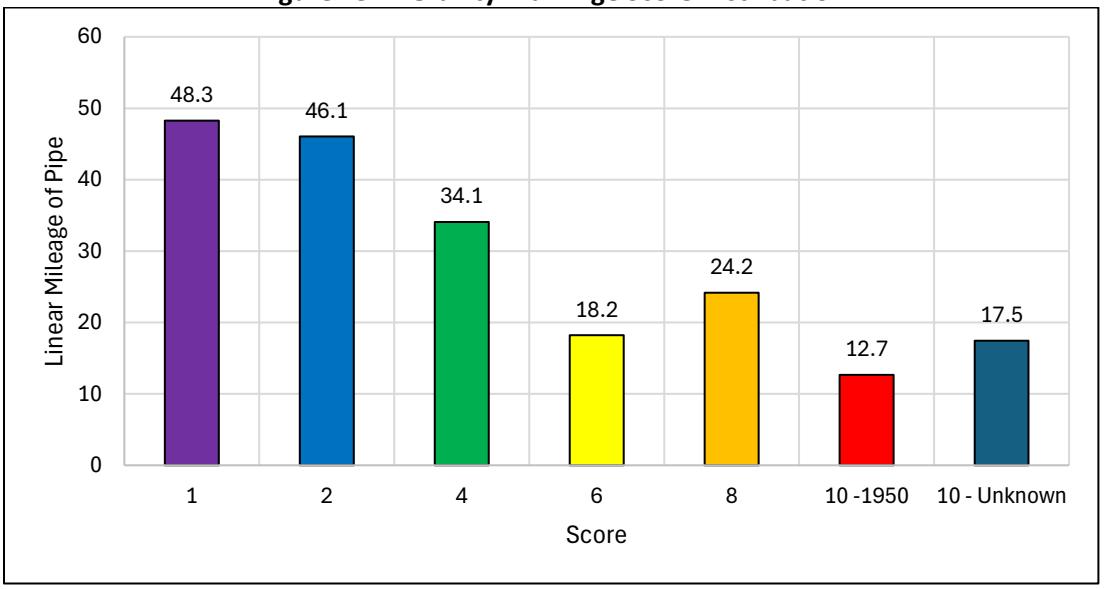
The gravity main material summarized by length is shown in **Figure 15-1**. As shown in this figure, the majority of the collection system is made of PVC or HDPE. With the remaining gravity mains being primarily vitrified clay pipes that can be seen in the downtown region of the City.

Figure 15-1: Gravity Main Material Score Distribution



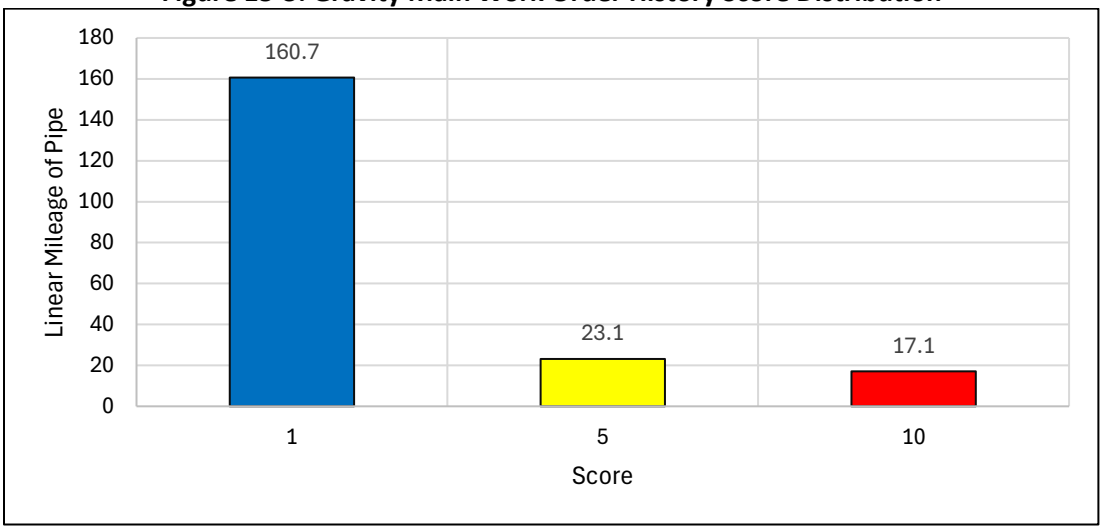
The gravity main age score summarized by length is presented in **Figure 15-2**. This distribution shows that most of the collection system is under 25 years of age, and this can be attributed to the City's rapid growth over this time span and pipeline rehabilitation schedule. A majority of the installed pipe, based on linear mileage, was between the years 2000 and 2024. However, there was also approximately 17.5 miles of pipe with an unknown installation date. With a majority of the older pipe being seen in the downtown region of the City.

Figure 15-2: Gravity Main Age Score Distribution



The gravity main work order score summarized by length is presented in **Figure 15-3**. Work order data was received from the City for 2018 – 2023, and as shown in this figure, a majority of the collection system has no work orders in this timeframe.

Figure 15-3: Gravity Main Work Order History Score Distribution



15.1.2. Gravity Main Condition Assessment Results

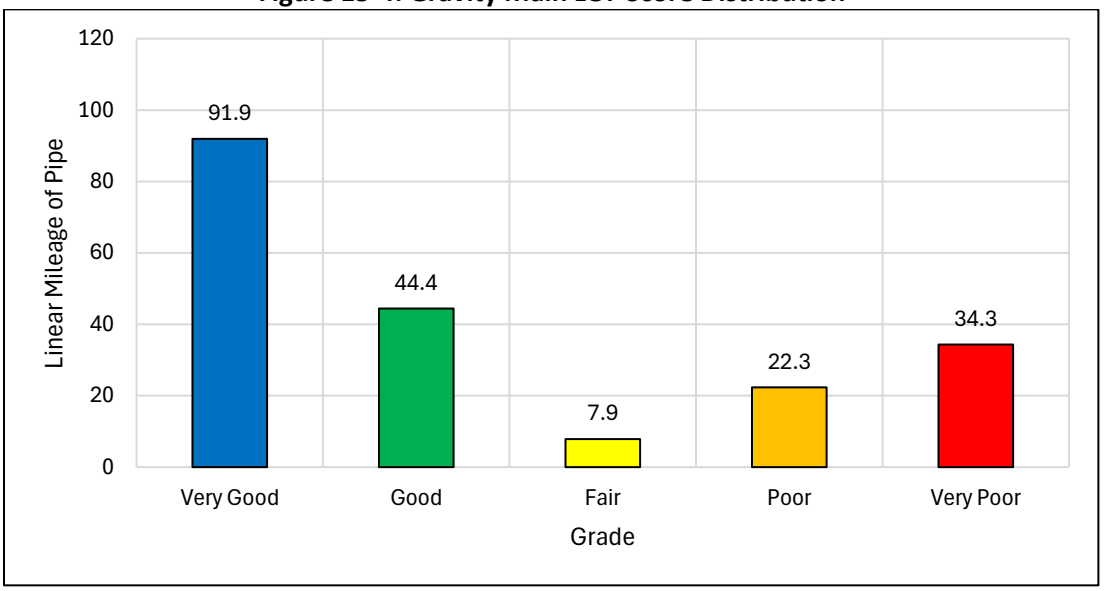
Gravity main condition scores were calculated for each segment by totaling the weighted individual scores for each parameter to develop a likelihood of failure (LOF) score. The gravity main condition scores were then grouped into ranges, and qualitative descriptions of Good to Poor conditions were assigned. The definitions for each scoring range are presented in **Table 15-2**. Results of the gravity main condition assessment are presented in **Figures 15-4** and **15-5**.

Based on the weightings and scores, approximately 17.1% of the collection system is estimated to be in very poor (High LOF score) condition. Like the age and material distributions, these scores are primarily seen in the downtown region of the City. These results are standard when compared to other utilities that perform similar studies.

Table 15-2: Gravity Main LOF Score Range and Results

Total LOF Score	LOF Score Range	Length (mi)	% of System
Very Low	0.0 - 2.0	91.9	45.8%
Low	2.1 - 4.0	44.4	22.1%
Medium	4.1 - 6.0	7.9	3.9%
High	6.1 - 8.0	22.3	11.1%
Very High	8.1 - 10.0	34.3	17.1%
	Total	**200.8**	**100%**

Figure 15-4: Gravity Main LOF Score Distribution



Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Hudson Oaks #3 LS

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

WWTP

0 1,900 3,800
SCALE IN FEET

WATERSHEDS

- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

CONDITION SCORE

- Very Good
- Good
- Fair
- Poor
- Very Poor

FIGURE 15-5

CITY OF WEATHERFORD

EXISTING WASTEWATER SYSTEM RISK-BASED ASSESSMENT TOTAL CONDITION SCORE (LIKELIHOOD OF FAILURE)

LEGEND

- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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FREESE AND NICHOLS

Created By Freese and Nichols, Inc.
Job No.: WEAU0002
Location: H:\W_WW_PLANNING\01_DELIVERABLES\00_FINAL_REPORT\02_FINAL_MP_REPORT\FINAL_REPORT_PRO_PROJECT\FINAL_REPORT_PRO_PROJECT.aprx\[Figure_15-05]-WW_LOF_ConditionScore
Updated: Wednesday, July 23, 2025 10:34 AM
User Name: OBS17

15.2 GRAVITY MAIN CRITICALITY ASSESSMENT

15.2.1. Gravity Main Criticality Parameters

The criticality of the City's gravity mains was assessed based on diameter, accessibility, potential environmental concerns, and customers served. The criticality parameters used for this study include:

- **Diameter:** Based on the diameter of the gravity main using GIS data and as-built information
- **Environmental Proximity:** Based on proximity to water bodies using GIS data.
- **Traffic Impact:** Highway, railroad, and arterial road crossing based on GIS data.

Weighting, criteria, and scoring for each parameter used in the gravity main criticality assessment are presented in **Table 15-3**. A series of charts summarizing the gravity main criticality assessment were developed for each parameter. Unlike condition, the criticality of a line rarely changes, as it is based on proximity to certain features or pipe size. **Appendix J** contains a series of maps showing the distribution of scores for each parameter throughout the collection system.

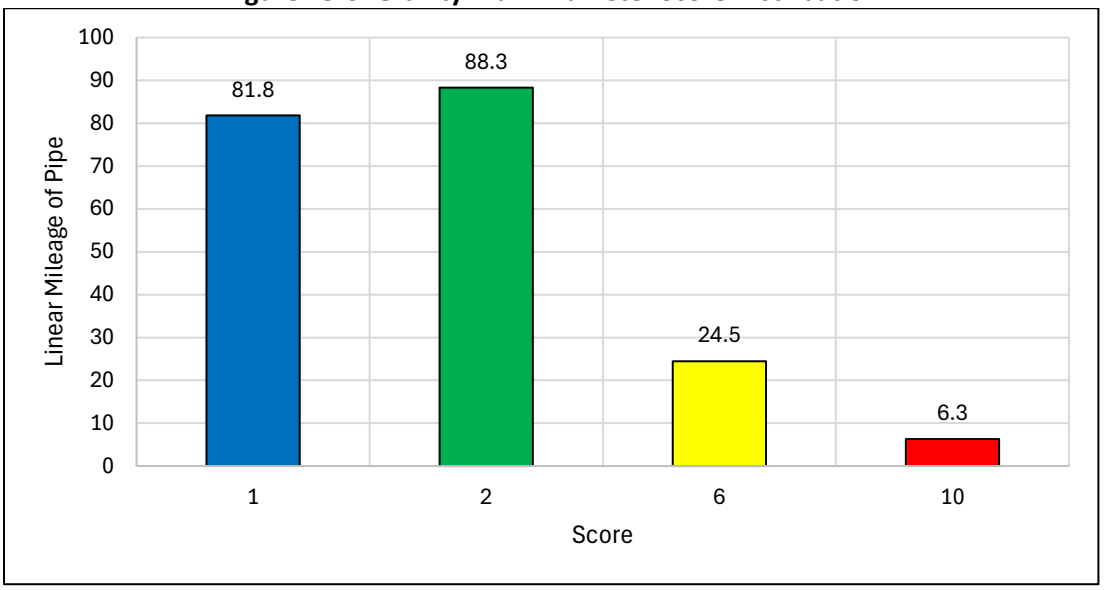
Table 15-3: Gravity Main Criticality Assessment Parameters

Weighting	Parameter	Criteria	Score
50%	Diameter	18-inch and Larger	10
		10-inch to 15-inch	6
		8-inch	2
		6-inch and Smaller	1
20%	Environmental Proximity	Within Flood Zone	10
		Within 500 feet of a Lake	8
		Within 500 feet of a Creek/Stream	6
		Outside Environmental Impact Area	1
30%	Accessibility/Traffic Impact	Within 150 feet of a Railroad[1]	10
		Highway[2]	10
		Thoroughfare[2]	6
		Collector[2]	4
		Other Road Types[2]	2
		Outside Traffic Impact Area[1,2]	1

[1]Evaluated as within 150 feet from railroad center line
[2]Evaluated as within 50 feet from road center line

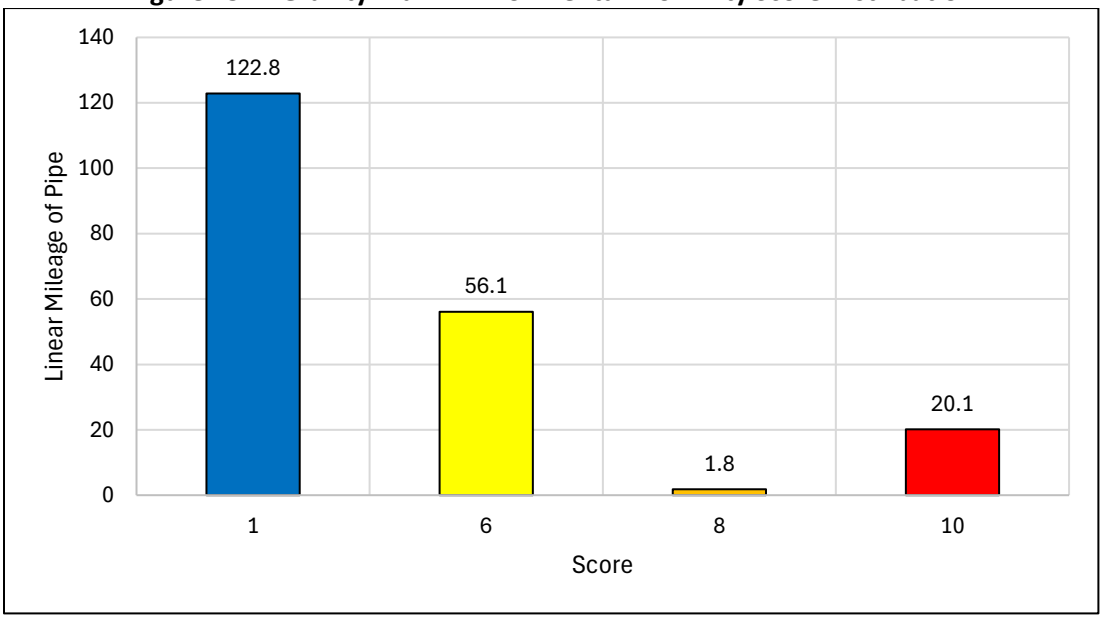
Gravity main diameter score by length is presented in **Figure 15-6**. Based on the score distribution below, the majority of the collection system is comprised of gravity mains sized at 8-inches or below.

Figure 15-6: Gravity Main Diameter Score Distribution



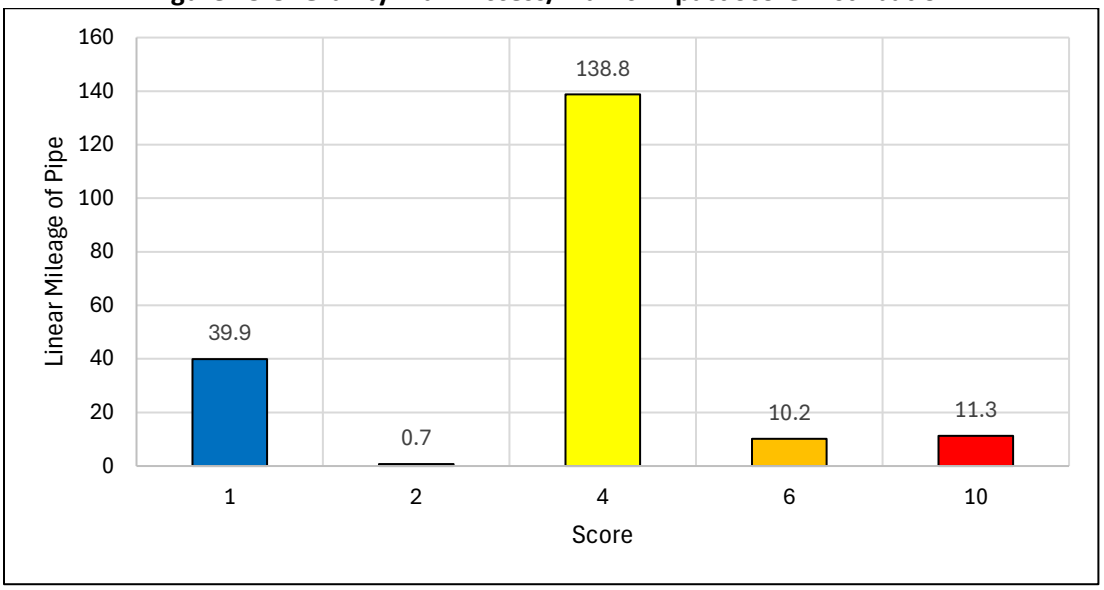
The gravity main environmental proximity score by length is presented in **Figure 15-7**. As shown in this figure, approximately 38% of the system is within a flood zone or 500 feet of a creek/stream.

Figure 15-7: Gravity Main Environmental Proximity Score Distribution



The gravity main access/traffic impact score by length is presented in **Figure 15-8**. As shown in this figure, a majority of the system is within close proximity to a collector road.

Figure 15-8: Gravity Main Access/Traffic Impact Score Distribution



15.2.2. Gravity Main Criticality Assessment Results

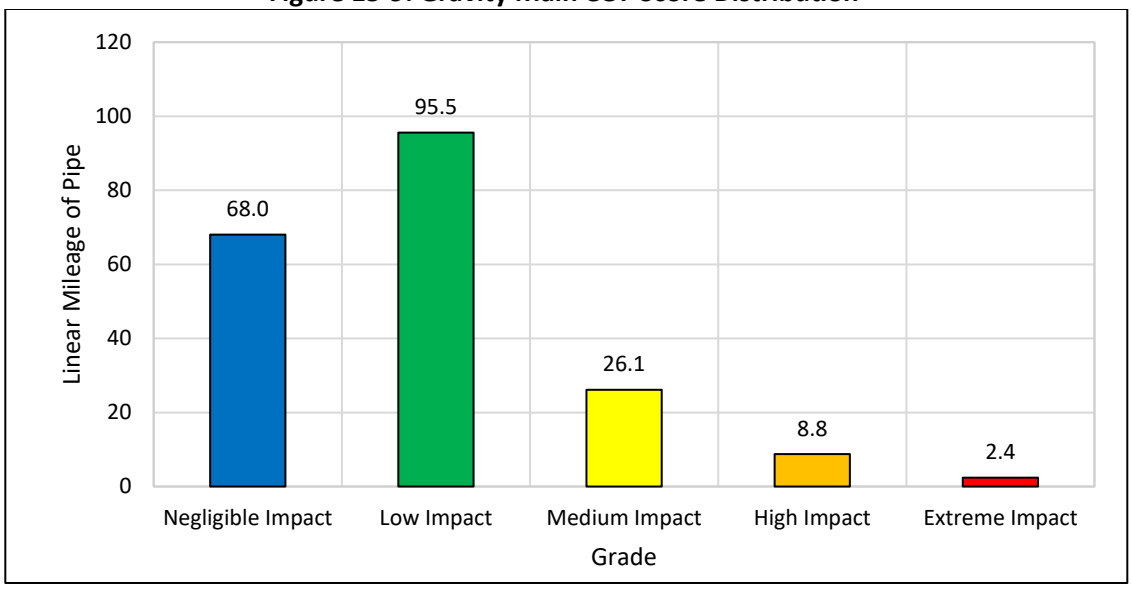
Wastewater gravity main criticality scores were calculated for each pipeline segment by totaling the weighted individual scores for each parameter to develop a total COF score. The gravity main criticality scores were then grouped into ranges, and descriptive scores of Negligible Impact to Extreme Impact were assigned. The definitions for each scoring range are presented in **Table 15-4**. The results of the gravity main criticality assessment are presented in **Figures 15-9** and **15-10**.

Based on the weightings and scores, approximately 94.4% of the collection system is estimated to have a Negligible to Medium Impact of failure. The pipes indicating High or Extreme COF for the City are the larger diameter interceptors which are primarily located along major roads in the center of the City and make up approximately 5.6% of the system.

Table 15-4: Gravity Main COF Score Range and Results

Total COF Score	COF Score Range	Length (mi)	% of System
Negligible Impact	0.0 - 2.0	68.0	33.9%
Low Impact	2.1 - 4.0	95.5	47.5%
Medium Impact	4.1 - 6.0	26.1	13.0%
High Impact	6.1 - 8.0	8.8	4.4%
Extreme Impact	8.1 - 10.0	2.4	1.2%
	Total	**200.8**	**100%**

Figure 15-9: Gravity Main COF Score Distribution



Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Hudson Oaks #3 LS

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lake Weatherford
Willow Park
Hudson Oaks
Annetta North

0 1,900 3,800
SCALE IN FEET

WATERSHEDS
- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

CRITICALITY SCORE
- Negligible Impact
- Low Impact
- Medium Impact
- High Impact
- Extreme Impact

FIGURE 15-10
CITY OF WEATHERFORD
EXISTING WASTEWATER SYSTEM RISK-BASED ASSESSMENT TOTAL CRITICALITY SCORE (CONSEQUENCE OF FAILURE)

LEGEND
- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Job No.: WEAU0002
Location: H:\W_WW_PLANNING\01_DELIVERABLES\00_FINAL_REPORT\02_FINAL_MP_REPORT\FINAL_REPORT_PRO_PROJECT\FINAL_REPORT_PRO_PROJECT.aprx\[Figure_15-10]-WW_COF_CriticalityScore
Updated: Wednesday, July 23, 2025 10:34 AM
User Name: 08817

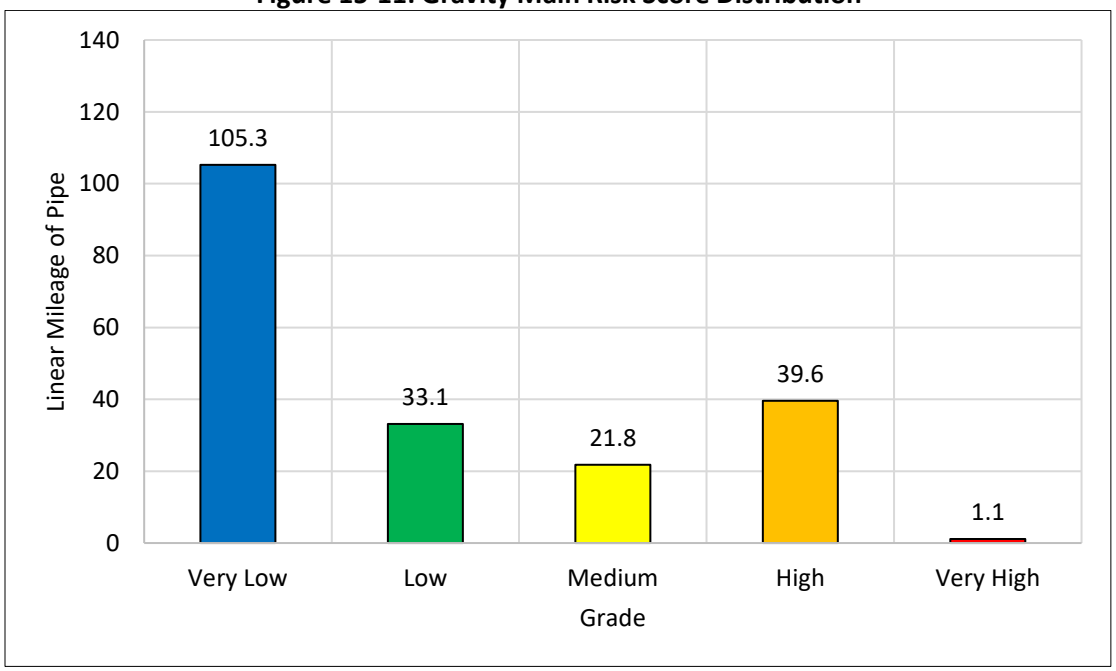
15.3 GRAVITY MAIN TOTAL RISK SCORE

A total risk score was assigned to each gravity main by adding the total condition score (LOF) and criticality score (COF) after applying their respective weightings. Through discussions with City staff, the LOF scores were weighted higher than COF scores for calculating the total risk score. This analysis assumes a 70% to 30% weighting split between LOF and COF scores, respectively. The 1 to 10 risk scores were adjusted to range from 1 to 100, and then inverted so that a lower number (lowest possible of 1) represents pipes of very poor quality and extreme criticality. The gravity main risk scores were then grouped into ranges, and descriptive scores of Very Low to Very High were assigned. The wastewater gravity main risk-based assessment results are summarized in **Table 15-5** and displayed in **Figures 15-11** and **15-12**.

Table 15-5: Gravity Main Risk Scoring Results

Risk Grade	Risk Score Range	Length (mi)	% of System
Very Low	100 – 80.1	105.2	52.4%
Low	80 – 60.1	33.1	16.5%
Medium	60 – 40.1	21.8	10.8%
High	40 – 20.1	39.6	19.7%
Very High	20 - 1	1.1	0.6%
	Total	**200.8**	**100%**

Figure 15-11: Gravity Main Risk Score Distribution



Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Hudson Oaks #3 LS

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

WATERSHEDS
- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

RISK SCORE
- Very Low
- Low
- Medium
- High
- Very High

0 1,900 3,800
SCALE IN FEET

FIGURE 15-12
CITY OF WEATHERFORD
EXISTING WASTEWATER SYSTEM
RISK-BASED ASSESSMENT
TOTAL RISK SCORE
70% CONDITION, 30% CRITICALITY

LEGEND
- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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FREESE AND NICHOLS

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Job No.: WEAU0002
Location: H:\W_WW_PLANNING\01_DELIVERABLES\00_FINAL_REPORT\02_FINAL_MP_REPORT\FINAL_REPORT_PRO_PROJECT\FINAL_REPORT_PRO_PROJECT.aprx\[Figure_15-12]-WW_RBA_TotalRiskScore_70_30
Updated: Wednesday, July 23, 2025 10:35 AM
User Name: OBS17

16.0 LIFT STATION RISK BASED ASSESSMENT

A risk-based assessment was performed on all of the City's 23 lift stations to develop a prioritized list of maintenance and improvement projects. A risk-based assessment consists of a condition assessment and a criticality assessment. The condition assessment included a visual inspection of each lift station. The criticality, or consequence of failure, assessment included an analysis of the proximity of each lift station to environmentally sensitive areas, as well as the population served. Each lift station was assigned condition and criticality scores based on the results of the assessments. The condition and criticality scores were used to assign a risk category (extreme, high, medium, or low) to each asset.

16.1 LIFT STATION CONDITION ASSESSMENT

FNI developed a list of electrical, structural, mechanical, and site components to be inspected at each lift station site. A condition weighting factor was assigned to each component group based on the importance of the component to the overall function of the lift station. Major components in each of these categories were evaluated separately. **Table 16-1** illustrates the condition component groups, parameters, and weighting for the lift station facilities.

Table 16-1: Lift Station Condition Assessment Component Group and Weighting

Component Group	Weight Factor
Pumps and Motors	15%
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-Up Power, Cables	20%
Instrumentation and Controls – SCADA Cabinet, Pump Controls, Communications	15%
Structure – Hatches, Corrosion, Cracks, Leaking	20%
Piping and Valves	15%
Mechanical – Ventilation, Odor Control	5%
Site – Drainage, Access Drive, Security, Fencing	10%
Total Weighting	**100%**

Numerical scores were assigned to each component based on the physical condition as seen during the inspection and information provided by City staff relating to its operational performance. Each component group received a score between 1 and 5. **Table 16-2** shows the guidelines used during assignments of numerical scores for component group conditions.

Table 16-2: Scoring Guideline for Condition Assessment for Lift Stations

Condition Rating	Description
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

Site visits of the 23 lift stations were conducted by City staff and inspection scoring sheets were developed for each lift station. The inspection sheets include details of the lift station such as number of pumps, design capacity, and the condition components. Each member of the team was provided with a scoring sheet for each lift station that was to be inspected. As a group, inspectors assigned final scores to each component and recorded written comments. The condition assessment sheets for each lift station are included in **Appendix K**.

Once the site visits for all the lift stations were completed, ranges were assigned for the condition scores, and categories were designated from Very Good to Very Poor as shown in **Table 16-3**. Final condition scores for each lift station are shown in **Table 16-4**. Based on the results of the condition assessment, Lift Stations #9 and #10 were rated in Poor condition. No lift stations were rated to be in Very Poor condition.

Table 16-3: Lift Station Condition Ratings

Condition Rating	Minimum	Maximum
Very Good	0.00	1.39
Good	1.40	2.49
Fair	2.50	2.99
Poor	3.00	3.39
Very Poor	3.40	5.00

Table 16-4: Lift Station Condition Results

Lift Station	Condition Score	Condition Rating
Lift Station #1	1.10	Very Good
Lift Station #3	1.05	Very Good
Lift Station #4	2.05	Good
Lift Station #5	2.55	Fair
Lift Station #6	1.75	Good
Lift Station #8	2.10	Good
Lift Station #9	3.15	Poor
Lift Station #10	3.00	Poor
Lift Station #11	2.35	Good
Lift Station #12	1.05	Very Good
Lift Station #13	2.15	Good
Lift Station #14	2.80	Fair
Lift Station #15	2.20	Good
Lift Station #16	2.70	Fair
Lift Station #17	2.10	Good
Lift Station #18	2.00	Good
Lift Station #19	2.00	Good
Lift Station #20	2.85	Fair
Lift Station #21	2.35	Good
Lift Station #22	2.55	Fair
Lift Station #23	2.40	Good
Lift Station #24	2.40	Good
Lift Station #25	1.45	Good

16.2 LIFT STATION CRITICALITY ASSESSMENT

In addition to condition scores, each lift station was assigned a criticality score based on the following three categories:

- Proximity to environmentally sensitive areas
- Proximity to high impact areas
- Population served

These categories were weighted based on input from City staff. **Table 16-5** shows the scoring parameters used and the weighting factors assigned to each lift station criticality category.

Table 16-5: Lift Station Criticality Scoring Categories and Weighting

Criticality Parameters and Weighting	
Proximity to High Impact Areas (30%)	**Population Served (40%)**
≤ 500 ft from Hospital, School, or University = 5	> 2,000 = 5
≤ 500 ft from Attractions (Mall or Golf Course) = 4	1,501 - 2,000 = 4
≤ 250 ft from Residential or Commercial Structure = 3	1,001 - 1,500 = 3
251 - 1,000 ft from Any Structure = 2	501 - 1,000 = 2
No Criteria Met = 1	≤ 500 = 1
Proximity to Environmentally Sensitive Areas (30%)	
≤ 500 ft from Town Creek, Sanchez Creek, Lake Weatherford = 5	
501 - 1,000 ft from Town Creek, Sanchez Creek, Lake Weatherford = 4	
≤ 1,000 ft from Any Water Body = 3	
No Criteria Met = 1	

FNI developed a shapefile for each of the high impact areas and environmentally sensitive areas. GIS tools were utilized to determine the distance from each lift station to the high impact and environmentally sensitive areas. The hydraulic model was used to determine the existing population served by each lift station.

Similar to the condition scores, the criticality scores were grouped in categories from Negligible to Extreme impact. **Table 16-6** shows the scores associated with rating categories of the criticality assessment. The criticality scores for the lift stations are shown in **Table 16-7**. Lift stations #12, # 14, #15 and #17 were scored as Extreme impact.

Table 16-6: Lift Station Criticality Scoring Ranges

Criticality Rating	Minimum	Maximum
Negligible Impact	0.00	1.49
Low Impact	1.50	1.99
Medium Impact	2.00	2.99
High Impact	3.00	3.49
Extreme Impact	3.50	5.00

Table 16-7: Lift Station Criticality Scoring Results

Lift Station	Criticality Score	Criticality Rating
Lift Station #1	2.8	Medium Impact
Lift Station #3	1.6	Low Impact
Lift Station #4	1.6	Low Impact
Lift Station #5	2.8	Medium Impact
Lift Station #6	3.2	High Impact
Lift Station #8	3.2	High Impact
Lift Station #9	3.4	High Impact
Lift Station #10	2.2	Medium Impact
Lift Station #11	2.8	Medium Impact
Lift Station #12	3.6	Extreme Impact
Lift Station #13	2.6	Medium Impact
Lift Station #14	4.4	Extreme Impact
Lift Station #15	3.8	Extreme Impact
Lift Station #16	3.2	High Impact
Lift Station #17	3.8	Extreme Impact
Lift Station #18	3.0	High Impact
Lift Station #19	3.4	High Impact
Lift Station #20	1.6	Low Impact
Lift Station #21	2.5	Medium Impact
Lift Station #22	1.6	Low Impact
Lift Station #23	2.2	Medium Impact
Lift Station #24	2.2	Medium Impact
Lift Station #25	1.6	Low Impact

16.3 LIFT STATION RISK ASSESSMENT

FNI utilized the results of the condition and criticality assessments to develop an RBA of the 23 lift stations the City currently operates. Risk scores were determined by comparing the condition and criticality results within an overall risk matrix. Each lift station's risk was determined by its location in the risk matrix shown in **Table 16-8**.

Table 16-8: Lift Station Risk Scoring Matrix

		Condition				
		Very Good	Good	Fair	Poor	Very Poor
Criticality	Negligible Impact	-	-	-	-	-
	Low Impact	LS#3	LS#4, LS#25	LS#20, LS#22	-	-
	Medium Impact	LS#1	LS#11, LS#13, LS#21, LS#23, LS#24	LS#5	LS#10	-
	High Impact	-	LS#6, LS#8, LS#18, LS#19	LS#16	LS#9	-
	Extreme Impact	LS#12	LS#15, LS#17	LS#14	-	-

17.0 WASTEWATER COLLECTION SYSTEM CAPITAL IMPROVEMENT PLAN

The goal of a CIP is to address existing deficiencies in the system, as well as provide capacity for future loading of the wastewater collection system. Upon completion of the wastewater model representing existing and future loading conditions, the capital improvement projects were analyzed and phased into the planning period in which they are hydraulically necessary. The purpose of each improvement is discussed in this section. **Table 17-1** summarizes the cost of the wastewater collection system CIP. **Figure 17-1** illustrates the proposed CIP projects.

Table 17-1: Wastewater Capital Improvements Plan Cost Summary

Project Number	Project Name	Cost
5-Year Projects		
1	Town Creek Interceptor Expansion Phase 1	$4,987,400
2	Lift Station #17 Force Main and Treatment Plant Influent Expansion	$5,526,300
3	Lift Station #15 Capacity Expansion to 2.50 MGD	$2,242,500
4	Highway 171 24-inch Gravity Main Expansion	$2,864,200
5	Lift Station #8 Capacity Expansion to 5.10 MGD and Force Main Expansion	$7,762,100
6	Lift Station #8 18-inch Gravity Main Expansion	$2,475,200
7	Lift Station #6 Capacity Expansion to 2.20 MGD	$1,794,000
8	Proposed 0.50 MGD Lift Station A, Force Main and Gravity Main Phase 1	$6,205,800
9	Old Airport Road Proposed Gravity Main and Decommission Lift Station #4	$3,234,200
10	Meadowview Road 15-inch Gravity Main Expansion and 12-inch Extension	$1,944,500
11	Old Dicey Road Proposed 12/15-inch Gravity Main	$4,148,600
12	Town Creek Interceptor Expansion Phase 2	$3,501,600
13	Peaster Highway 12/15-inch Gravity Main Expansion	$3,920,700
14	Lift Station #12 Capacity Expansion to 1.00 MGD and Force Main Expansion	$2,146,900
15	Lift Station A Gravity Main Phase 2 and Decommission Lift Station #25	$1,403,200
16	Lift Station A Gravity Main Phase 3 and Decommission Lift Station #10	$2,560,400
	5-Year Total	**$56,717,600**

Table 17-1: Wastewater Capital Improvements Plan Cost Summary Continued

Project Number	Project Name	Cost
10-Year Projects		
17	Sanchez Creek Proposed 12-inch Gravity Main	$3,749,500
18	Lift Station #6 Capacity Expansion to 3.50 MGD and Force Main Expansion	$5,340,200
19	Lift Station A Capacity Expansion to 1.50 MGD	$1,495,000
20	Lift Station A Gravity Main Phase 4 and Decommission Lift Station #22	$2,394,800
21	Wastewater Treatment Plant Influent 24/27-inch Gravity Main Expansion	$2,511,300
22	Proposed 3.50 MGD Lift Station B and 16-inch Force Main	$13,821,300
23	Center Point Road Gravity Main and Decommission Lift Station #20	$2,243,900
24	Fort Worth Highway Gravity Main and Decommission Lift Station #15	$2,031,100
25	Lift Station B Gravity Main Phase 1 and Decommission Lift Station #16	$2,047,600
26	Lift Station B Gravity Main Phase 2 and Decommission Lift Station #9	$2,085,300
	10-Year Total	**$37,720,000**
25-Year Projects		
27	Wastewater Treatment Plant Expansion to 6.00 MGD	$100,912,500
28	North Willow Creek Proposed 12-inch Gravity Main Phase 1	$4,803,800
29	North Willow Creek Proposed 12-inch Gravity Main Phase 2	$3,025,400
30	York Avenue 12-inch Proposed Gravity Main	$3,683,200
31	Lift Station #6 Capacity Expansion to 4.00 MGD	$747,500
32	Lift Station A Capacity Expansion to 2.00 MGD	$747,500
33	Ranger Highway Proposed 12-inch Gravity Main	$1,233,400
34	Mitchell Boulevard Proposed 12-inch Gravity Main	$2,115,800
35	Lift Station B Capacity Expansion to 4.00 MGD	$747,500
	25-Year Total	**$118,016,600**
	CIP Total	**$212,454,200**

Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43
Decommission

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD
Decommission

Lift Station #25
Firm Capacity = 0.68 MGD
Decommission

Lift Station #26
Firm Capacity = 0.86 MGD

Proposed Lift Station A
Firm Capacity = 0.50 MGD
Expand Firm Capacity to 1.50 MGD
Expand Firm Capacity to 2.00 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD
Expand Firm Capacity to 2.20 MGD
Expand Firm Capacity to 3.50 MGD
Expand Firm Capacity to 4.00 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD
Decommission

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.70 MGD
Expand Firm Capacity to 5.10 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD
Decommission

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD
Expand Capacity to 6.0 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD
Decommission

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD
Decommission

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD
Decommission

Proposed Lift Station B
Firm Capacity = 3.50 MGD
Expand Firm Capacity to 4.00 MGD

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Hudson Oaks #3 LS

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD
Expand Firm Capacity to 2.50 MGD
Decommission

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD
Expand Firm Capacity to 1.00 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Proposed Lift Station D
Firm Capacity = 0.10 MGD

Proposed Lift Station C
Firm Capacity = 0.50 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

La Salle Package
Wastewater Treatment Plant
Permitted Avg Day Capacity = 0.30 MGD
Expand Capacity to 0.60 MGD

Replace 8/10-inch Wastewater Line with 12/15-inch Wastewater Line

Replace 10/12-inch Wastewater Line with 21/24-inch Wastewater Line

Replace 18-inch Wastewater Line with 30-inch Wastewater Line

36-inch Gravity Main Improvements

Replace 15/18/24-inch Wastewater Line with 24/27-inch Wastewater Line

Replace 8/10-inch Wastewater Line with 15-inch Wastewater Line

Replace 18-inch Wastewater Line with 24-inch Wastewater Line

Replace 12-inch Wastewater Line with 18-inch Wastewater Line

Consider purchase of land for future wastewater treatment plant.

Lake Weatherford

Willow Park

Hudson Oaks

WATERSHEDS

- Lake
- Sanchez Creek
- Town Creek
- Willow Creek
- Squaw Creek

PROPOSED IMPROVEMENTS

2029 Proposed Improvements
- Lift Station
- Wastewater Line
- Force Main

2034 Proposed Improvements
- Lift Station
- Wastewater Line
- Force Main

2049 Proposed Improvements
- Lift Station
- Wastewater Treatment Plant
- Wastewater Line
- Force Main

The timing of projects shown is subject to change based on development patterns. The utility alignments shown in this figure are for illustration purposes only and do not set the alignments. The alignment of each utility will be determined at the time of the engineering design.

FIGURE 17-1

CITY OF WEATHERFORD

WASTEWATER SYSTEM CAPITAL IMPROVEMENTS PLAN

LEGEND

Under Design/Construction
- Lift Station
- Wastewater Treatment Plant
- Wastewater Line
- Force Main

Exiting Wastewater System
- Manhole
- Lift Station
- Wastewater Treatment Plant

- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

0 2,500 5,000
SCALE IN FEET

1858 WEATHERFORD TRUE TEXAS

FREESE AND NICHOLS

Created By Freese and Nichols, Inc.
Job No.: WEA24002
Location: H:\W_WW_PLANNING\01_DELIVERABLES\00_FINAL_REPORT\02_FINAL_MP_REPORT\FINAL_REPORT_PRO_PROJECT\FINAL_REPORT_PRO_PROJECT.aprx\Figure_17-1\WW_CIP
Updated: Thursday, September 4, 2025 4:37 PM
User Name: DSW9

17.1 FIVE-YEAR CAPITAL IMPROVEMENT PLAN

The Five-Year CIP contains 16 projects, which have an estimated total cost of $56,717,600. **Appendix L** contains a detailed summary of each project, highlighting drivers, locations and cost. These projects were selected to be part of the short-term CIP because they address system needs to support existing infrastructure and projected short-term development.

Project #1: Town Creek Interceptor Expansion Phase 1

This project consists of expanding the 18-inch line to 30 inches, beginning southeast of where Jack Borden Way passes over the railroad and running northwest along Town Creek until terminating north of the intersection of North Elm Street and East Bridge Street. The proposed wastewater line expansion will reduce existing capacity issues and accommodate future growth.

Project #2: Lift Station #17 Force Main and Treatment Plant Influent Expansion

This project consists of expanding the 12-inch force main to 16 inches, beginning from the WWTP influent line and running east to Lift Station #17. This project also consists of expanding the influent WWTP line to 36 inches from the WWTP to the under-design/construction 36-inch line. Expanding the force main will accommodate the recently increased capacity of Lift Station #17, and expanding the influent WWTP line is intended to reduce existing capacity issues.

Project #3: Lift Station #15 Capacity Expansion to 2.50 MGD

This project consists of expanding the firm capacity of Lift Station #15 from 1.01 MGD to 2.50 MGD. Expanding Lift Station #15 will reduce existing capacity issues and accommodate future growth.

Project #4: Highway 171 24-inch Gravity Main Expansion

This project consists of expanding the 18-inch wastewater line to 24 inches, beginning southeast of the intersection of East BB Fielder Road and the I-20 service road and running south, curving along East BB Fielder Road until tying into the Lift Station #8 force main. The proposed wastewater line expansion will provide the capacity needed for Projects #5 - #8.

Project #5: Lift Station #8 Capacity Expansion to 5.10 MGD and Force Main Expansion

This project consists of expanding the firm capacity of Lift Station #8 from 1.70 MGD to 5.10 MGD and expanding the 10-inch force main to 16 inches, beginning by tying into the upstream end of Project #4 and running west until tying into the under-design/construction Lift Station #8. Expanding Lift Station #8 will reduce existing capacity issues and accommodate future growth, and expanding the force main will accommodate the under-design/construction capacity of Lift Station #8.

Project #6: Lift Station #8 18-inch Gravity Main Expansion

This project consists of expanding the 12-inch wastewater line to 18 inches, beginning by tying into Lift Station #8 and running north until it crosses West BB Fielder Road. It then runs west until it ties into the Lift Station #6 force main. The proposed wastewater line expansion will increase wastewater system capacity for future growth and provide the capacity needed for Projects #7 and #8.

Project #7: Lift Station #6 Capacity Expansion to 2.20 MGD

This project consists of expanding the firm capacity of Lift Station #6 from 1.01 MGD to 2.20 MGD. Expanding Lift Station #6 will increase wastewater system capacity for future growth.

Project #8: Proposed 0.50 MGD Lift Station A, Force Main and Gravity Main Phase 1

This project consists of the construction of the 0.50 MGD Lift Station A, which will be near the southwest corner of Dean Road, a 12-inch force main to connect Lift Station A to Lift Station #6 and a 15-inch gravity main that runs northeast from Lift Station A along the nearby creek until it terminates south of I-20. The proposed Lift Station A, force main and gravity main construction will extend the wastewater system to serve future developments.

Project #9: Old Airport Road Proposed Gravity Main and Decommission Lift Station #4

This project consists of the construction of a proposed 12-inch wastewater line that begins on the trail running west from the intersection of Clear Lake Road and Woodland Hills Lane and runs southwest until it terminates east of the intersection between Old Airport Road and Causbie Road. This project also consists of decommissioning Lift Station #4 and branching the proposed 12-inch line to run northwest and tie into the Lift Station #4 influent line. The proposed wastewater line and Lift Station #4 decommission will extend the wastewater system to serve future developments and reduce the number of lift stations to be maintained by the City.

Project #10: Meadowview Road 15-inch Gravity Main Expansion and 12-inch Extension

This project consists of expanding the 8/10-inch wastewater line to 15 inches, beginning south of the intersection of Mitchell Boulevard and Meadowview Road and running north until it terminates north of the intersection of Mitchell Boulevard and Louis Trail. This project also consists of the construction of a proposed 12-inch wastewater line that continues north until it terminates east of Waterford Way. The proposed wastewater line expansion and extension will increase wastewater system capacity for future growth and extend the wastewater system to serve future developments.

Project #11: Old Dicey Road Proposed 12/15-inch Gravity Main

The project consists of the construction of a proposed 15-inch wastewater line beginning northwest of where Willow Creek crosses Old Dicey Road and running north until it reaches a point between the north end of De La Cruz Street and Willow Creek. From there, the line sizes down to a 12-inch and continues north along Murls Lake Road until it terminates southwest of where Ric Williamson Memorial Highway crosses Holder Branch Creek. The proposed wastewater line will extend the wastewater system to serve future developments.

Project #12: Town Creek Interceptor Expansion Phase 2

This project consists of a 24-inch wastewater line expansion beginning upstream of Project #1 and running north until the intersection of Front Street and North Elm Street. From there, the line size changes to a 21-inch expansion and runs northwest along Town Creek until it ties into the Lift Station #1 force main. The proposed wastewater line expansion will reduce existing capacity issues and accommodate future growth.

Project #13: Peaster Highway 12/15-inch Gravity Main Expansion

This project consists of a 15-inch wastewater line expansion beginning upstream of Project #12 and running northwest along Town Creek until it crosses North Bowie Drive. From there, the 12-inch line expansion continues northwest until the existing line ends east of the intersection of Peaster Highway and Ric Williamson Memorial Highway. The proposed 12-inch wastewater line continues northwest along Peaster Highway for approximately 2,500 feet. The proposed wastewater line expansion and construction will reduce existing capacity issues, accommodate future growth and extend the wastewater system to serve future developments.

Project #14: Lift Station #12 Capacity Expansion to 1.00 MGD and Force Main Expansion

This project consists of expanding Lift Station #12's firm capacity from 0.65 MGD to 1.00 MGD and expanding the force main to 8 inches. The proposed lift station and force main expansions will reduce existing capacity issues at Lift Station #12.

Project #15: Lift Station A Gravity Main Phase 2 and Decommission Lift Station #25

This project consists of decommissioning Lift Station #25 and extending the Lift Station A 15-inch wastewater line beginning upstream of Project #8 and running northwest to tie into the Lift Station #25 influent line. The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Project #16: Lift Station A Gravity Main Phase 3 and Decommission Lift Station #10

This project consists of decommissioning Lift Station #10 and the expansion of the Lift Station A wastewater line as a 12-inch beginning upstream of Project #15 and running north along Old Brock Road until it ties into the Lift Station #10 influent line. The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

17.2 TEN-YEAR CAPITAL IMPROVEMENT PLAN

The Ten-Year CIP contains 10 projects, with an estimated total cost of $37,720,000. **Appendix L** contains a one-page summary of each project highlighting drivers, location and cost.

Project #17: Sanchez Creek Proposed 12-inch Gravity Main

The project consists of the construction of a 12-inch wastewater line beginning east of where I-20 crosses Sanchez Creek and running east, then north along Ric Williamson Memorial Highway until it terminates southeast of the intersection between Ric Williamson Memorial Highway and Ranger Highway. The proposed wastewater line will extend the wastewater system to serve future developments.

Project #18: Lift Station #6 Capacity Expansion to 3.50 MGD and Force Main Expansion

This project consists of expanding the firm capacity of Lift Station #6 from 2.20 MGD to 3.50 MGD as well as expanding the 10-inch force main to 16 inches, beginning by tying into the upstream end of Project #6 and running southwest until tying into Lift Station #6. The proposed lift station and force main expansions will increase wastewater system capacity for future growth.

Project #19: Lift Station A Capacity Expansion to 1.50 MGD

This project consists of expanding the firm capacity of Lift Station A from 0.50 MGD to 1.50 MGD. The proposed lift station expansion will increase wastewater system capacity for future growth.

Project #20: Lift Station A Gravity Main Phase 4 and Decommission Lift Station #22

This project consists of decommissioning Lift Station #22 and the extension of the Lift Station A wastewater line as a 12-inch beginning upstream of Project #16 and running north until it ties into the Lift Station #22 influent line. The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Project #21: Wastewater Treatment Plant Influent 24/27-inch Gravity Main Expansion

This project consists of expanding the 24-inch WWTP influent line to 27 inches, beginning north of Eureka Street and running southwest until it meets Holland Lake Trail. It then expands the 15/18-inch line to 24 inches, running southeast along King Arthur Drive until it ties into the existing Lift Station #9 force main. The proposed wastewater line expansion will increase wastewater system capacity for future growth and provide the capacity needed for Projects #22 - #26.

Project #22: Proposed 3.50 MGD Lift Station B and 16-inch Force Main

The project consists of the construction of the 3.50 MGD Lift Station B, which will be north of where the railroad crosses over Town Creek, and a 16-inch force main tying into the upstream end of Project #21 and running southeast along the existing Lift Station #9 and Lift Station #16 force mains, then east along Town Creek until tying into Lift Station B. The proposed Lift Station B and force main will increase wastewater system capacity for future growth and provide the capacity needed for Projects #23 - #26.

Project #23: Center Point Road Gravity Main and Decommission Lift Station #20

This project consists of decommissioning Lift Station #20 and the construction of a 21-inch wastewater line beginning at the proposed Lift Station B and running north along Center Point Road, then northeast along East Bankhead Highway until tying into the existing Lift Station #20 influent line. The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Project #24: Fort Worth Highway Gravity Main and Decommission Lift Station #15

This project consists of decommissioning Lift Station #15 and the construction of a 15-inch wastewater line beginning southwest of where Fort Worth Highway crosses Underwood Branch Creek. The line runs east to cross Underwood Branch Creek, then north until tying into the existing Lift Station #15 influent line. The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Project #25: Lift Station B Gravity Main Phase 1 and Decommission Lift Station #16

This project consists of decommissioning Lift Station #16 and the construction of a 12-inch wastewater line tying into Lift Station B and running west parallel to the force main from Project #22 until tying into the existing Lift Station #16 influent line. The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Project #26: Lift Station B Gravity Main Phase 2 and Decommission Lift Station #9

This project consists of decommissioning Lift Station #9 and the construction of a 12-inch wastewater line tying into the upstream end of Project #25 and running northwest along Town Creek until tying into the existing Lift Station #9 influent line. The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

17.3 TWENTY-FIVE-YEAR CAPITAL IMPROVEMENT PLAN

The Twenty-Five-Year CIP contains nine projects, with an estimated total cost of $118,016,600. **Appendix L** contains a one-page summary of each project highlighting drivers, location and cost.

Project #27: Wastewater Treatment Plant Expansion to 6.00 MGD

This project consists of expanding the treatment capacity of the WWTP from 4.50 MGD to 6.00 MGD. The proposed treatment plant expansion will provide enough capacity to treat projected average day flows through the twenty-five-year planning period.

Project #28: North Willow Creek Proposed 12-inch Gravity Main Phase 1

This project consists of the construction of a 12-inch wastewater line tying into Project #11 south of where it crosses Willow Creek and running northwest along Willow Creek until it terminates southwest of where North Bend Road crosses Willow Creek. The proposed wastewater line will extend the wastewater system to serve future developments.

Project #29: North Willow Creek Proposed 12-inch Gravity Main Phase 2

This project consists of the construction of a 12-inch wastewater line tying into Project #28 south of where it crosses Ric Williamson Memorial Highway and running west along Ric Williamson Memorial Highway until it terminates east of the intersection of Ric Williamson Memorial Highway and North Main Street. The proposed wastewater line will extend the wastewater system to serve future developments.

Project #30: York Avenue Proposed Gravity Main

This project consists of the construction of a 12-inch wastewater line tying into the under-design/construction 15-inch line along the railroad, running northwest, then southwest along Ric Williamson Memorial Highway until it terminates east of the intersection of Ric Williamson Memorial Highway and Old Garner Road. The proposed wastewater line expansion and construction will increase wastewater system capacity for future growth and extend the wastewater system to serve future developments.

Project #31: Lift Station #6 Capacity Expansion to 4.00 MGD

This project consists of expanding the firm capacity of Lift Station #6 from 3.50 MGD to 4.00 MGD. The proposed lift station expansion will increase wastewater system capacity for future growth.

Project #32: Lift Station A Capacity Expansion to 2.00 MGD

This project consists of expanding the firm capacity of the proposed Lift Station A from 1.50 MGD to 2.00 MGD. The proposed lift station expansion will increase wastewater system capacity for future growth.

Project #33: Ranger Highway Proposed 12-inch Gravity Main

This project consists of the construction of a 12-inch wastewater line tying into the upstream end of Project #14 and running north along Ric Williamson Memorial Highway for approximately 2,800 feet. The proposed wastewater line will extend the wastewater system to serve future developments.

Project #34: Mitchell Boulevard Proposed 12-inch Gravity Main

This project consists of the construction of a 12-inch wastewater line tying into the upstream end of Project #10 and running north until it terminates southwest of the intersection of Azle Highway and Trailwood Drive. The proposed wastewater line will extend the wastewater system to serve future developments.

Project #35: Lift Station B Capacity Expansion to 4.00 MGD

This project consists of expanding the firm capacity of the proposed Lift Station B from 3.50 MGD to 4.00 MGD. The proposed lift station expansion will increase wastewater system capacity for future growth.

17.4 SQUAW CREEK WATERSHED CAPITAL IMPROVEMENT PLAN

As discussed in **Section 2.1.1**, the LaSalle Ranch Development will convey wastewater flows to a package WWTP and not flow to the City's existing WWTP. However, FNI prepared a preliminary CIP for existing wastewater service to the LaSalle Ranch Development area, which primarily falls within the Squaw Creek Watershed. The Squaw Creek Watershed CIP contains six projects, with an estimated total cost of $29,206,900 as shown in **Table 17-2**. **Appendix L** contains a one-page summary of each project highlighting drivers, location, and cost.

Table 17-2: Squaw Creek Watershed Capital Improvements Plan Cost Summary

Project Number	Project Phase	Project Name	Cost
36	5-Year	LaSalle Package Plant Proposed 12-inch Gravity Main	$1,589,600
37	25-Year	LaSalle Package Plant Expansion to 0.60 MGD	$15,697,500
38	25-Year	LaSalle Package Plant Proposed 12-inch Gravity Main Phase 1	$3,448,200
39	25-Year	LaSalle Package Plant Proposed 12-inch Gravity Main Phase 2	$1,747,500
40	25-Year	Proposed 0.50 MGD Lift Station C, Force Main and Gravity Main	$4,184,600
41	25-Year	Proposed 0.10 MGD Lift Station D, Force Main and Gravity Main	$2,539,500
		LaSalle Total	**$29,206,900**

Project #36: LaSalle Package Plant Proposed 12-inch Gravity Main

This project consists of the construction of a 12-inch wastewater line tying into the LaSalle Package WWTP and running northeast until it terminates when it reaches the south-most trail running east from Pearson Ranch Road. The proposed wastewater line will extend the LaSalle Ranch wastewater system to serve future developments.

Project #37: LaSalle Package Plant Expansion to 0.60 MGD

This project consists of expanding the treatment capacity of the LaSalle Package WWTP from 0.30 MGD to 0.60 MGD. The proposed treatment plant expansion will provide enough capacity to treat projected flows in the LaSalle Ranch Development through the twenty-five-year planning period.

Project #38: LaSalle Package Plant Proposed 12-inch Gravity Main Phase 1

This project consists of the construction of a 12-inch wastewater line tying into the LaSalle Package WWTP and running northwest until it terminates at the city limits. The proposed wastewater line will extend the LaSalle Ranch wastewater system to serve future developments.

Project #39: LaSalle Package Plant Proposed 12-inch Gravity Main Phase 2

This project consists of the construction of a 12-inch wastewater line tying into Project #38 approximately 5,500 feet upstream of the LaSalle Package WWTP and running northeast to the city limits. The proposed wastewater line will extend the LaSalle Ranch wastewater system to serve future developments.

Project #40: Proposed 0.50 MGD Lift Station C, Force Main and Gravity Main

This project consists of the construction of the 0.50 MGD Lift Station C on White Settlement Road, an 8-inch force main tying into the LaSalle Package WWTP influent line, and a 15-inch gravity main running north along city limits until it terminates after approximately 2,300 feet. The proposed Lift Station C, force main and gravity main will extend the LaSalle Ranch wastewater system to serve future developments.

Project #41: Proposed 0.10 MGD Lift Station D, Force Main and Gravity Main

This project consists of the construction of the 0.10 MGD Lift Station D on Ragle Road, an 8-inch force main tying into the proposed 12-inch gravity main from Project #40, and a 12-inch gravity main running north until it terminates after approximately 3,100 feet. The proposed Lift Station D, force main and gravity main will extend the LaSalle Ranch wastewater system to serve future developments.

Appendix A
Land Use Assumptions Tech Memo

TECHNICAL MEMORANDUM

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www.freese.com

TO: Bill Smith, P.E., C.F.M., City of Weatherford

CC: Rick Shaffer, P.E., City of Weatherford

FROM: Cullen Carlson, P.E., Nicholas McCormick, P.E., Julia Mfitundinda, P.E., Thomas Botsch, E.I.T., Freese and Nicholas, Inc.

SUBJECT: Land Use Assumptions

PROJECT: Water and Wastewater Master Plan Update

DATE: October 17, 2024

WEATHERFORD 1858 TRUE TEXAS

DRAFT

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FREESE AND NICHOLS, INC.
TEXAS REGISTERED ENGINEERING FIRM
F- 2144

1.0 INTRODUCTION

Population and land use are important elements in the analysis of water and wastewater systems. Water demands and wastewater flows are dependent on the residential population and commercial development served by the systems and determine the sizing and location of the respective system infrastructure. A thorough analysis of historical and projected populations and non-residential acreage provides the basis for accurately predicting future water demands and wastewater flows. Freese and Nichols, Inc. (FNI) utilized various sources of information to calculate the population and non-residential acreage projections in the City of Weatherford (City) for the existing (2024), five-year (2029), ten-year (2034), and twenty-five-year (2049) planning periods. The projections were developed on a parcel-level basis utilizing information from the City's planning department, water meter billing data, and the City's *2018 General Plan*. Historical data from the North Central Texas Council of Governments (NCTCOG) and the U.S. Census Bureau (Census) were reviewed to determine historical trends to guide projections. Utilizing this data, FNI was able to determine population and non-residential acreage projections for the future planning periods.

2.0 SERVICE AREAS

Delineating the water and wastewater service areas is an important aspect for any master plan. The service area determines where and the extent to which the water or wastewater system will expand. FNI worked with the City to define the five-, ten-, and twenty-five-year service areas for this study. **Figure 2-1** and **Figure 2-2** identify the water and wastewater service areas for this study, respectively.

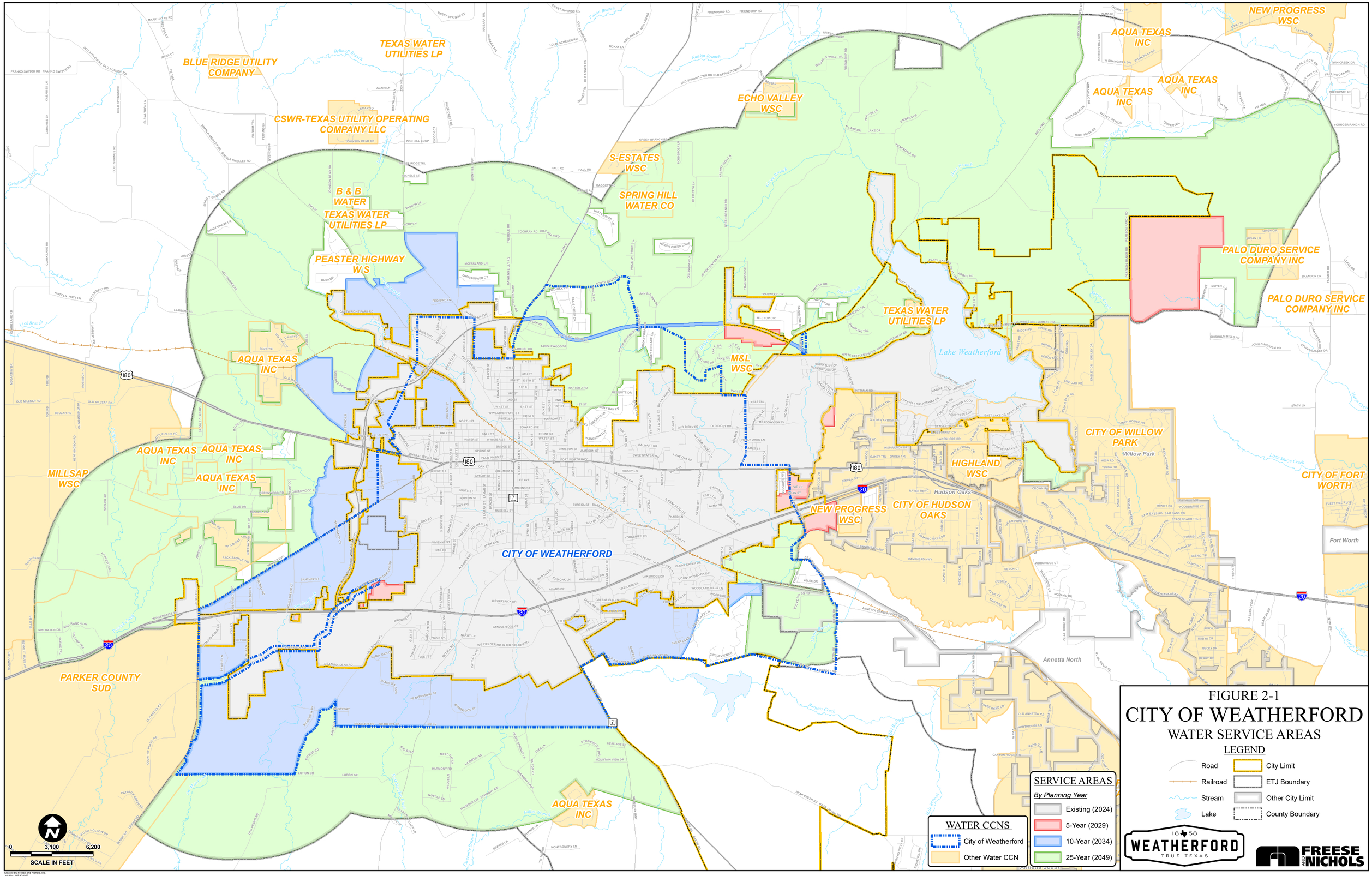


FIGURE 2-1

CITY OF WEATHERFORD

WATER SERVICE AREAS

WEATHERFORD TRUE TEXAS

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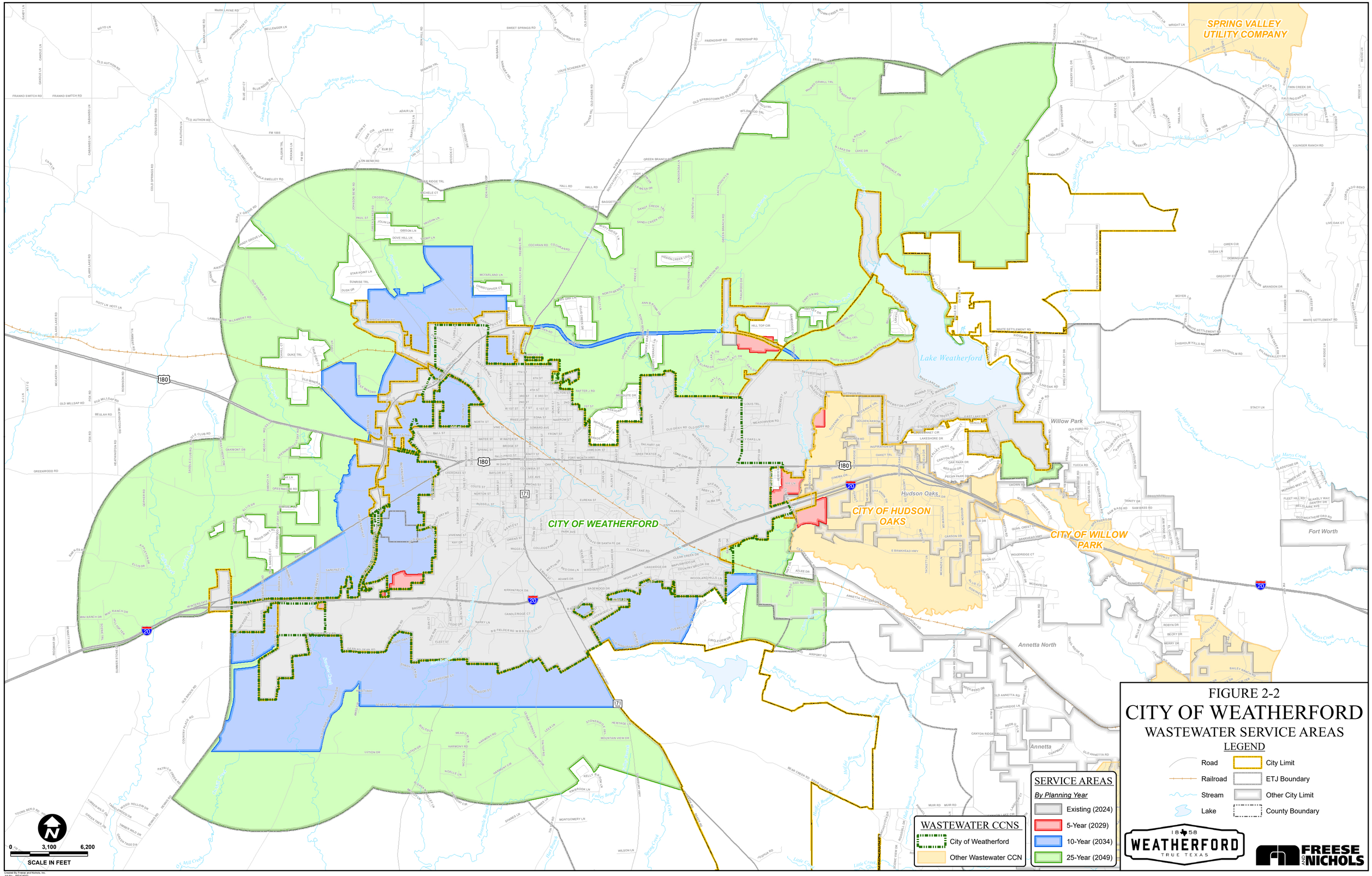


FIGURE 2-2

CITY OF WEATHERFORD

WASTEWATER SERVICE AREAS

LEGEND

- Road
- Railroad
- Stream
- Lake
- City Limit
- ETJ Boundary
- Other City Limit
- County Boundary

SERVICE AREAS

By Planning Year

- Existing (2024)
- 5-Year (2029)
- 10-Year (2034)
- 25-Year (2049)

WASTEWATER CCNS

- City of Weatherford
- Other Wastewater CCN

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3.0 POPULATION AND NON-RESIDENTIAL ACREAGE

In the following sections, the population projections are differentiated between the "total population" and "population served." There are some customers who have private wells and/or private septic systems and will not be served by the City's water and/or wastewater systems. The "total population" includes the people estimated to live at all residences in the service area, while the "population served" is the population served by the City's water and/or wastewater systems.

3.1 HISTORICAL POPULATION

Total population data for 2009-2023 was obtained from NCTCOG, the Census, and the City. Based on this data, the three-year, five-year, and overall average annual growth rates were determined to be between 1.4% and 7.0% for 2009-2023. **Table 3-1** summarizes the historical population data and corresponding annual growth rates from all sources.

Table 3-1: City of Weatherford Historical Population Summary

	NCTCOG Estimates		Census Estimates		City Estimates	
Year	Total Population	Growth Rate	Total Population	Growth Rate	Total Population	Growth Rate
2009	24,939	-	27,440	-	-	-
2010	25,250	1.2%	25,250	-8.0%	-	-
2011	25,300	0.2%	26,217	3.8%	-	-
2012	25,440	0.6%	26,763	2.1%	-	-
2013	25,940	2.0%	27,242	1.8%	-	-
2014	26,200	1.0%	27,918	2.5%	-	-
2015	26,600	1.5%	28,775	3.1%	-	-
2016	27,080	1.8%	29,618	2.9%	-	-
2017	27,660	2.1%	30,744	3.8%	-	-
2018	27,900	0.9%	31,882	3.7%	-	-
2019	28,090	0.7%	33,582	5.3%	28,175	-
2020	30,854	9.8%	31,144	-7.3%	28,539	1.3%
2021	31,180	1.1%	33,954	9.0%	30,933	8.4%
2022	31,690	1.6%	36,231	6.7%	32,208	4.1%
2023	32,209	1.6%	38,109	5.2%	34,586	7.4%
Overall Average Growth Rate		**1.9%**	**--**	**2.5%**	**--**	**5.3%**
5-Year Average Growth Rate		**3.0%**	**--**	**3.8%**	**--**	**5.3%**
3-Year Average Growth Rate		**1.4%**	**--**	**7.0%**	**--**	**6.6%**

3.2 PROJECTED TOTAL POPULATION

FNI calculated population projections utilizing 1%, 2%, 3%, and 6% growth rates for comparison with population projections from the *2011 Water Master Plan*, *2015 Wastewater Master Plan*, *2021 Impact Fee Update,* and *2026 Region C Water Plan*. The 2% growth rate was selected based on the average growth rate of the NCTCOG population estimates from 2009-2023, with 1% and 3% growth rates to provide low- and high-end projections. A 6% growth rate was also evaluated based on the growth rate in the *Region C Water Plan* projections. The *2011 Water Master Plan*, *2015 Wastewater Master Plan,* and *2021 Impact Fee Update* estimated a 2.5% growth rate throughout their ten-year planning periods, and the *2011 Water Master Plan* and *2015 Wastewater Master Plan* determined the ultimate buildout population to be 160,720 and 143,927, respectively. Buildout is defined as the planning period when all planned developments are completed, which will be beyond the twenty-five-year planning period of the *2024 Water and Wastewater Master Plan Update*. The projected population for each growth rate is presented in **Table 3-2**, and projections from previous reports are shown in **Table 3-3**. A chart of the historical population and all population projections is shown in **Figure 3-1**.

Table 3-2: Total Population Projections by Growth Rate

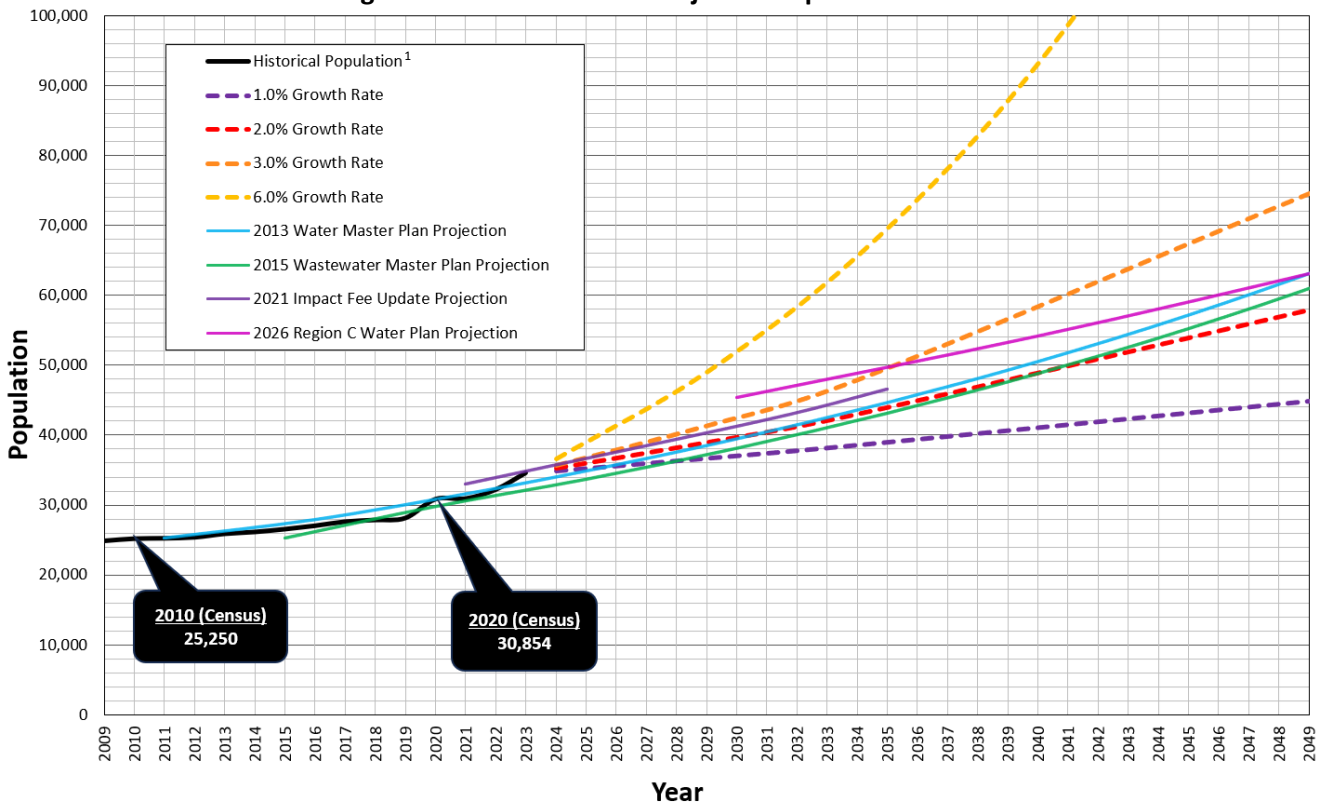
Year	Projected Population Growth Rate			
	1%	2%	3%	6%
Existing (2024)[1]	34,932	35,278	35,624	36,661
5-Year (2029)	36,714	38,949	41,297	49,061
10-Year (2034)	38,587	43,003	47,875	65,655
25-Year (2049)	44,798	57,877	74,588	157,345

[1]*Existing was based on the 2023 City-estimated population of 34,586 people*

Table 3-3: Previous Population Projections

2011 Water Master Plan		2015 Wastewater Master Plan		2021 Impact Fee Update		2026 Region C Water Plan	
Year	Population	Year	Population	Year	Population	Year	Population
2011	25,300	2015	25,318	2021	32,951	2030	45,410
2016	27,933	2020	29,834	2031	42,180	2040	54,197
2021	31,604	2025	33,725	2035	46,559	2050	64,123
Buildout	160,720	Buildout	143,927	-	-	2060	74,543

Figure 3-1: Historical and Projected Population Chart



[1]Historical population shows NCTCOG data for 2009-2018 and City-estimated data for 2019-2023

3.3 PROJECTIONS DATABASE

FNI developed a projections database based on data provided by the City. All parcels within the buildout service area are included, and the database criteria estimate population and non-residential demographics. The projections serve as the basis for determining future water demands and wastewater flows that will be utilized to hydraulically assess the systems. The magnitude and distribution of the growth in population and non-residential development dictate where future infrastructure may be required.

The City provided parcel shapefiles and water meter billing data with existing land use categories as well as the location and size of planned developments. FNI geocoded the billing meter data to provide a basis to distribute population and assign corresponding land use categories to each parcel. Geocoding is a process in which a field or group of fields of an attribute table collectively signifies an address that can be assigned a spatial location using corresponding streets or small area polygons, such as parcels, to describe an area.

The City's existing land use categories were simplified to single-family residential, multi-family residential, non-residential, and mixed-use. For residential land uses, units per parcel, people per unit, and existing

number of units were used to calculate the existing population. Mixed-use was estimated to be 70% non-residential and 30% residential. Values for future land use assumptions were estimated using the *2018 General Plan* and discussions with the City. **Table 3-4** shows the simplification of the City's existing land use categories, and **Table 3-5** shows existing land use assumptions. **Figure 3-2** shows a map of existing land use. For parcels with a billing meter, existing land use was assigned based on that billing meter; for parcels without a billing meter, existing land use was assigned "Unknown". **Table 3-6** shows future land use assumptions and **Figure 3-3** shows a map of future land use with planned developments. **Figure 3-4** shows a map of individual parcels identified for development in the five-year, ten-year, and twenty-five-year planning periods.

Table 3-4: Existing Land Use Categories

Land Use	Simplified Land Use for Database
Municipal	Single-Family
Residential	Single-Family
Apartment	Multi-Family
College	Multi-Family
Multi-Family	Multi-Family
Plex	Multi-Family
College	Mixed-Use
Auto	Non-Residential
Cable	Non-Residential
Carwash	Non-Residential
Church	Non-Residential
City	Non-Residential
Commercial	Non-Residential
Daycare	Non-Residential
Gas	Non-Residential
Grocery	Non-Residential
Hospital	Non-Residential
Hotel/Motel	Non-Residential
Laundry	Non-Residential
Medical	Non-Residential
MFG	Non-Residential
Nursing Home	Non-Residential
Office	Non-Residential
Restaurant	Non-Residential
School	Non-Residential
Wholesale	Non-Residential
Irrigation	Not Included
Fire Hydrant	Not Included

Table 3-5: Existing Land Use Assumptions

Land Use	Units per Parcel	People per unit	Existing Units*	Population*
Single-Family	1	2.6	11,250	29,250
Multi-Family	If Provided by City Staff, Else 1	2.0	2,750	5,500
Mixed-Use	If Provided by City Staff, Else 1	2.5	250	750
Non-Residential	--	--	--	--
			Total	**35,500**

**Rounded to nearest 250*

Table 3-6: Future Land Use Assumptions

Future Land Use	Units Per Acre			People per Unit	Anticipated Connection[1]	
	Low	High	Assumed		Water	Sewer
Ranching & Agricultural	--	--	--	--	No	No
Rural Living	0.1	0.5	0.3	2.8	No	No
Estate Residential	0.5	2.0	1.0	2.8	Yes	No
Cluster Residential	1.0	--	2.4	2.8	No	No
Suburban Living	1.0	--	4.0	2.8	Yes	Yes
Urban Living[2]	6.0	40	20	2.5	Yes	Yes
Community Commercial	--	--	--	--	Yes	Yes
Regional Activity Center	--	--	--	--	Yes	Yes
Historic Downtown	--	--	--	--	Yes	Yes
Entertainment Center	--	--	--	--	Yes	Yes
Transit Ready Development	--	--	--	--	--	--
Mixed Use Center[2]	--	--	20	2.5	Yes	Yes
Employment Mix	--	--	--	--	Yes	Yes
Professional Campus	--	--	--	--	Yes	Yes
Manufacturing & Warehouse	--	--	--	--	Yes	Yes
Aviation	--	--	--	--	--	--
Permanent Open Space	--	--	--	--	--	--
Transition Zone	--	--	--	--	--	--

[1]*Anticipated connection to the City water/wastewater system based on language in the 2018 General Plan*
[2]*Assumes 70% of acreage as non-residential and 30% as residential*

Table 3-7: Population and Non-Residential Acreage Projections

Planning Year	Population	Annual Growth Rate	Non-Residential Acreage	Acreage Difference
Existing (2024)	35,751	--	2,295	--
5-Year (2029)	39,309	1.9%	2,828	533
10-Year (2034)	44,552	2.2%	3,292	464
25-Year (2049)	60,499	2.1%	3,580	288

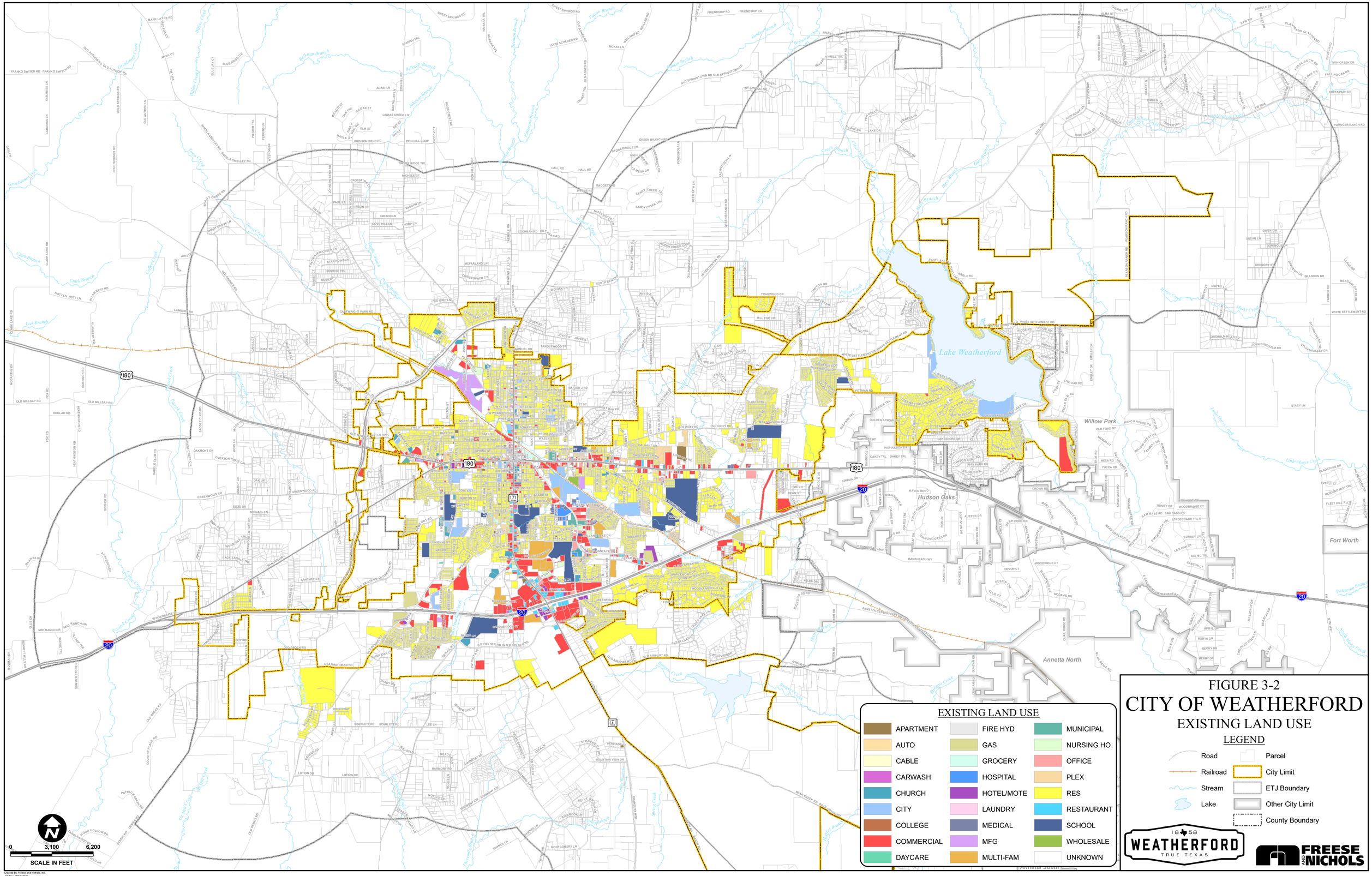


FIGURE 3-2

CITY OF WEATHERFORD

EXISTING LAND USE

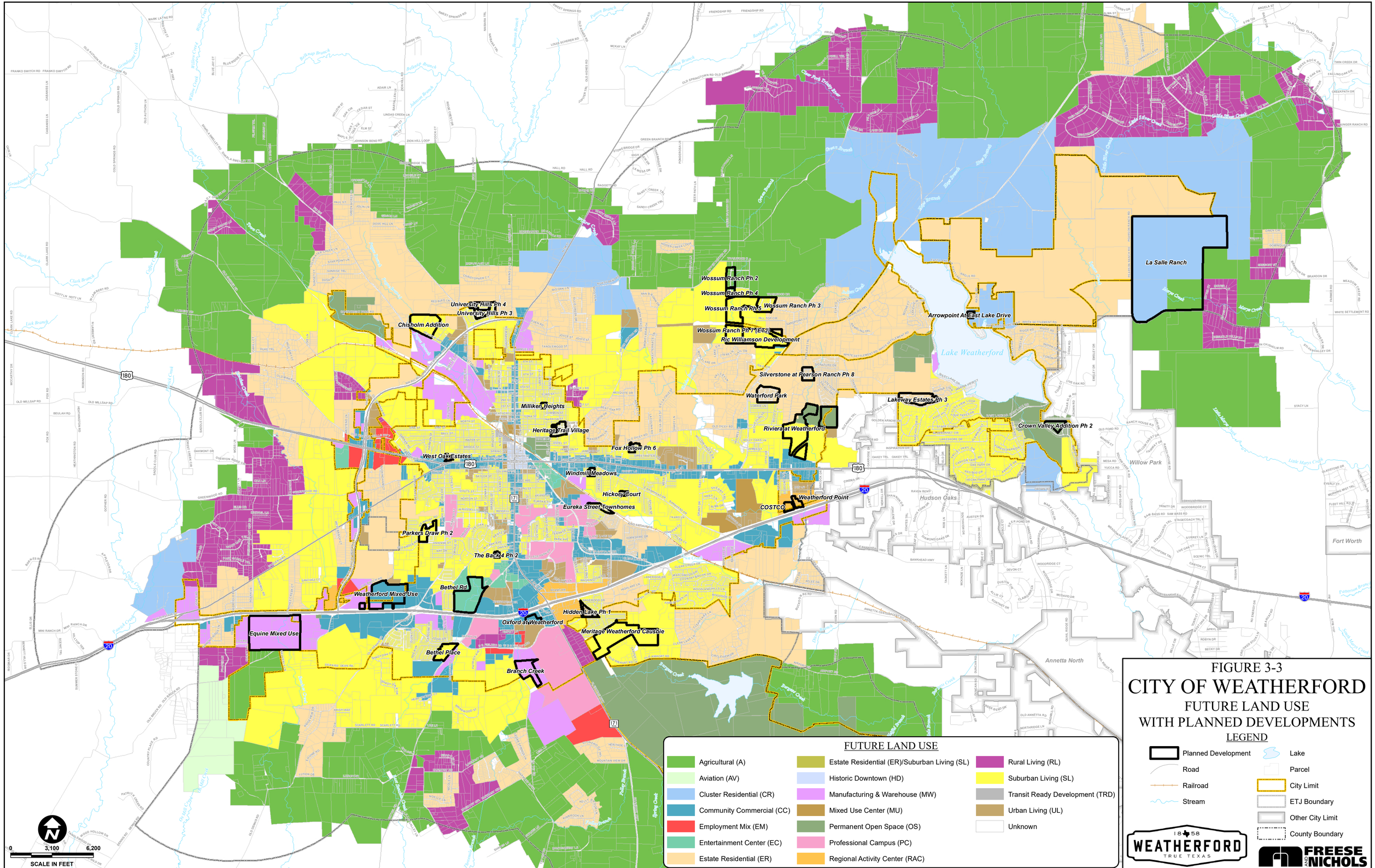
LEGEND

- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit
- County Boundary

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FUTURE LAND USE

- Agricultural (A)
- Aviation (AV)
- Cluster Residential (CR)
- Community Commercial (CC)
- Employment Mix (EM)
- Entertainment Center (EC)
- Estate Residential (ER)
- Estate Residential (ER)/Suburban Living (SL)
- Historic Downtown (HD)
- Manufacturing & Warehouse (MW)
- Mixed Use Center (MU)
- Permanent Open Space (OS)
- Professional Campus (PC)
- Regional Activity Center (RAC)
- Rural Living (RL)
- Suburban Living (SL)
- Transit Ready Development (TRD)
- Urban Living (UL)
- Unknown

FIGURE 3-3
CITY OF WEATHERFORD
FUTURE LAND USE
WITH PLANNED DEVELOPMENTS

LEGEND

- Planned Development
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit
- County Boundary

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FIGURE 3-4
CITY OF WEATHERFORD
PARCELS BY PLANNING YEAR

LEGEND

Road	Parcel
Railroad	City Limit
Stream	ETJ Boundary
Lake	Other City Limit
	County Boundary

PARCELS BY PLANNING YEAR

- Existing (2024)
- 5-Year (2029)
- 10-Year (2034)
- 25-Year (2049)
- No Current Plan for Service

0 3,100 6,200

SCALE IN FEET

WEATHERFORD TRUE TEXAS 1858

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4.0 WATER AND WASTEWATER PROJECTIONS

A water utility must be able to supply water throughout the City at rates that fluctuate over a wide range, and the City must be able to convey and treat wastewater flows to the wastewater treatment plant (WWTP). A thorough analysis of historical and projected demands and flows provides the basis for efficient growth and operations.

4.1 HISTORICAL WATER DEMANDS

The City provided historical average day and maximum day water processing plant (WPP) production data from January 2009 through December 2023. All other 2009-2016 data was sourced from the *2011 Water Master Plan* and *2017 Water Master Plan Update (Franklin and Miller Pressure Planes).* This data served as the basis for the historical water usage summary, shown in **Table 4-2**. The City supplied water to Hudson Oaks until June 2023, so the City's usage was calculated by subtracting the Hudson Oaks usage, shown in **Table 4-1**, from the WPP production data. The historical residential per capita usage calculated was based on the available WPP production data and ranges from 88 to 112 gallons per capita per day (gpcd) with an average of 95 gpcd. The historical non-residential usage ranges from 711 to 1,155 gallons per acre day (gpad) with an average of 891 gpad.

Table 4-1: Historical Wholesale Water Usage

Year	Hudson Oaks Average Day Usage (MGD)	Hudson Oaks Maximum Day Usage (MGD)
2011	0.17	0.69
2012	0.17	0.69
2013	0.12	0.67
2014	0.04	0.41
2015	0.09	0.59
2016	0.13	0.64
2017	0.11	0.23
2018	0.21	0.59
2019	0.14	0.49
2020	0.14	0.43
2021	0.16	0.31
2022	0.17	0.42

2011-2016 data sourced from previous studies
2017-2022 data provided by the City

Table 4-2: Historical Retail Water Usage

Year	Population[1]	Non-Residential Acreage[2] (Acres)	Weatherford Average Day Usage[3] (MGD)	Residential Average Day Usage[4] (MGD)	Residential Average Per Capita Usage (gpcd)	Non-Residential Average Day Usage[4] (MGD)	Non-Residential Average Per Acre Usage (gpad)	Weatherford Maximum Day Usage[3] (MGD)	Maximum Day to Average Day Peaking Factor	Overall Average Per Capita Usage (gpcd)
2009	24,939	1,405	3.79	2.24	90	1.55	1,103	7.93	2.09	152
2010	25,250	1,434	3.90	2.49	99	1.59	1,109	8.07	2.07	162
2011	25,300	1,463	4.52	2.83	112	1.69	1,155	8.38	1.85	179
2012	25,440	1,482	4.11	2.57	101	1.54	1,039	7.56	1.84	162
2013	25,940	1,513	3.92	2.46	95	1.46	965	7.04	1.80	151
2014	26,200	1,544	4.03	2.56	98	1.47	952	6.59	1.64	154
2015	26,600	1,575	3.85	2.45	92	1.40	889	7.09	1.84	145
2016	27,080	1,655	3.79	2.41	89	1.38	834	7.98	2.11	140
2017	27,660	1,735	3.83	2.49	90	1.34	772	6.30	1.65	138
2018	27,900	1,815	4.00	2.60	93	1.40	772	7.96	1.99	143
2019	28,175	1,895	3.86	2.51	89	1.35	712	8.00	2.08	137
2020	28,539	1,975	4.15	2.70	95	1.45	736	7.76	1.87	146
2021	30,933	2,055	4.18	2.72	88	1.46	711	6.50	1.56	135
2022	32,208	2,135	5.00	3.25	101	1.75	820	8.60	1.72	155
2023	34,586	2,215	5.03	3.27	94	1.76	794	8.29	1.65	145
				Average	**95**	--	**891**	--	**1.8**	**150**
				Maximum	**112**	--	**1,155**	--	**2.1**	**179**
				Minimum	**88**	--	**711**	--	**1.6**	**135**

[1]Population data based on NCTCOG estimates for 2009-2018 and City estimates for 2019-2023
[2]2017-2023 non-residential acreage extrapolated from current GIS data and previous studies
[3]Data provided by the City
[4]2017-2022 residential and non-residential usage split of 65% and 35% based on the average ratio in billing meter consumption data

4.2 PROJECTED WATER DEMANDS

Design criteria for water demand projections were determined using data from the historical water usage summary in **Table 4-2**. The maximum residential average day per capita usage was 112 gpcd in 2011 and, since then, has been no greater than 101 gpcd; a conservative factor of 105 gpcd is recommended for the *2024 Water and Wastewater Master Plan Update*. The average non-residential average day per acre usage was 891 gpad for 2009-2023. However, this number has steadily been declining. The ten-year average is 799 gpad, and the five-year average is 755. A factor of 800 gpad is recommended for this study based on recent data. These design factors, shown in **Table 4-3**, were then used to calculate the projected water demands in **Table 4-4**. For these calculations, the estimated "population served" water was used in lieu of the total population.

Table 4-3: Recommended Water Demand Design Criteria

Water Demand Criteria	2011 Water Master Plan	2024 Master Plan Update
Residential Average Day Per Capita Usage (gpcd)	120	105
Non-Residential Average Day Per Acre Usage (gpad)	1,100	800
Maximum Day to Average Day Peaking Factor	2.0	2.0
Peak Hour to Maximum Day Peaking Factor	1.5	1.5

Table 4-4: Projected Water Demands

Year	Population	Non-Residential Acreage	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
Existing (2024)	35,751	2,295	5.59	11.18	16.77
5-Year (2029)	39,309	2,828	6.39	12.78	19.17
10-Year (2034)	44,552	3,292	7.31	14.62	21.93
25-Year (2049)	60,499	3,580	9.22	18.43	27.65

4.3 HISTORICAL WASTEWATER FLOWS

The City provided historical average day and maximum day WWTP flow data from January 2015 through December 2023. All 2009 through 2014 data was sourced from the *2015 Wastewater Master Plan*. This data served as the basis for the historical wastewater flow summary, shown in **Table 4-5** and **Table 4-6**. The City had historically provided sewer services to Hudson Oaks, so the City's average day flow was calculated by subtracting the Hudson Oaks average day flow from the total average day flow reported in the WWTP flow data. The historical residential per capita flow calculated was based on the available WWTP flow data and ranges from 50 to 60 gpcd with an average of 56 gpcd. The historical non-residential flow ranges from 427 to 560 gpad with an average of 494 gpad.

Table 4-5: Historical Wastewater Average Day Flow Summary

Year	Population Served[1]	Non-Residential Acreage[2] (Acres)	Total Average Day Flow (MGD)	Hudson Oaks Average Day Flow[3] (MGD)	Weatherford Average Day Flow[3] (MGD)	Residential Average Day Flow[4] (MGD)	Residential Average Day Per Capita Flow (gpcd)	Non-Residential Average Day Flow[4] (MGD)	Non-Residential Average Day Per Acre Flow (gpad)	Overall Weatherford Flow Per Capita (gpcd)
2009	23,737	1,405	2.02	-	2.02	1.31	55	0.71	505	85
2010	24,033	1,434	2.23	-	2.23	1.45	60	0.78	544	93
2011	24,081	1,463	2.22	0.08	2.14	1.34	56	0.80	547	89
2012	24,214	1,482	2.29	0.08	2.21	1.39	57	0.83	560	91
2013	24,690	1,513	2.25	0.08	2.17	1.36	55	0.81	535	88
2014	24,937	1,544	2.14	0.05	2.09	1.33	53	0.76	492	84
2015	25,318	1,575	2.29	0.06	2.23	1.45	57	0.78	496	88
2016	25,775	1,624	2.30	0.06	2.24	1.45	56	0.78	482	87
2017	26,327	1,672	2.10	0.06	2.04	1.33	50	0.71	427	78
2018	26,555	1,721	2.26	0.07	2.19	1.42	54	0.77	446	83
2019	26,817	1,770	2.39	0.07	2.32	1.51	56	0.81	459	87
2020	27,164	1,818	2.58	0.07	2.51	1.63	60	0.88	482	92
2021	29,442	1,873	2.78	0.08	2.70	1.75	60	0.94	504	92
2022	30,656	1,927	2.63	0.07	2.56	1.66	54	0.90	465	83
2023	32,919	2,011	2.74	0.08	2.66	1.73	53	0.93	464	81
					Average	**--**	**56**	**--**	**494**	**87**
					Maximum	**--**	**60**	**--**	**560**	**93**

[1]Population data based on NCTCOG estimates for 2009-2018 and City estimates for 2019-2023 and adjusted to remove septic customers

[2]2017-2023 non-residential acreage extrapolated from existing GIS and previous studies

[3]2015-2023 data provided by City

[4]2015-2023 residential and non-residential production split of 65% and 35% based on the average ratio in billing meter consumption data

Table 4-6: Historical Wastewater Peak Wet Weather Flow Summary

Year	Average Day Flow[1] (MGD)	Peak 2-Hour Flow[1] (MGD)	Peak 2-Hour to Average Day Flow Peaking Factor	Annual Rainfall[1] (inches)
2009	2.02	5.93	2.94	32.80
2010	2.23	6.20	2.78	30.80
2011	2.14	6.32	2.96	19.66
2012	2.21	6.13	2.77	25.45
2013	2.17	5.90	2.72	23.38
2014	2.09	6.32	3.03	17.78
2015	2.23	-	-	54.09
2016	2.24	-	-	38.37
2017	2.04	7.54	3.69	33.12
2018	2.19	8.56	3.91	45.87
2019	2.32	7.70	3.32	34.52
2020	2.51	8.10	3.23	36.37
2021	2.70	8.70	3.22	35.63
2022	2.56	7.17	2.80	21.69
2023	2.66	8.08	3.03	25.18
		Average	**3.11**	**31.65**
		Maximum	**3.91**	**54.09**

[1]*2015-2023 data provided by City*

4.3 PROJECTED WASTEWATER FLOWS

Design criteria for wastewater flow projections were determined using data from the historical water usage summary in **Table 4-5** and **Table 4-6**. The maximum residential average day per capita flow was 60 gpcd, so a conservative factor of 65 gpcd is recommended for the *2024 Water and Wastewater Master Plan Update*. The maximum non-residential average day per acre usage was 560 gpad in 2012 and has averaged 494 gpad over the past fifteen years. A factor of 550 gpad is recommended for this study. With these recommendations, the wastewater flow criteria shown in **Table 4-7** matches the criteria in the *2015 Wastewater Master Plan*. These design criteria were then applied to the population and non-residential acreage calculated in the projections database to calculate the projected wastewater flows in **Table 4-8**. For these calculations, the estimated "population served" wastewater services was used in lieu of the total population.

Table 4-7: Recommended Wastewater Flow Design Criteria

Criteria	2015 Wastewater Master Plan	2024 Master Plan Update
Residential Average Day Per Capita Flow (gpcd)	65	65
Non-Residential Average Day Per Acre Flow (gpad)	550	550
Existing Peak Wet Weather to Average Day Flow Peaking Factor	5.5	--[1]
Future Peak Wet Weather to Average Day Flow Peaking Factor	4.0	4.0

[1]Peaking factor for each flow meter basin developed from 2024 Weatherford Flow Monitoring Report

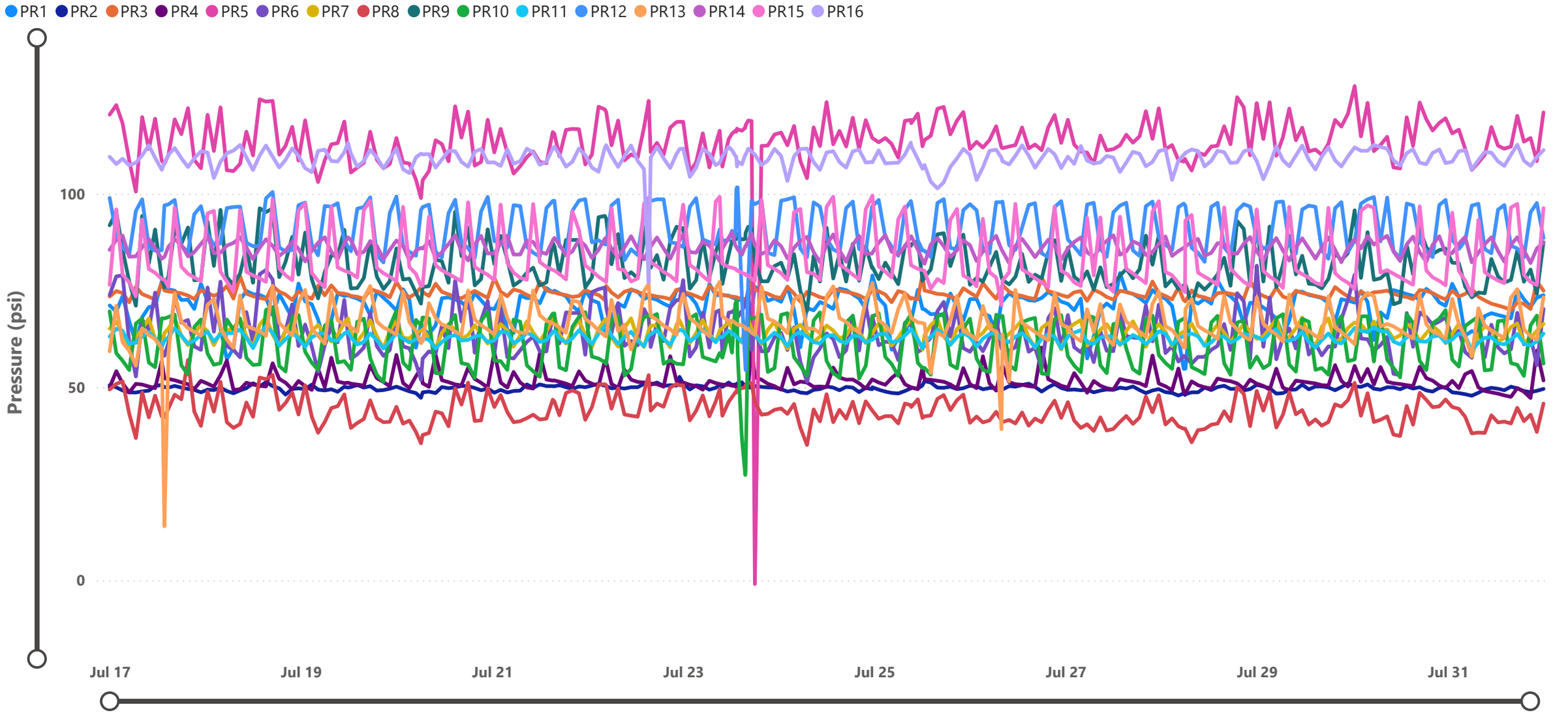
Table 4-8: Projected Wastewater Flows

Year	Population	Non-Residential Acreage	Average Day Flow (MGD)	Peak Wet Weather Flow (MGD)
Existing (2024)	33,693	2,146	3.37	12.66
5-Year (2029)	36,616	2,539	3.78	14.28
10-Year (2034)	41,063	3,002	4.32	16.46
25-Year (2049)	54,608	3,271	5.35	20.57

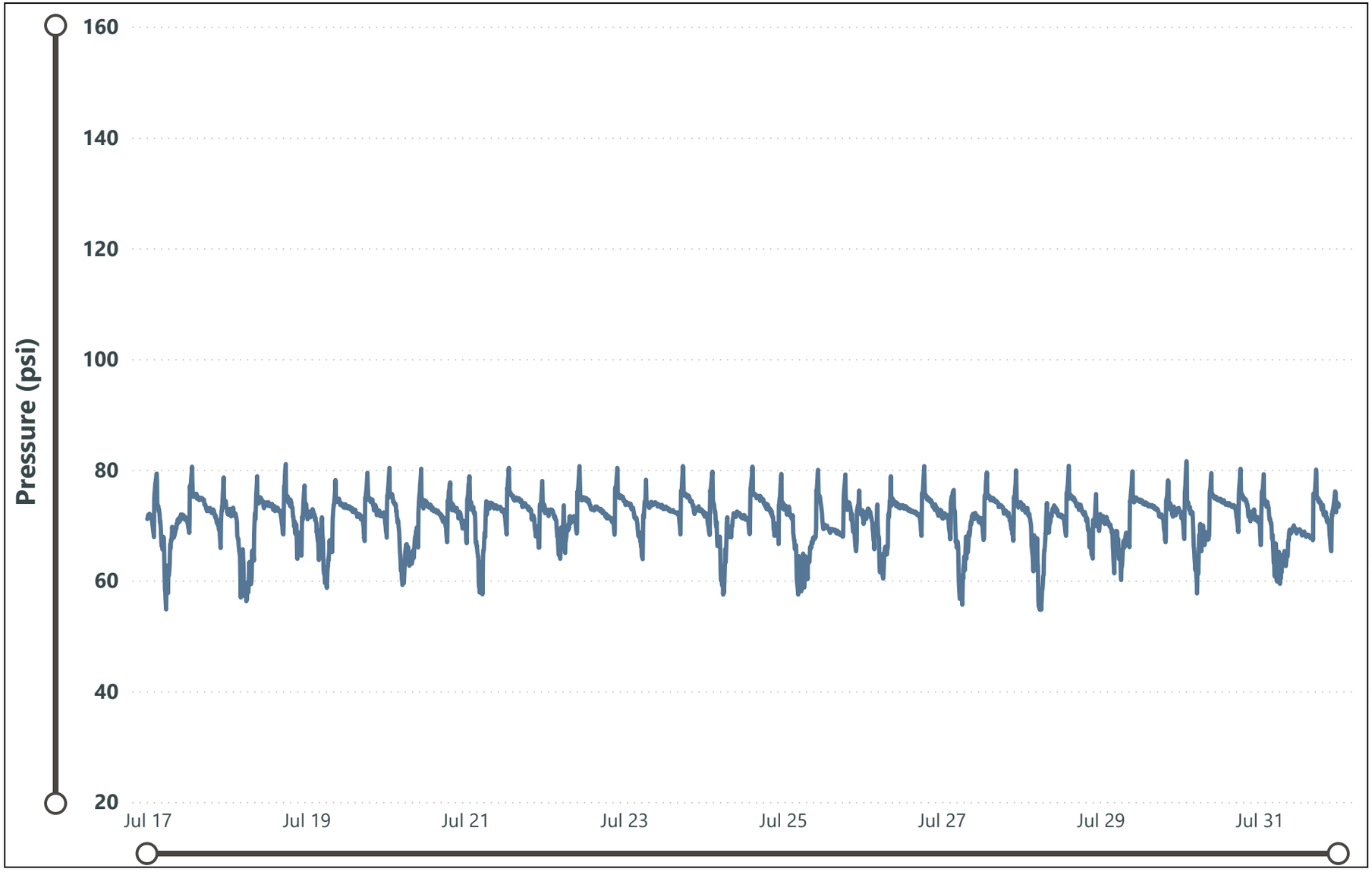
Appendix B
Pressure Recorder Data

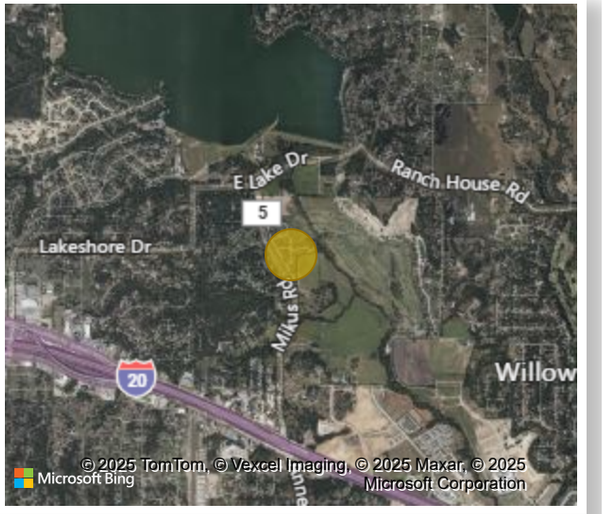
Appendix B
2024 Pressure Testing Results

Recorded Pressures



Appendix B
Pressure Testing Results
Pressure Recorder: PR1





Location

Reata Dr and Burkburnett Dr

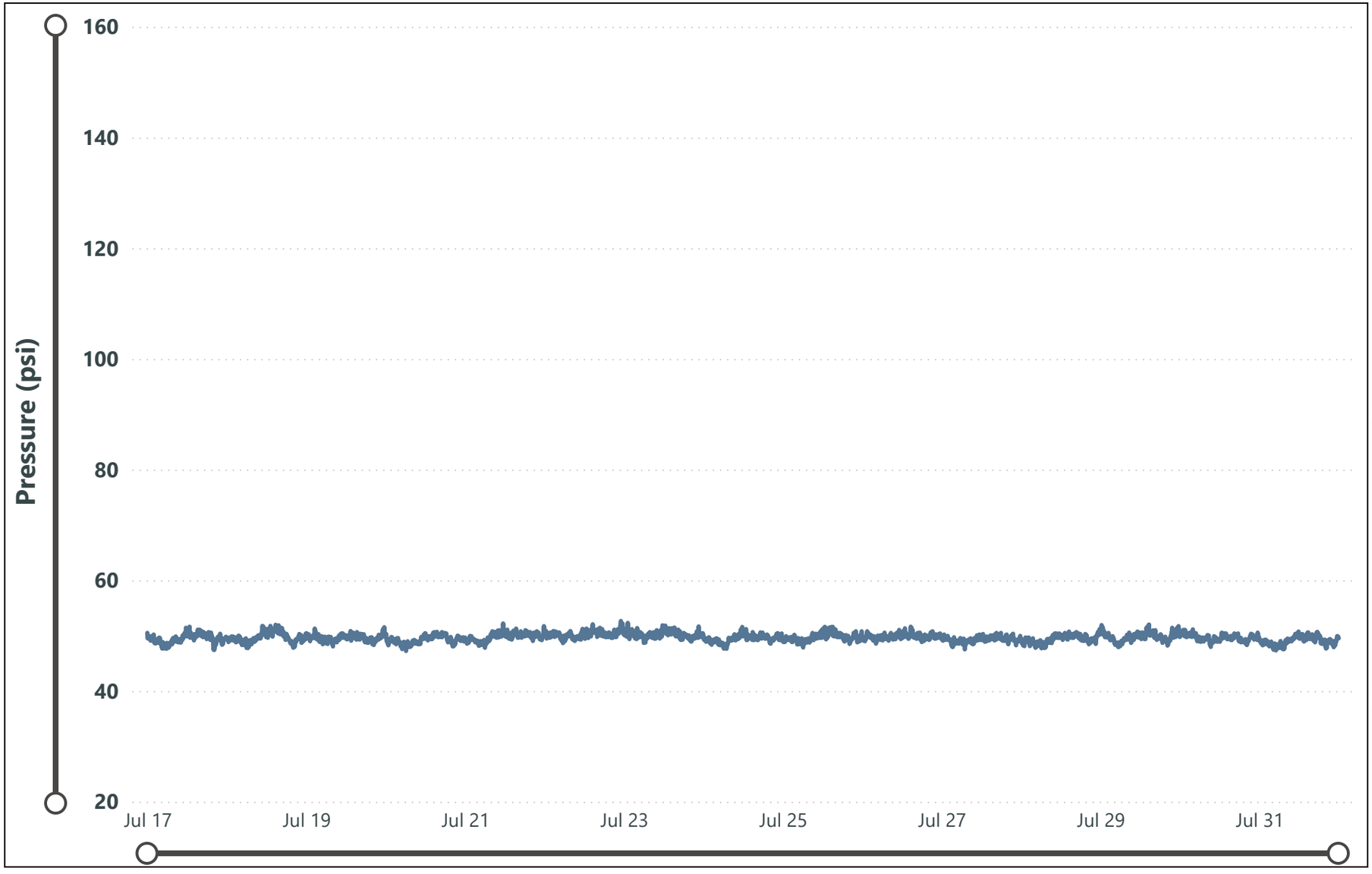
Elev (ft MSL)

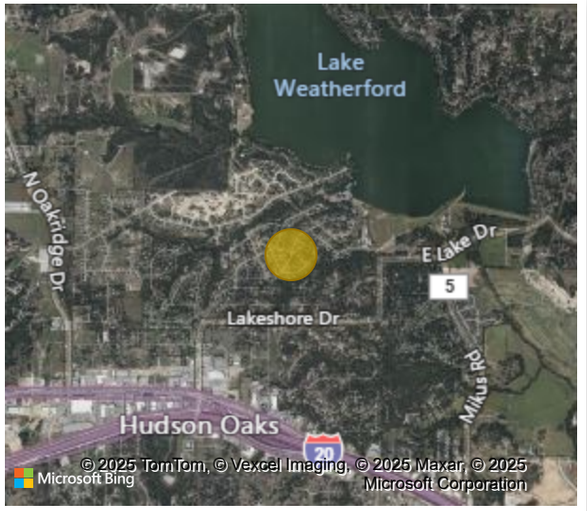
860

Pressure Statistics

Min: 55 psi
Max: 82 psi
Avg: 71 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR2





Location

3509 Cliff View Loop

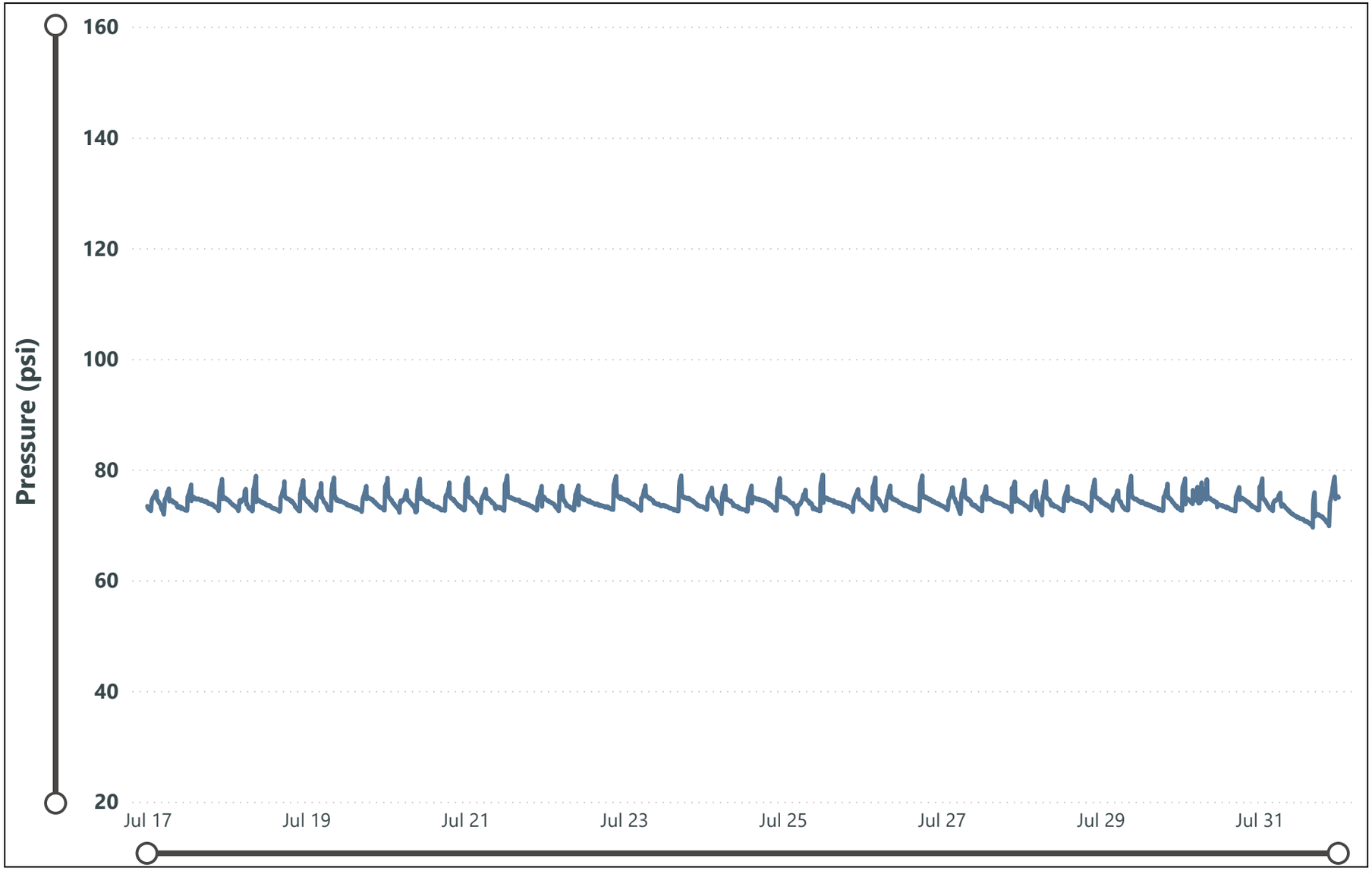
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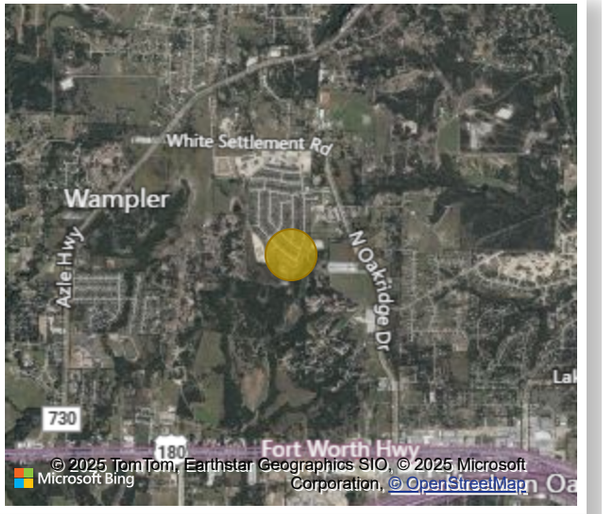
990

Pressure Statistics

Min: 47 psi
Max: 53 psi
Avg: 50 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR3





Location

1637 Salado Trl

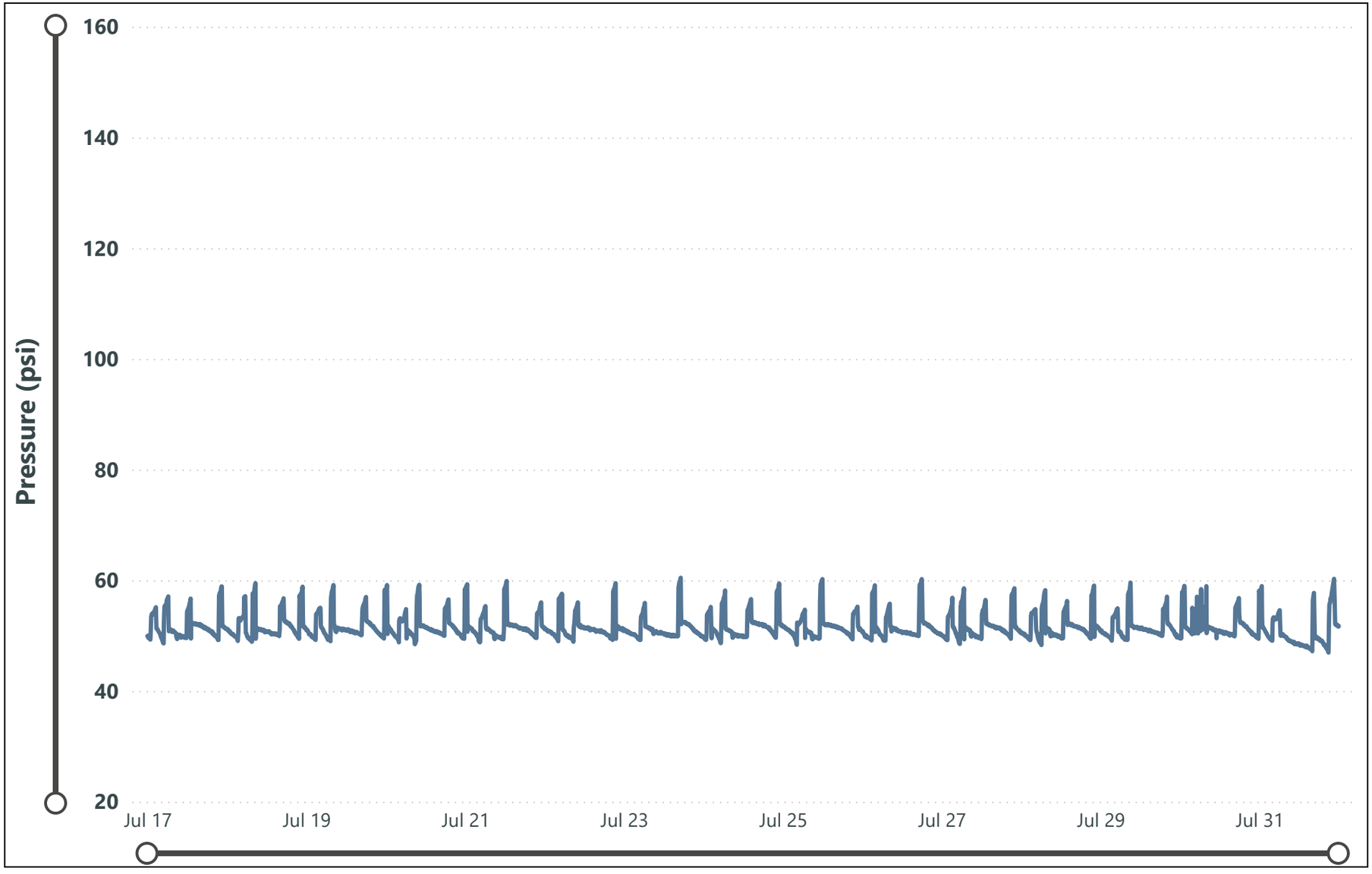
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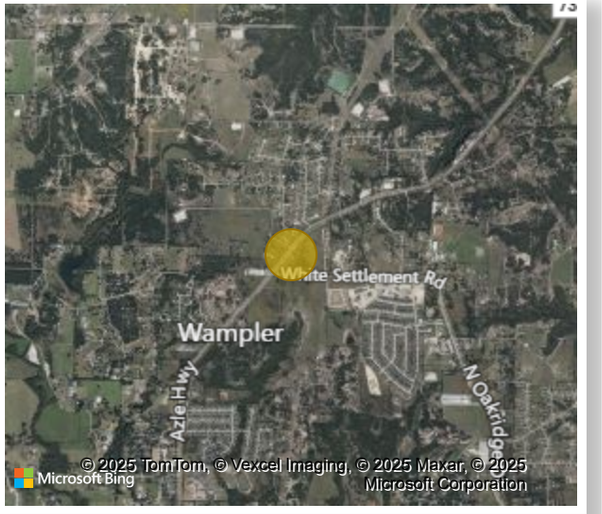
1,055

Pressure Statistics

Min: 70 psi
Max: 79 psi
Avg: 74 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR4





Location

1606 Azle Hwy

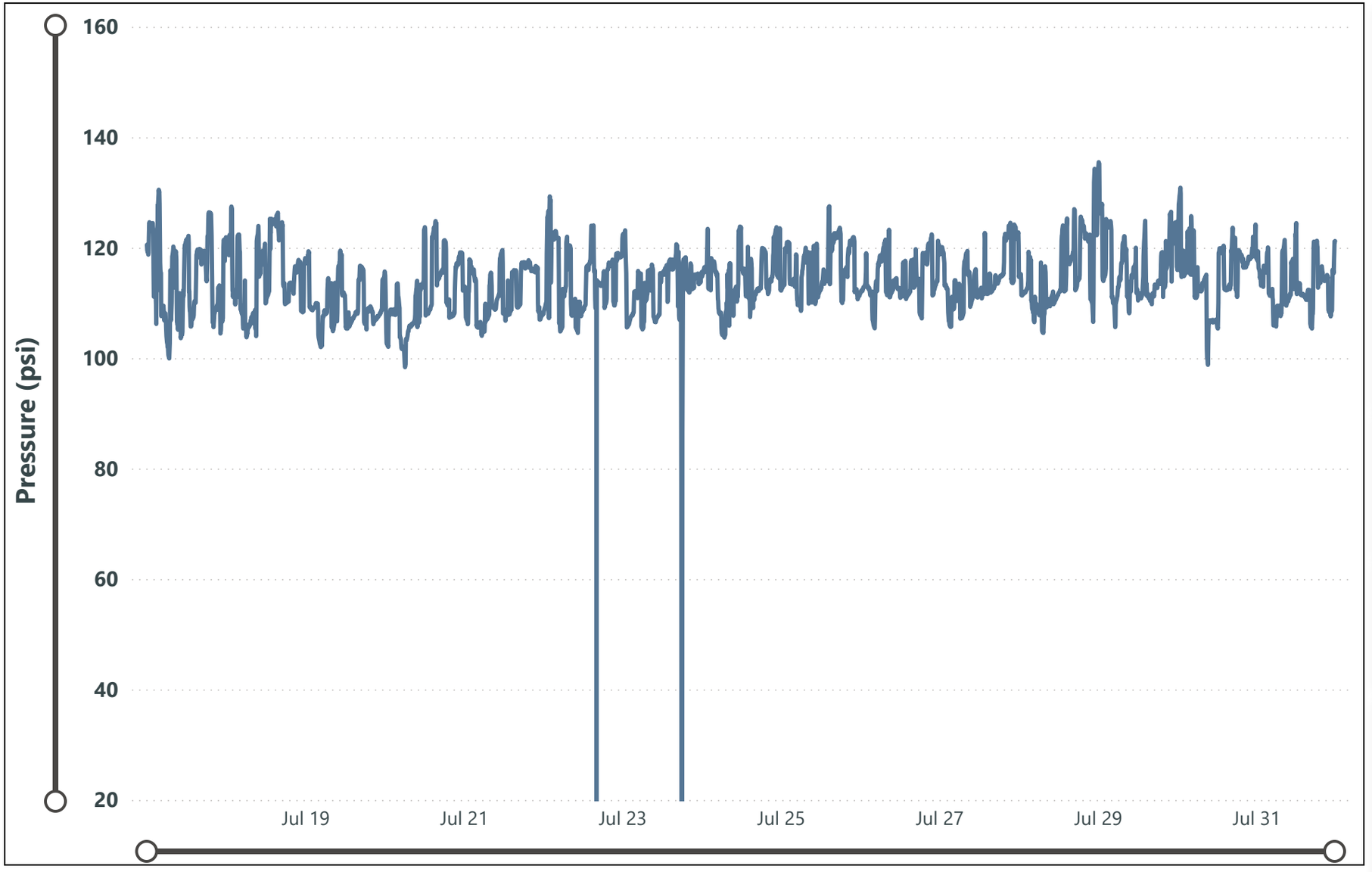
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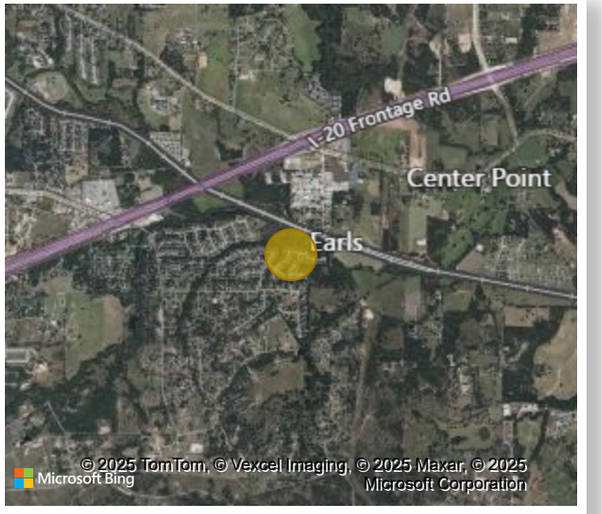
0

Pressure Statistics

Min: 47 psi
Max: 60 psi
Avg: 52 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR5





Location

2210 Summer Brook Drive

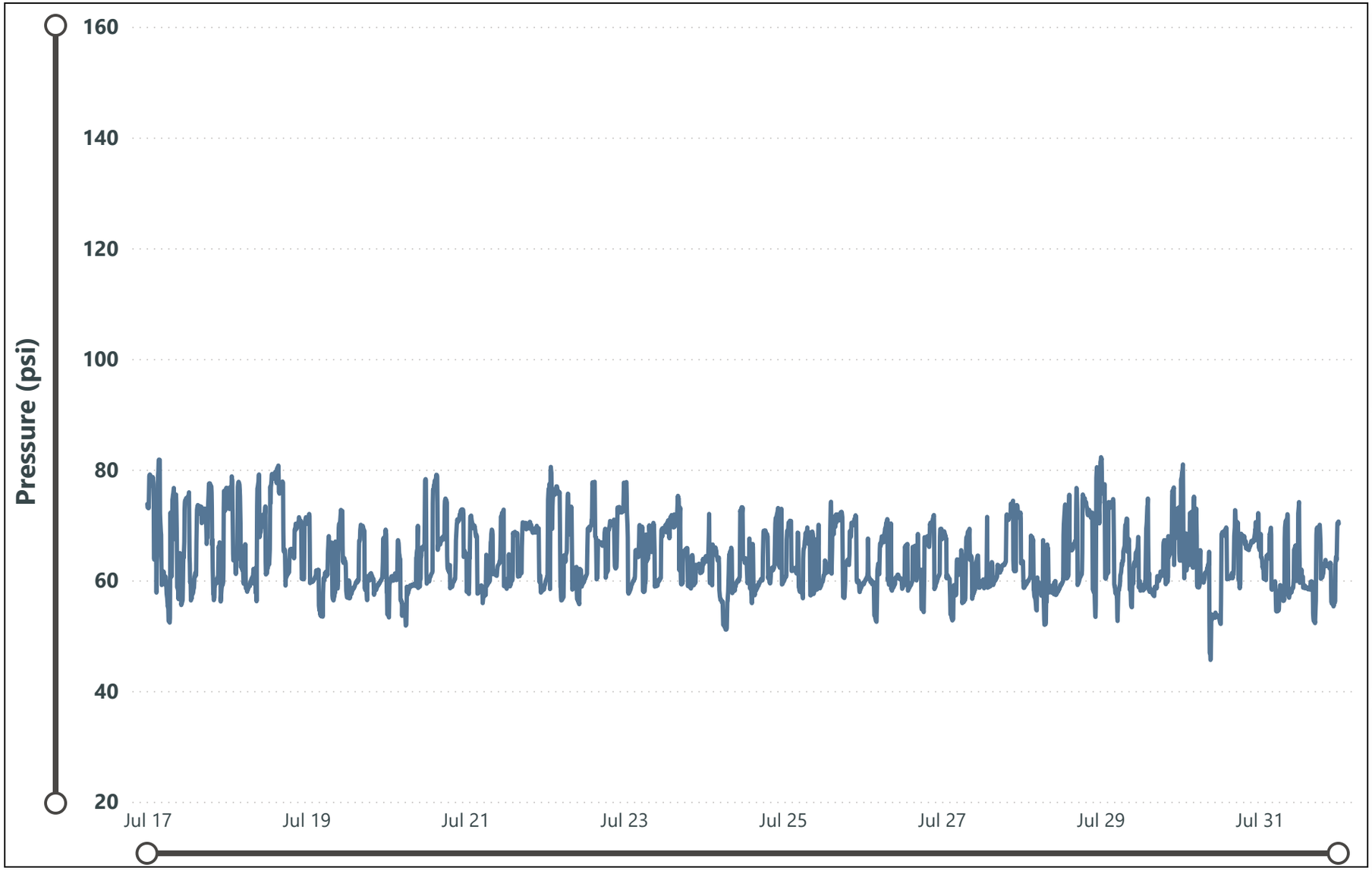
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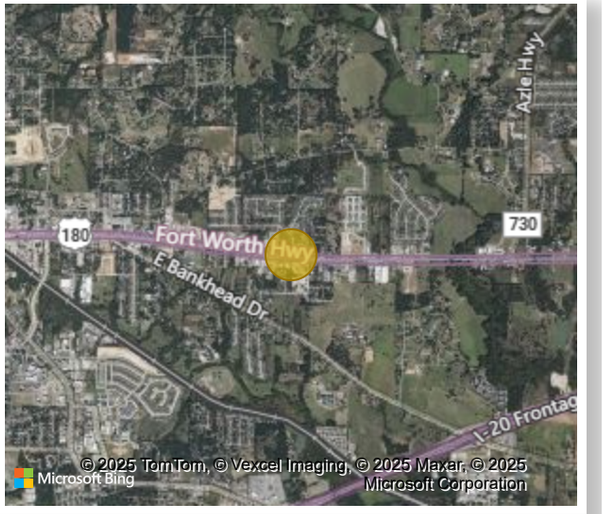
920

Pressure Statistics

Min: -1 psi
Max: 135 psi
Avg: 114 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR6





Location

Sweetwater Dr and Fort Worth Hwy

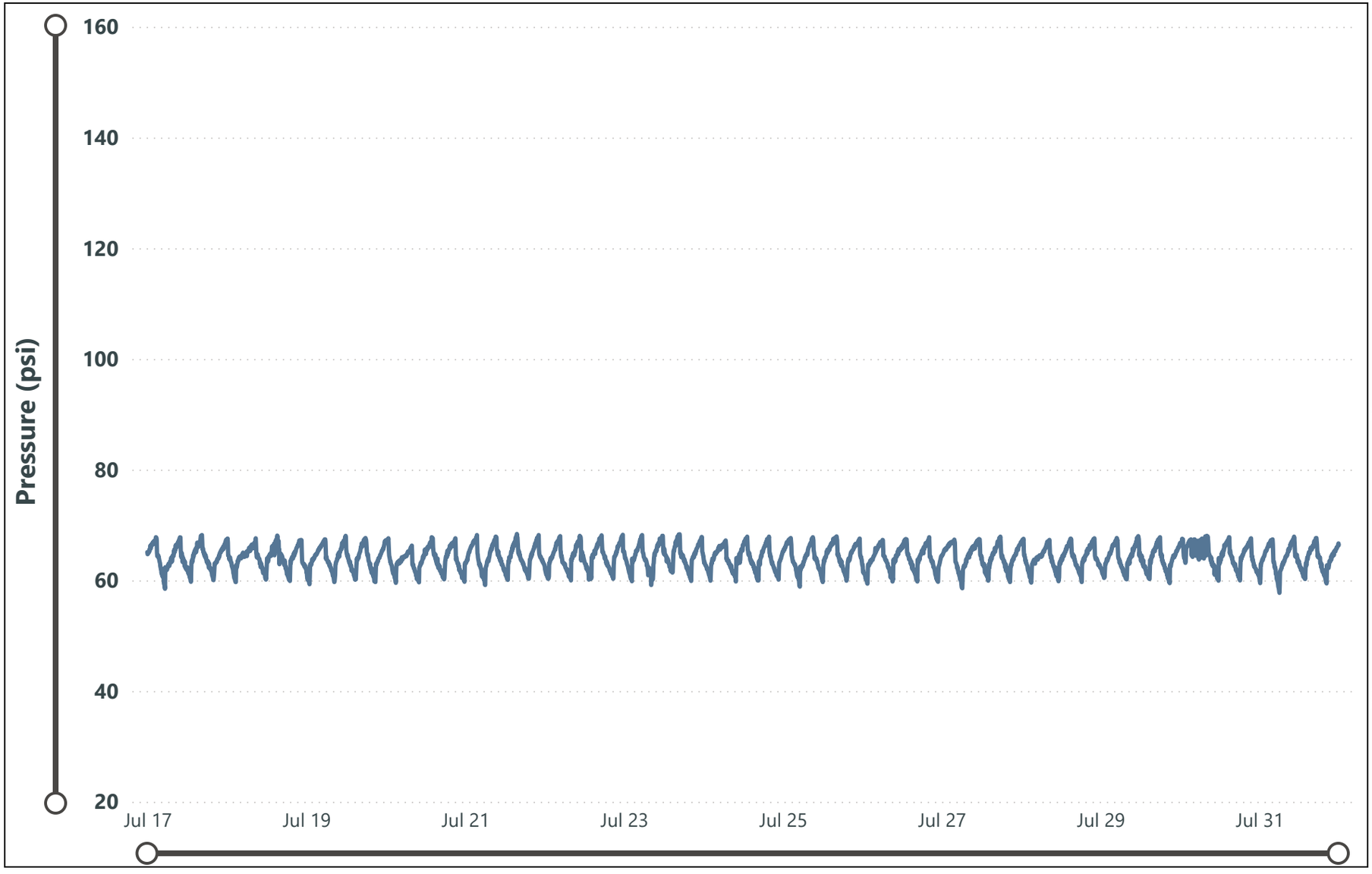
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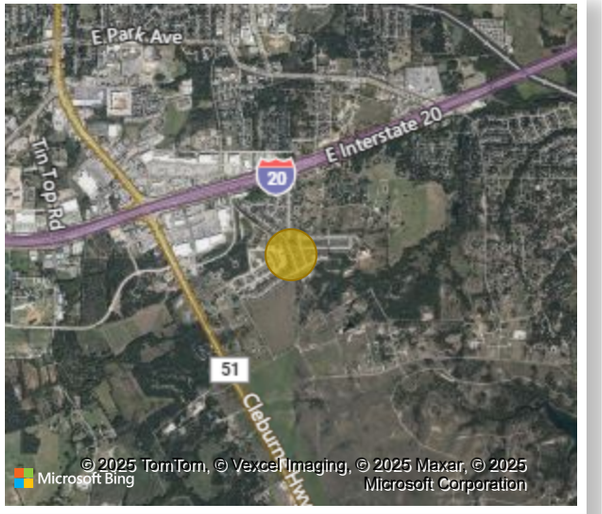
1,040

Pressure Statistics

Min: 46 psi
Max: 82 psi
Avg: 64 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR7





Location

2350 Trace Ridge Dr

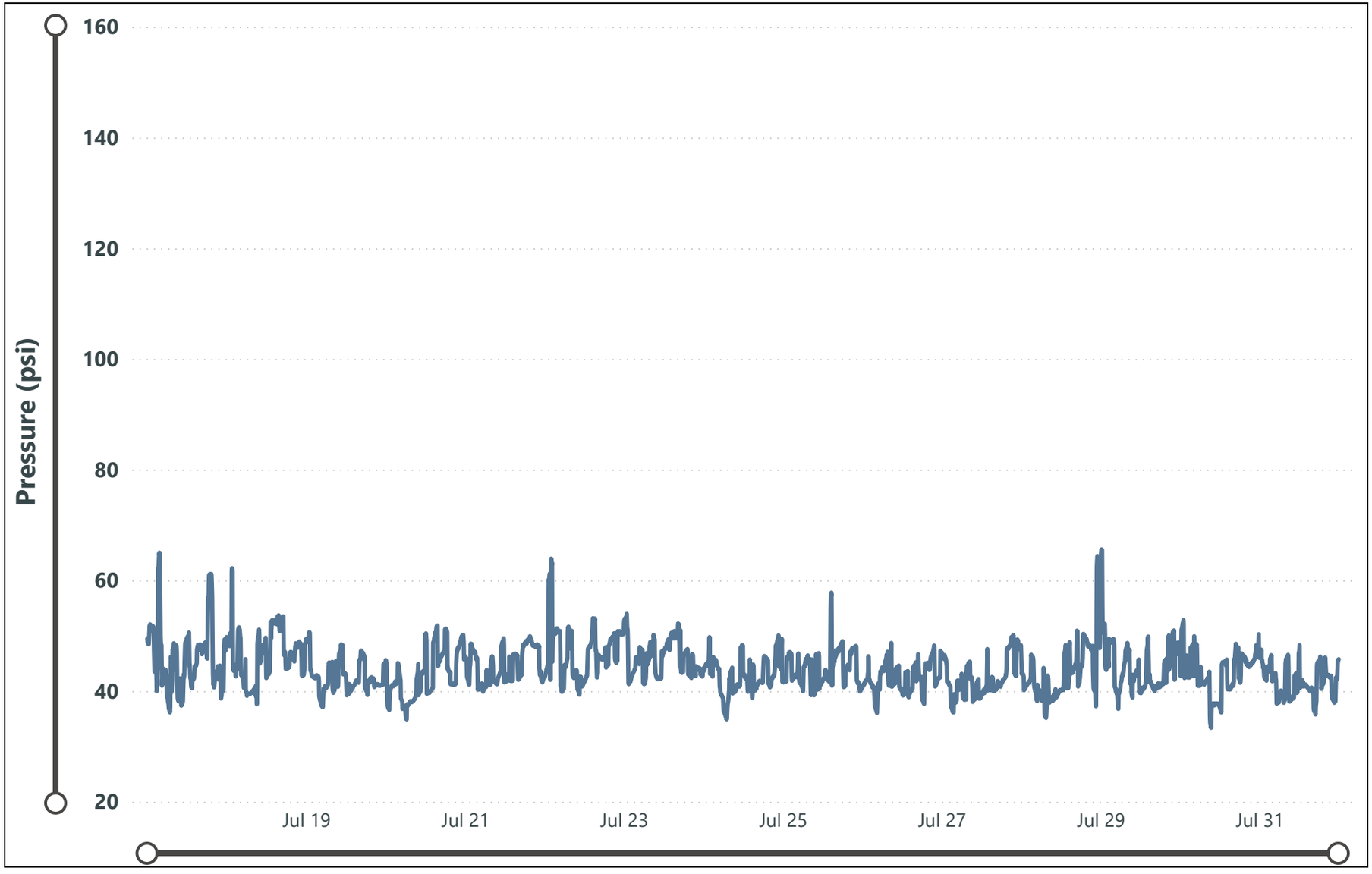
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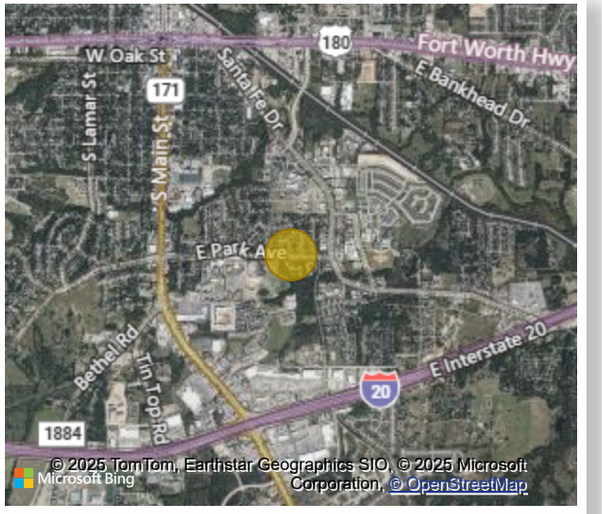
1,095

Pressure Statistics

Min: 58 psi
Max: 68 psi
Avg: 64 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR8





Location

1312 Tory St

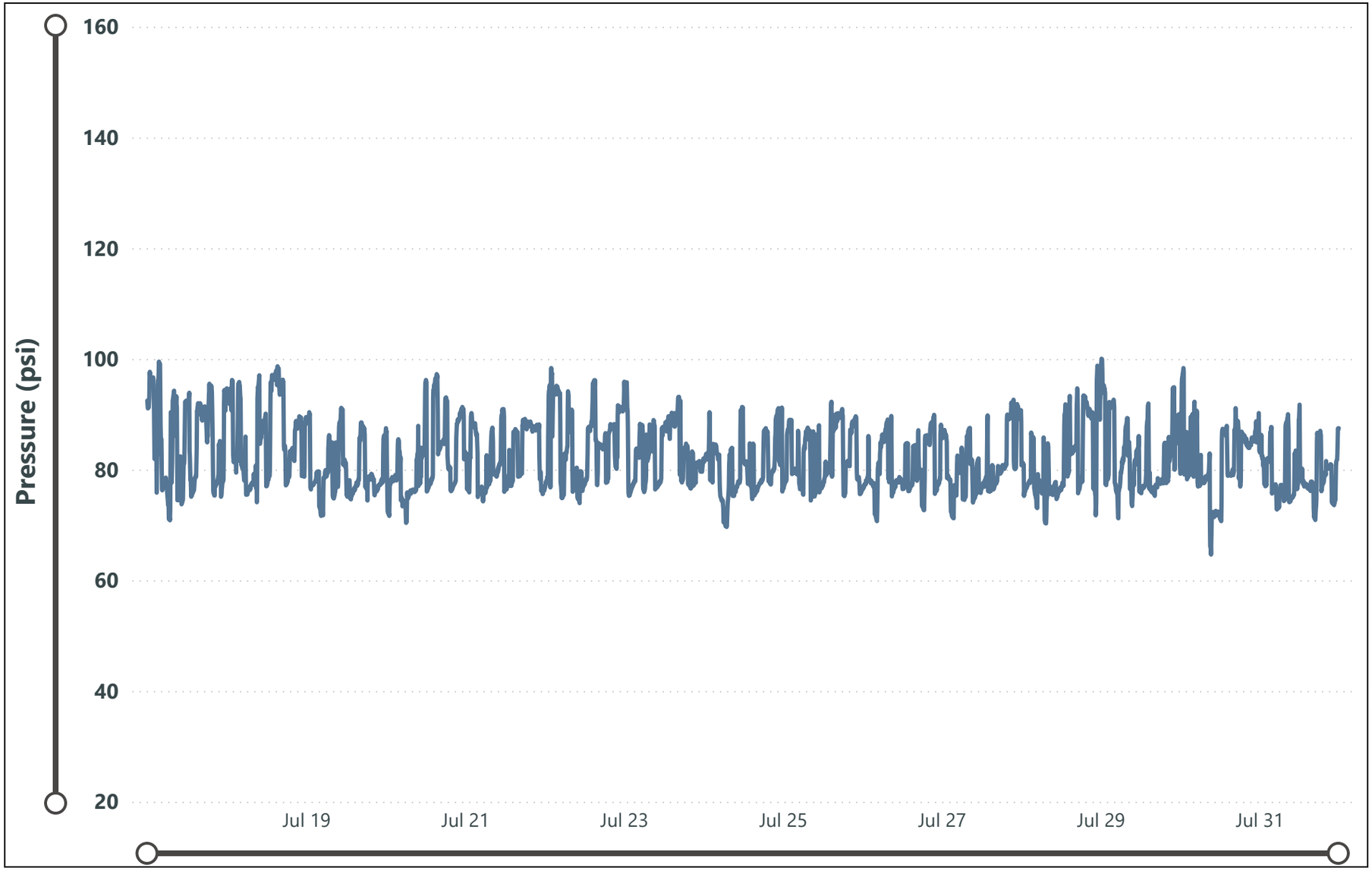
Elev (ft MSL)

1,075

Pressure Statistics

Min: 33 psi
Max: 66 psi
Avg: 44 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR9





Location

On the U-turn of N Mill St and Fort Worth Hwy

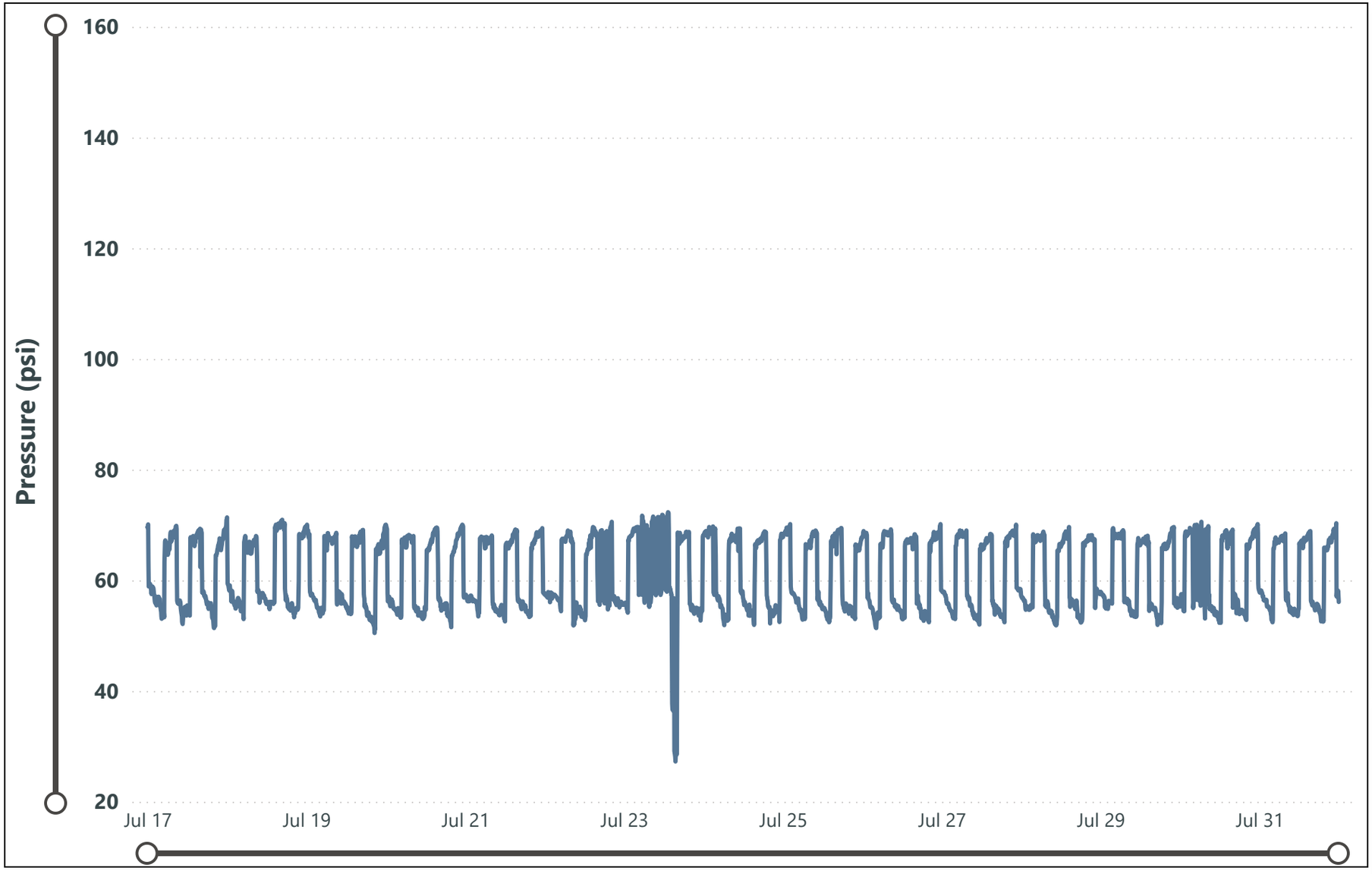
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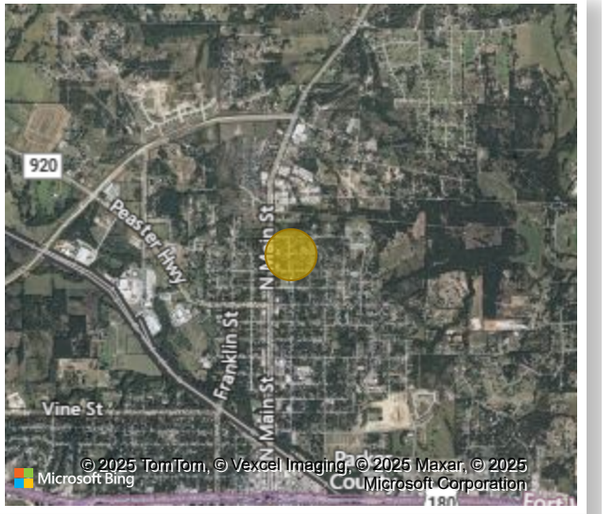
995

Pressure Statistics

Min: 65 psi
Max: 100 psi
Avg: 82 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR10





Location

E 7th St and Elm St

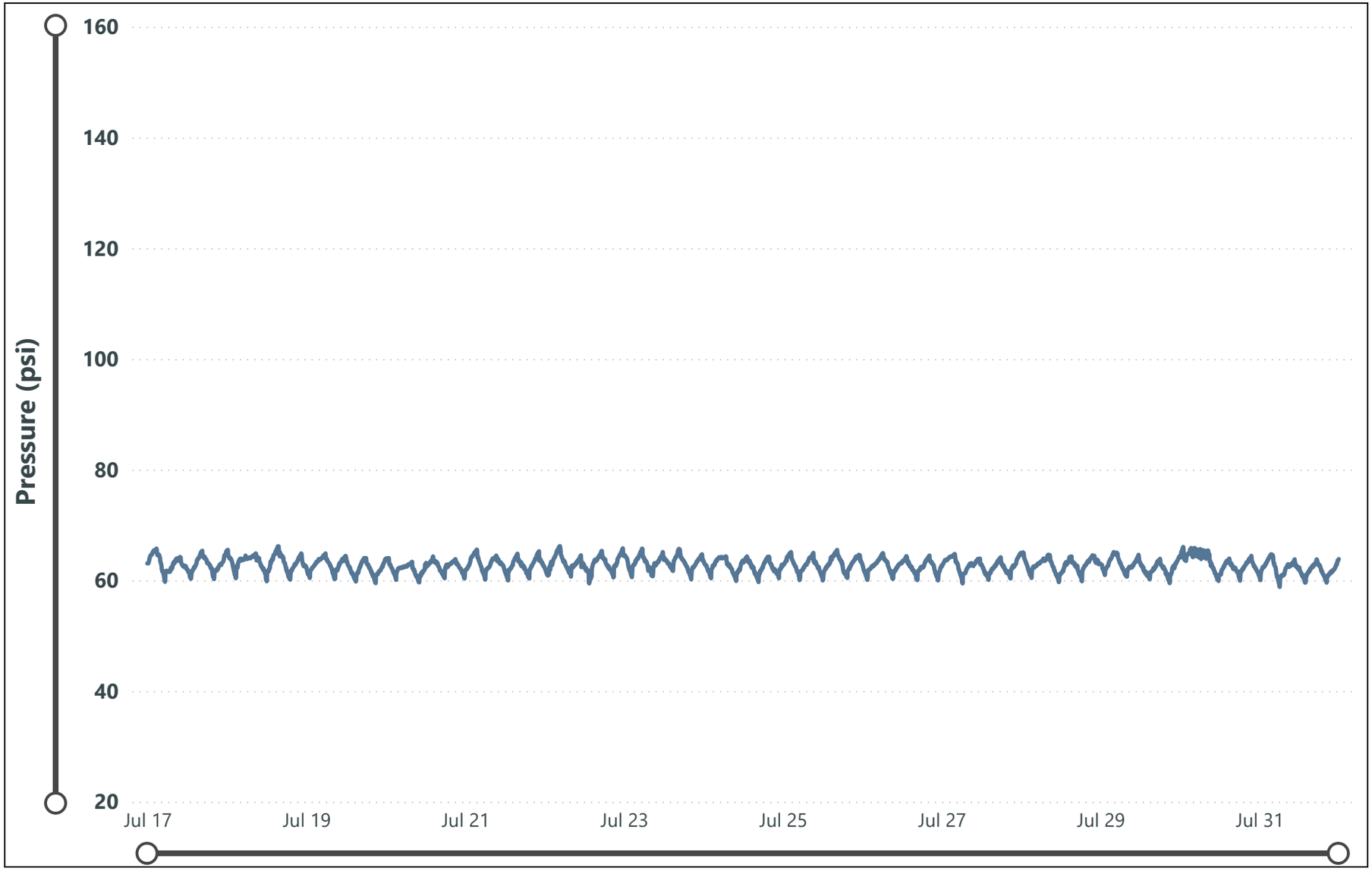
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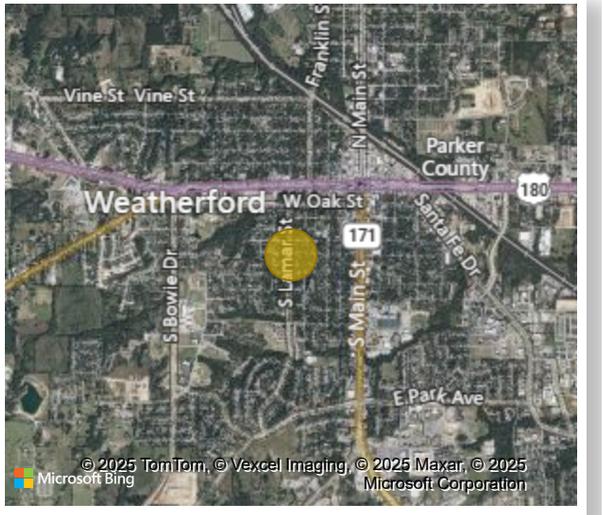
1,105

Pressure Statistics

Min: 27 psi
Max: 72 psi
Avg: 61 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR11





Location

415 W Josephine Ln

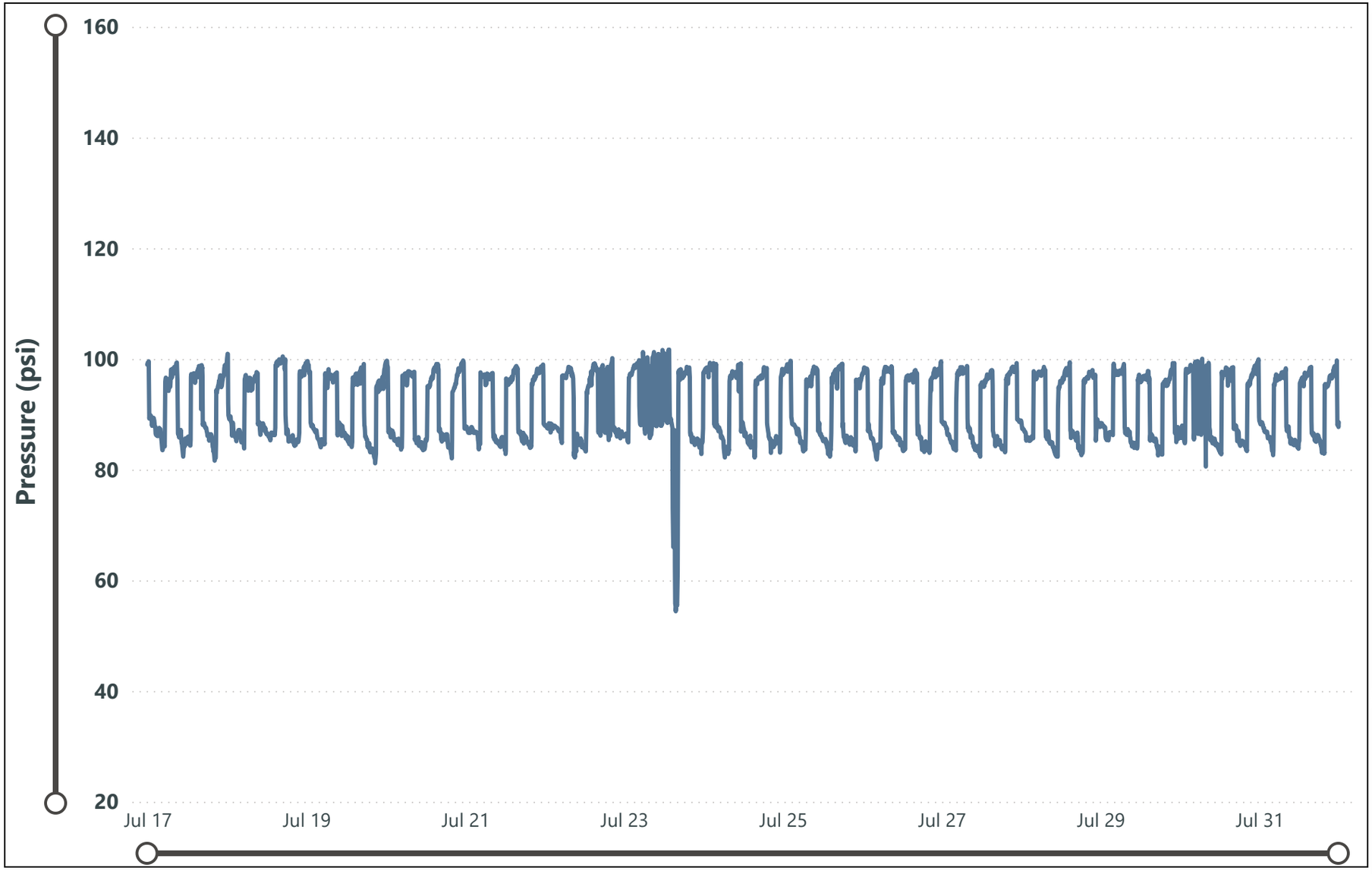
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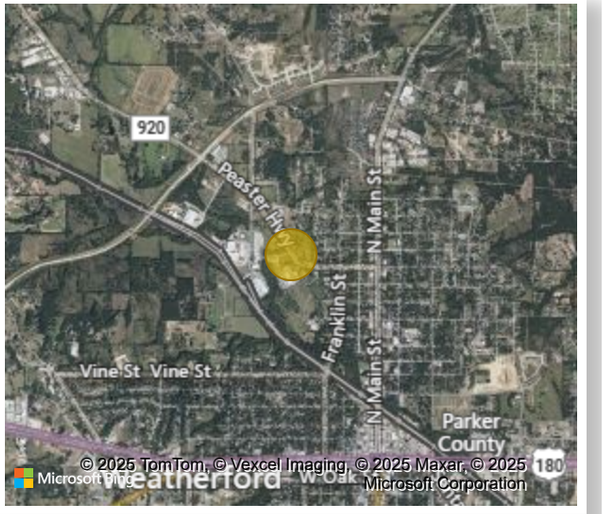
1,095

Pressure Statistics

Min: 59 psi
Max: 66 psi
Avg: 63 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR12





Location

500 Block of West 4th

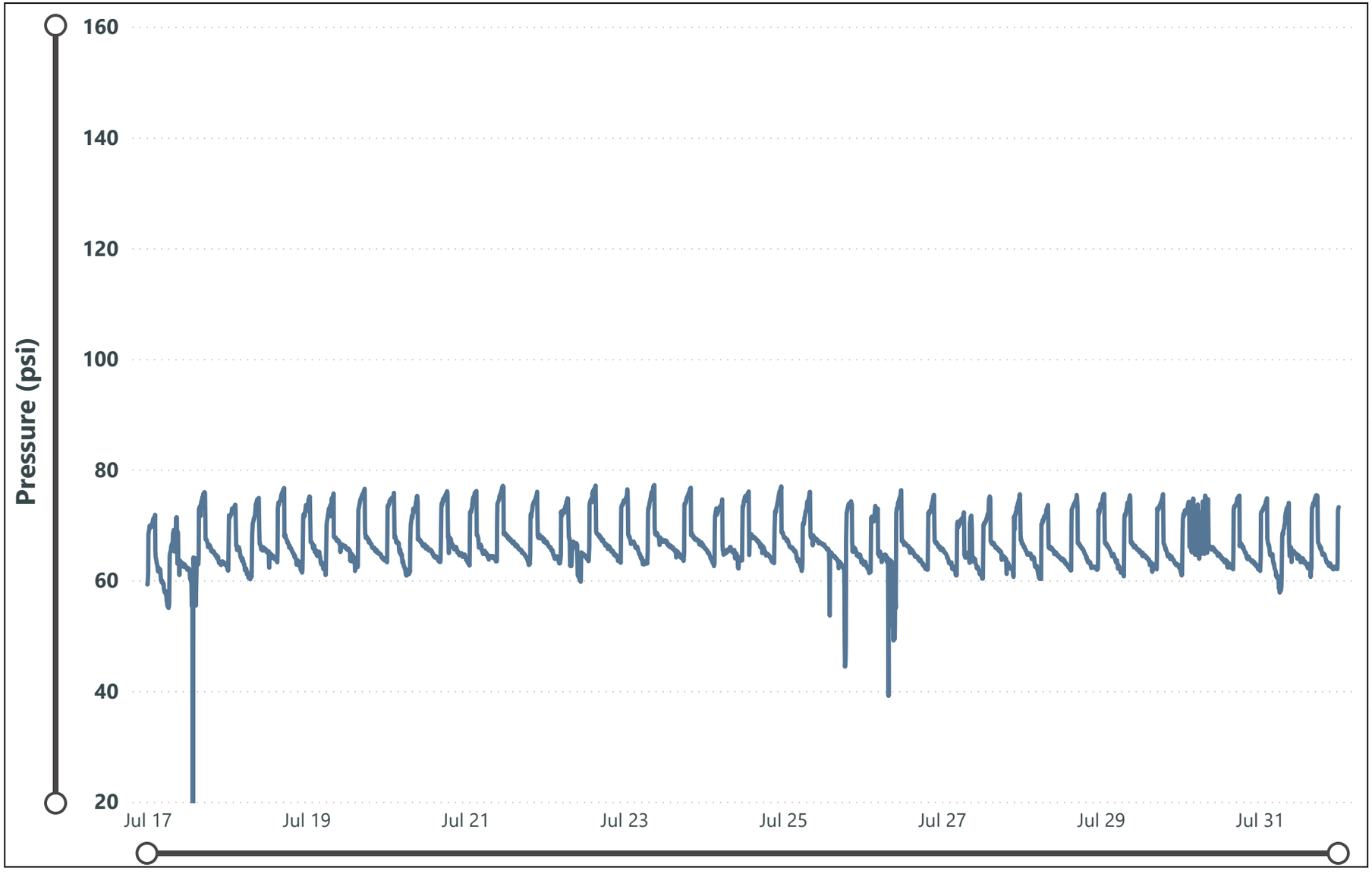
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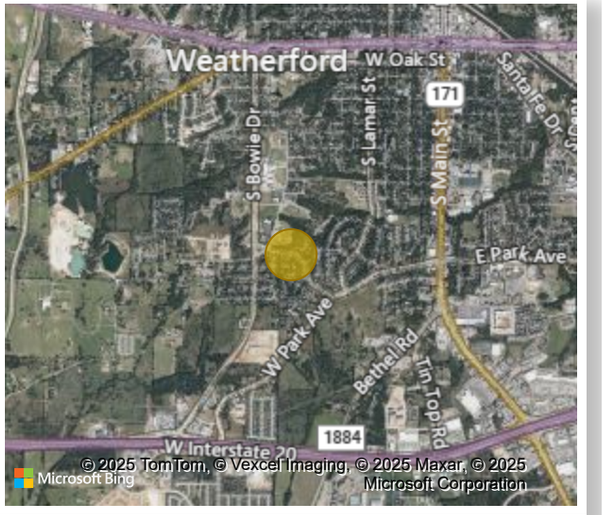
1,040

Pressure Statistics

Min: 54 psi
Max: 102 psi
Avg: 91 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR13





Location

508 Mockingbird Ln

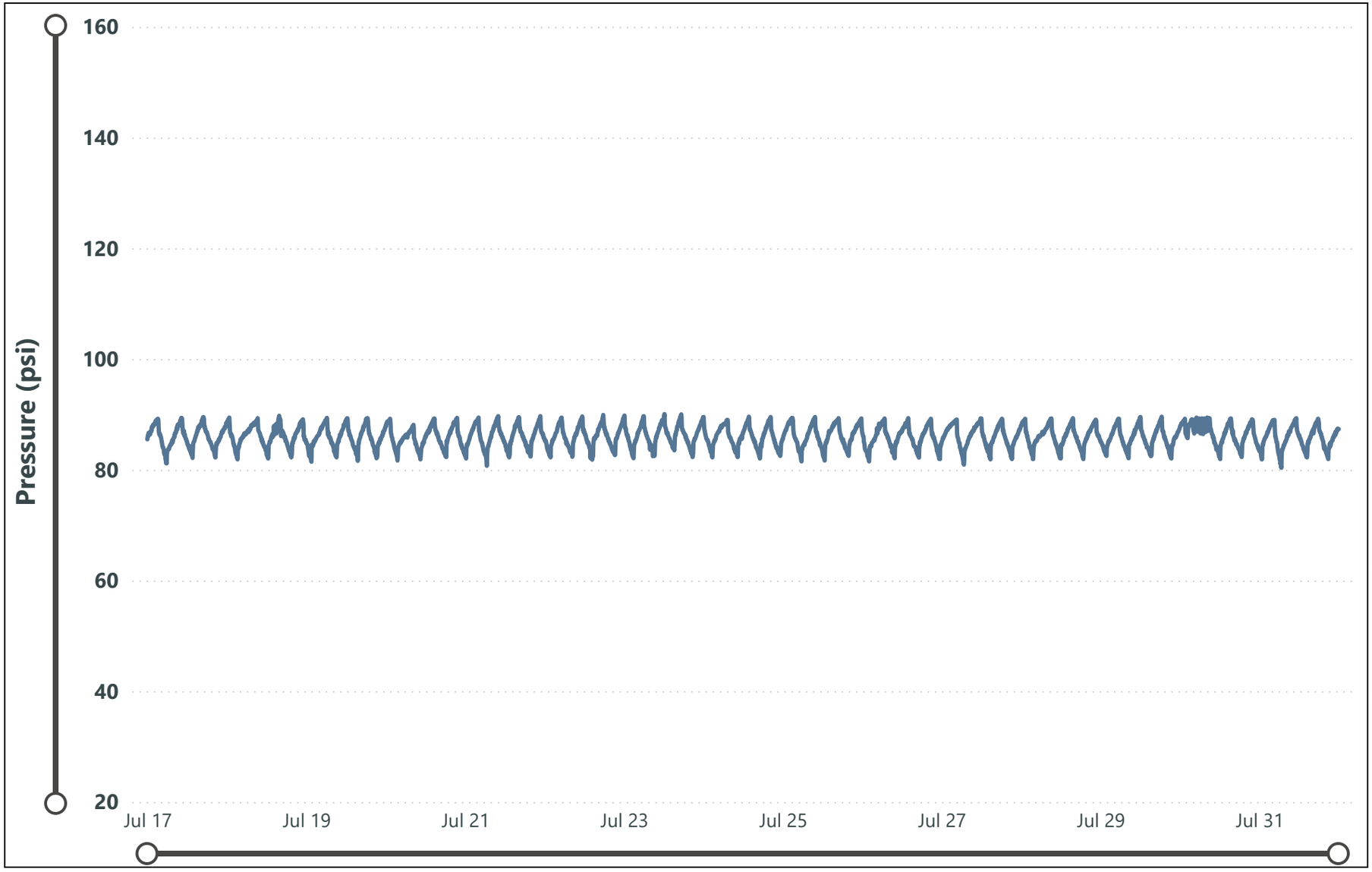
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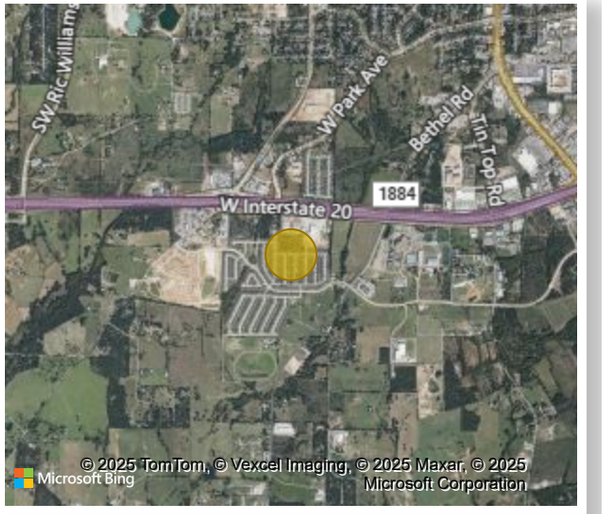
1,155

Pressure Statistics

Min: 14 psi
Max: 77 psi
Avg: 67 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR14





Location

2221 Trevor Dr

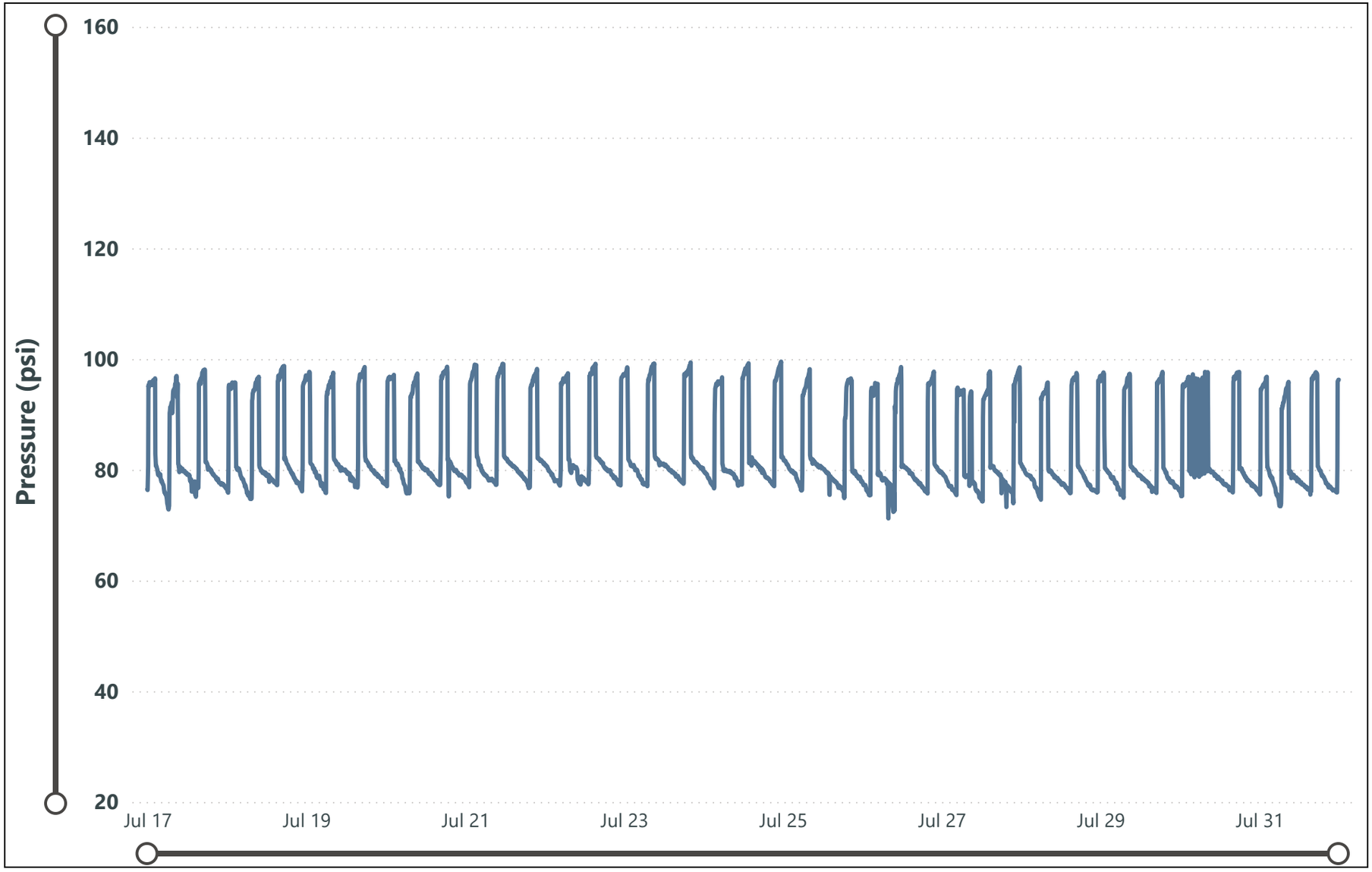
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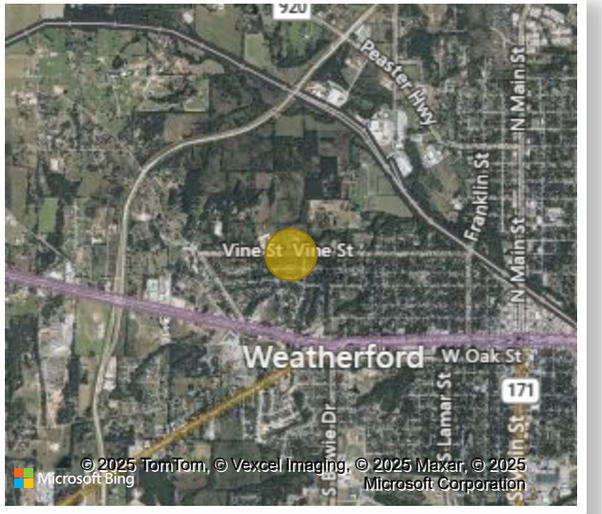
1,050

Pressure Statistics

Min: 80 psi
Max: 90 psi
Avg: 86 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR15





Location

1321 Vine St

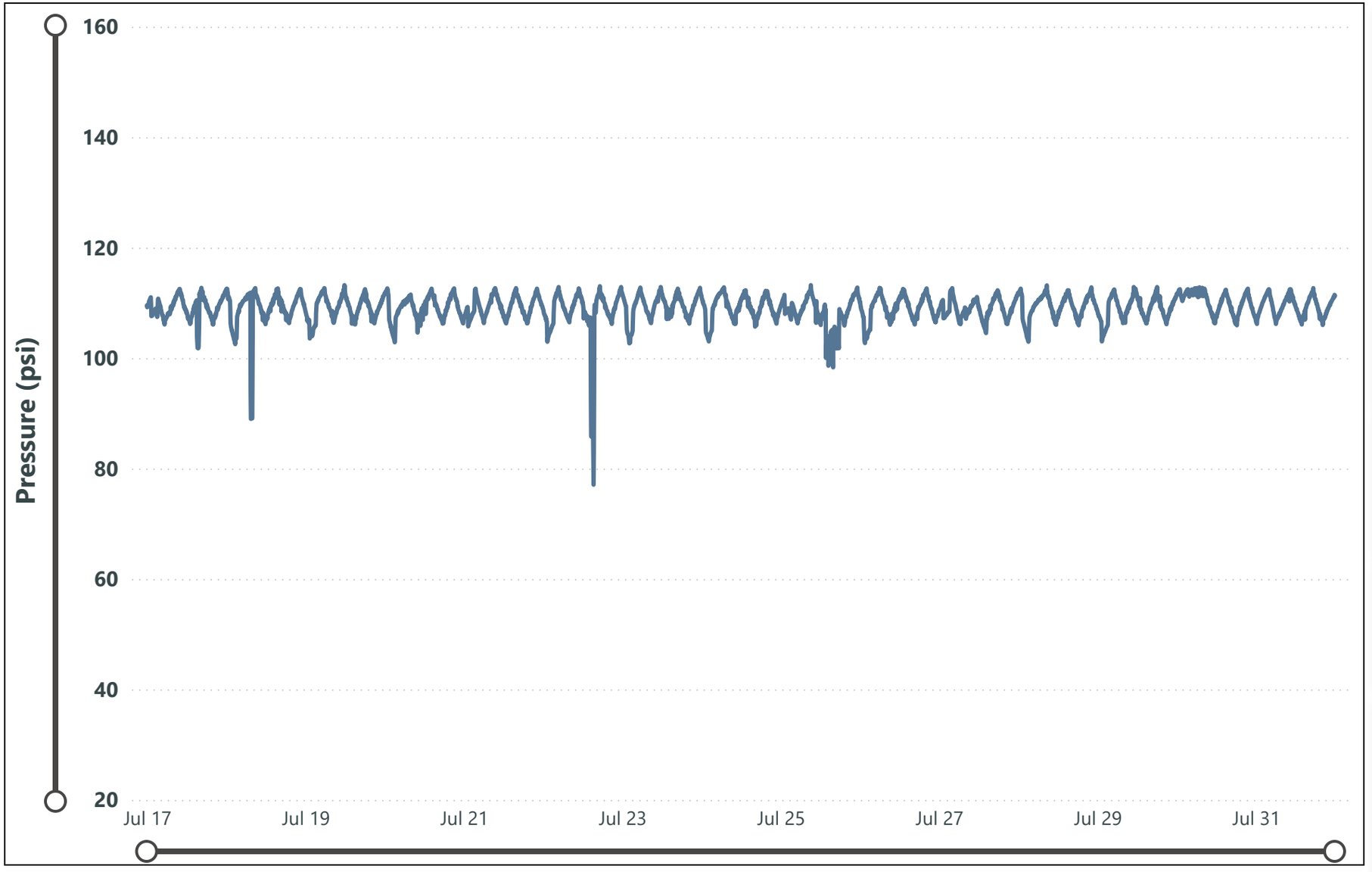
Elev (ft MSL)

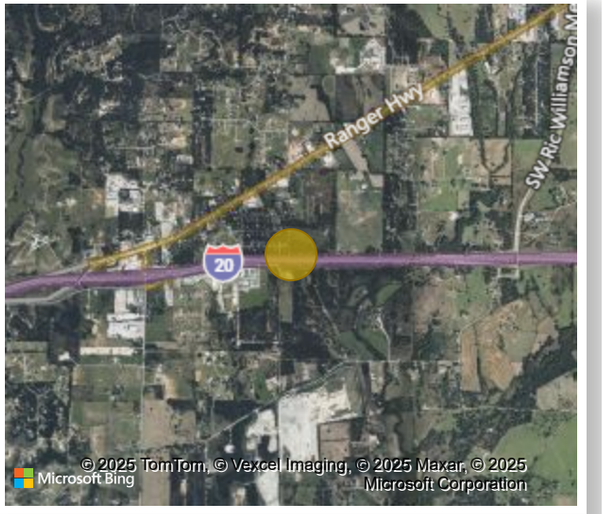
1,100

Pressure Statistics

Min: 71 psi
Max: 100 psi
Avg: 83 psi

Appendix B
Pressure Testing Results
Pressure Recorder: PR16





Location

Easement on the end of Roark Ln

Elev (ft MSL)

0

Pressure Statistics

Min: 77 psi
Max: 113 psi
Avg: 109 psi

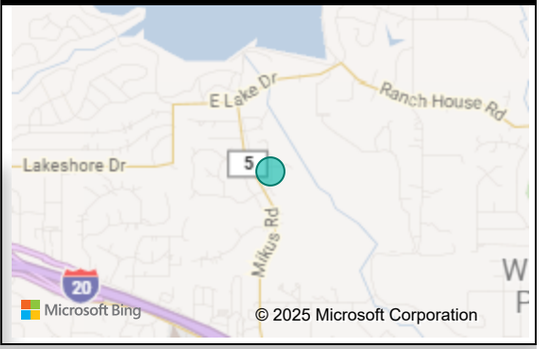
Appendix C
Water Model Calibration Results

City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

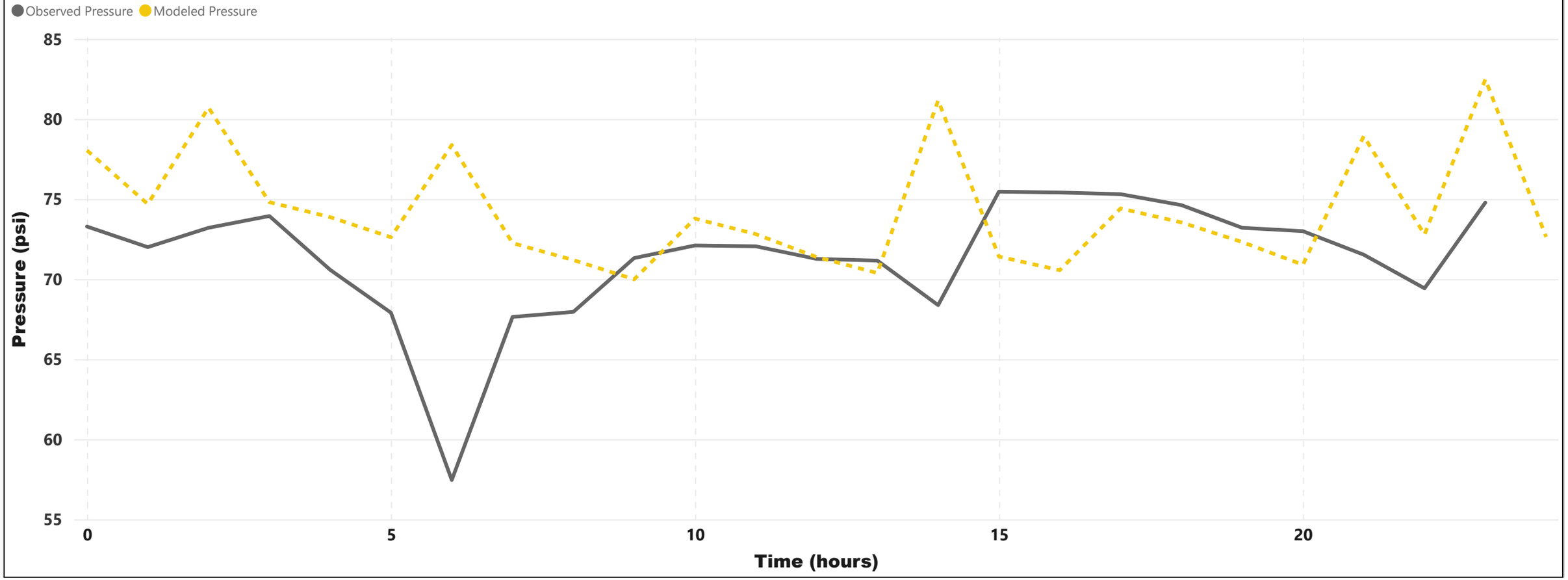
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Pressure Recorder Location



Model Calibration Results



City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

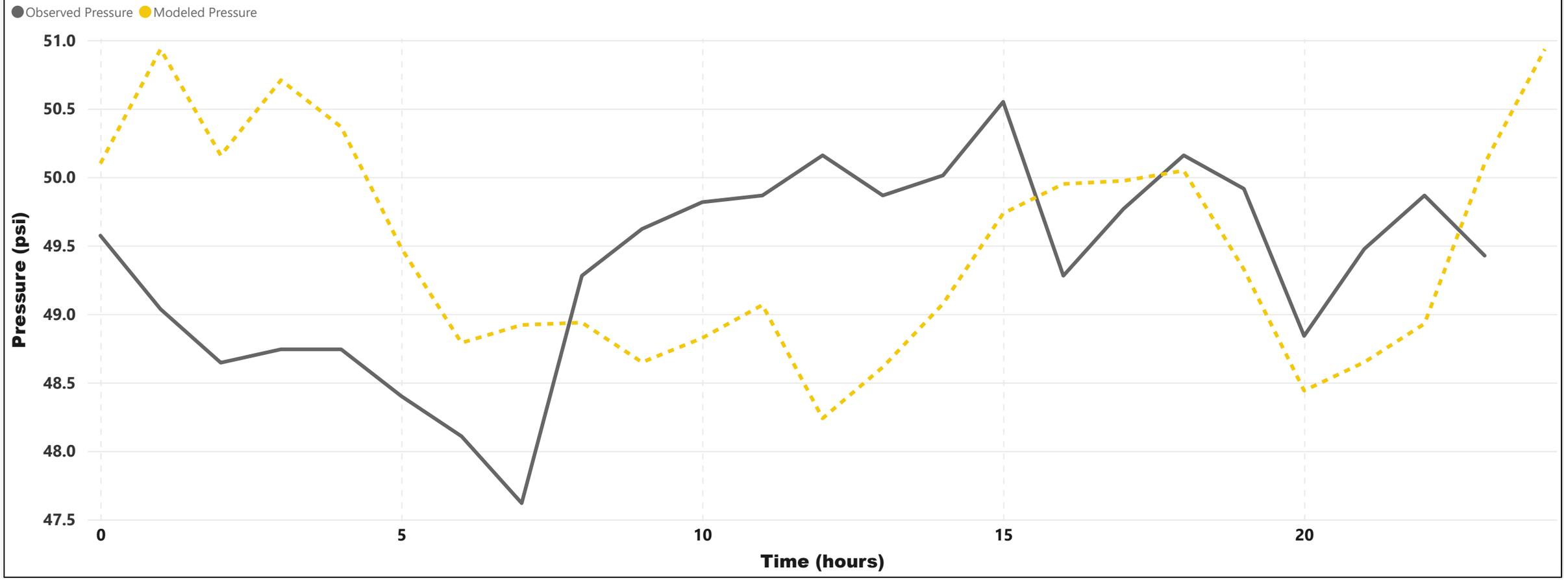
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Pressure Recorder Location



Model Calibration Results

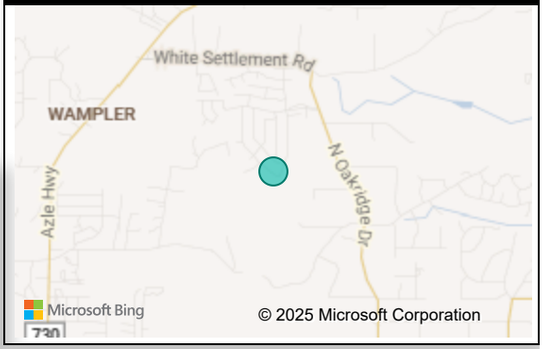


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

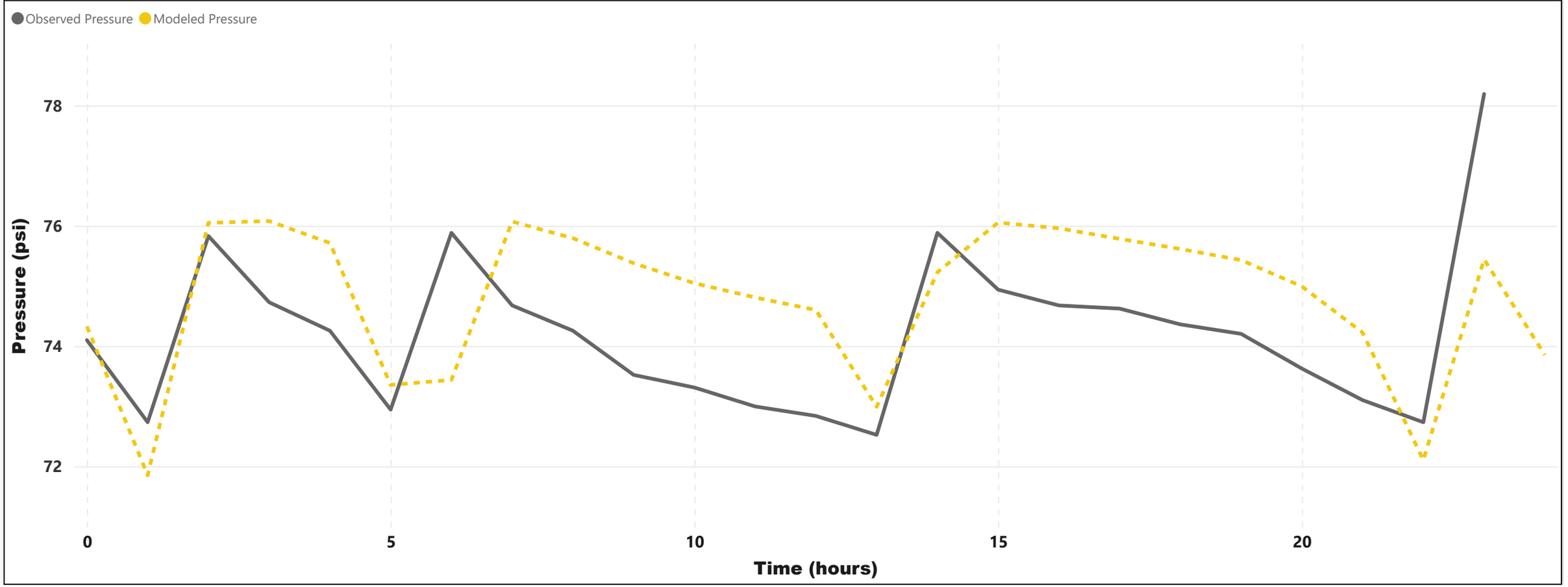
Pressure Recorder ID

PR-1 | PR-2 | **PR-3** | PR-4 | PR-5 | PR-6 | PR-7 | PR-8 | PR-9 | PR-10 | PR-11 | PR-12 | PR-13 | PR-14 | PR-15 | PR-16

Pressure Recorder Location



Model Calibration Results

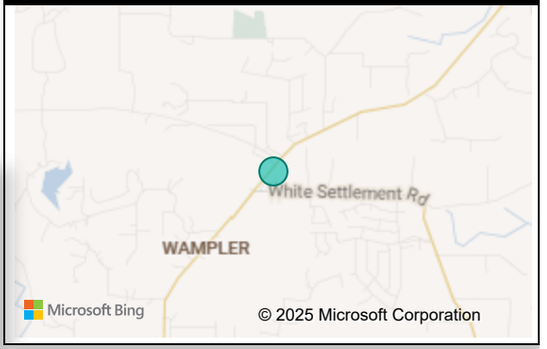


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

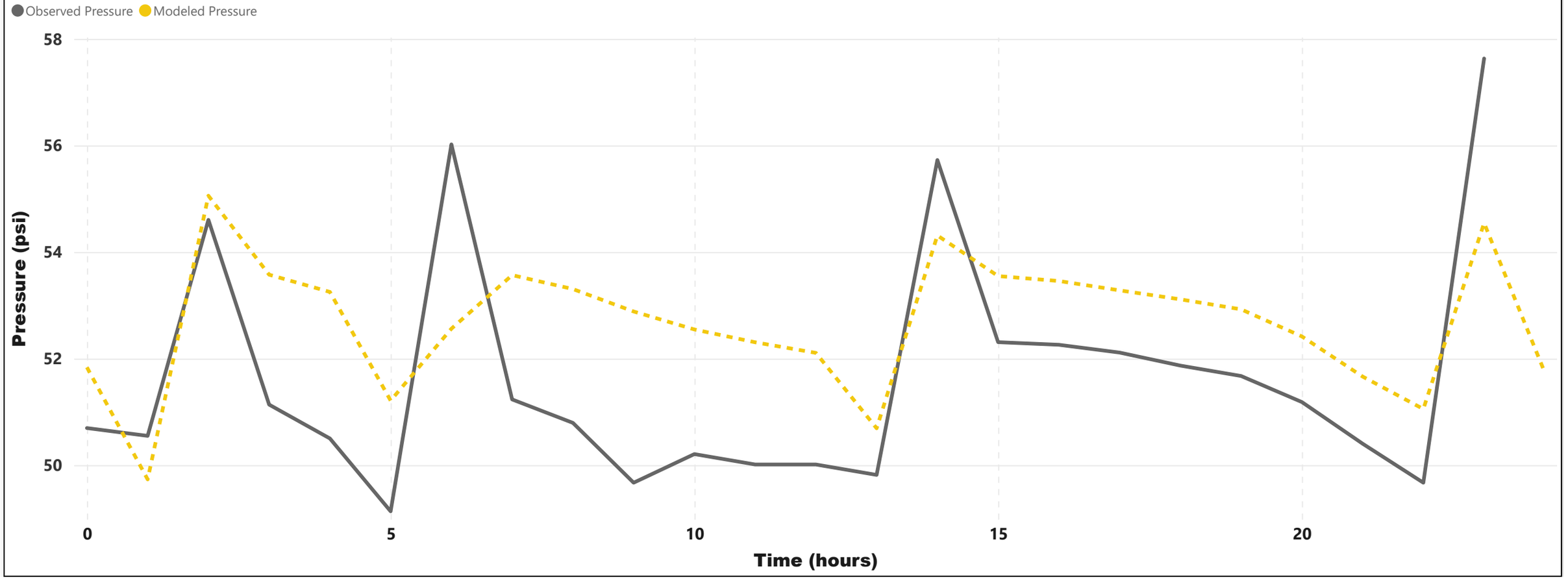
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Pressure Recorder Location



Model Calibration Results

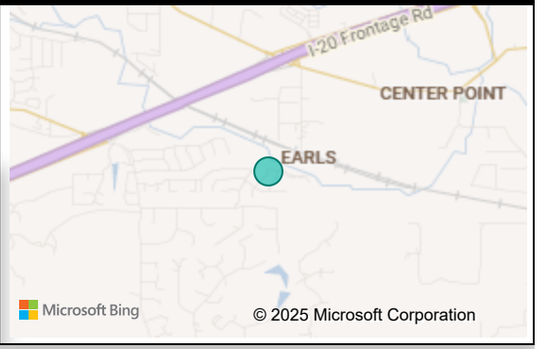


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

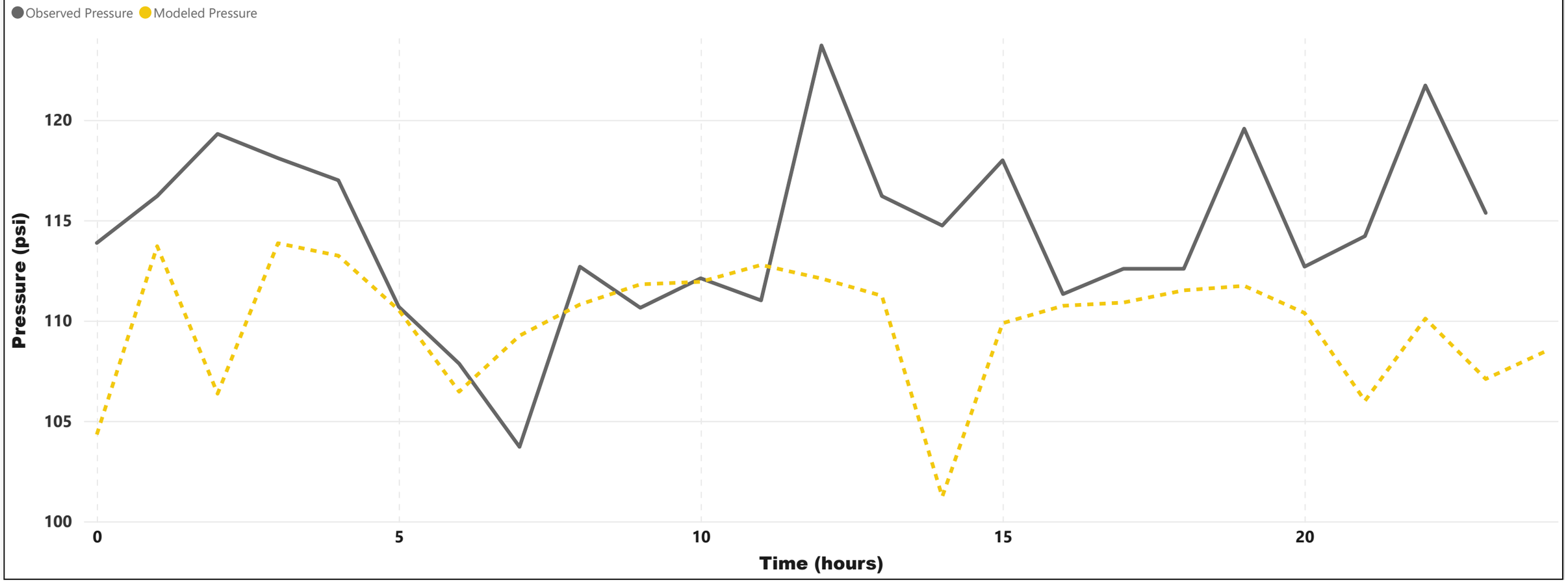
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Pressure Recorder Location



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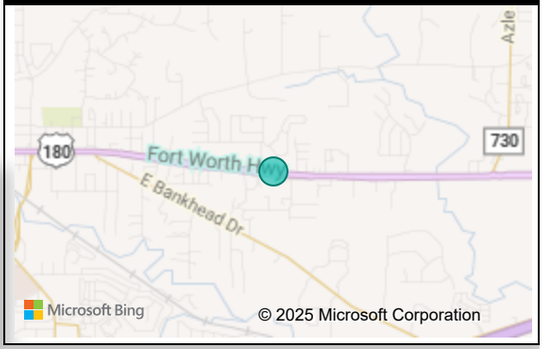


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

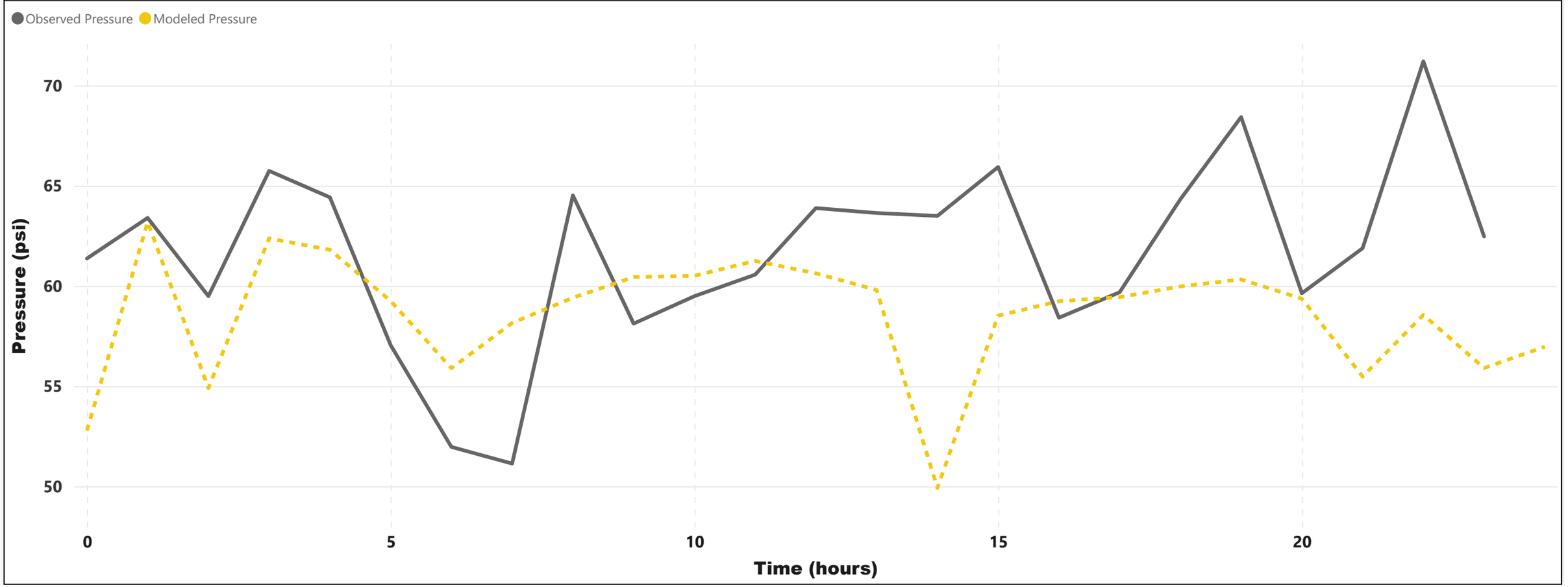
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Pressure Recorder Location



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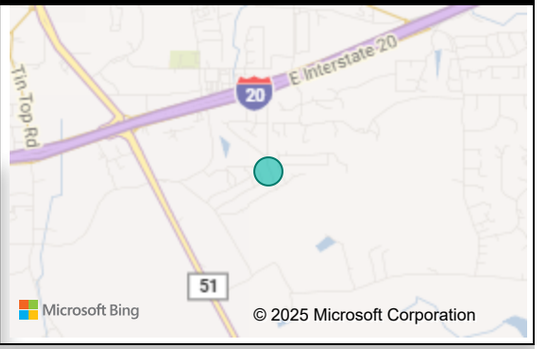


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

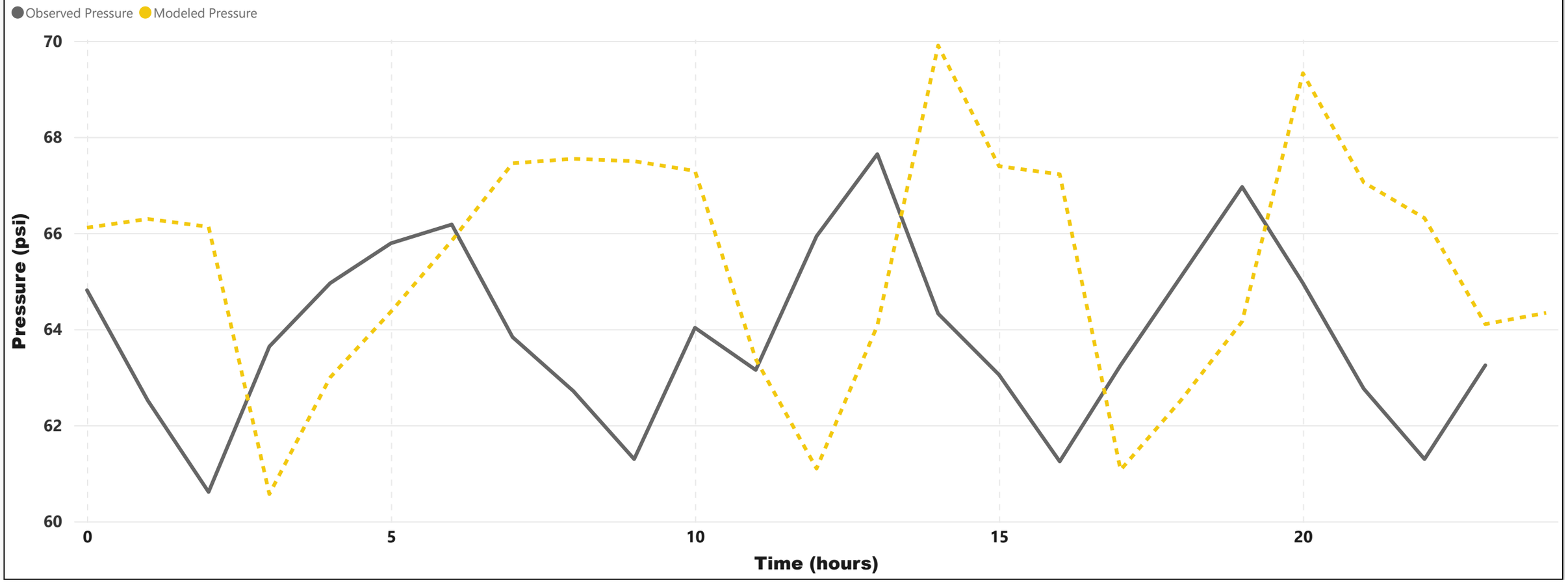
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Pressure Recorder Location



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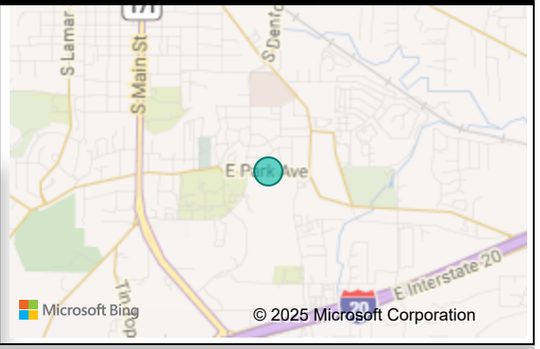


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

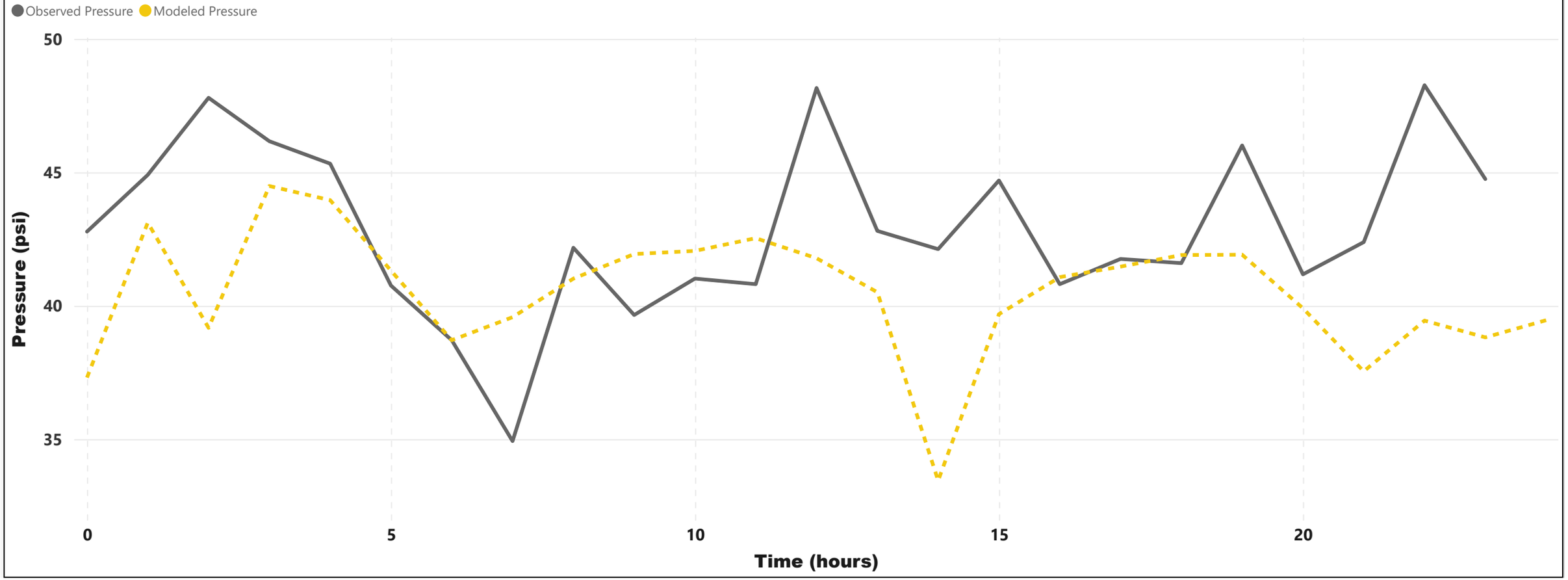
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Pressure Recorder Location



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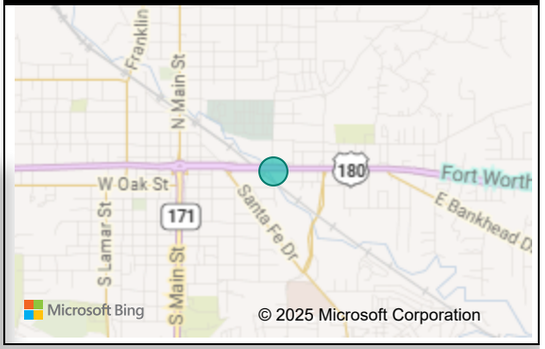


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

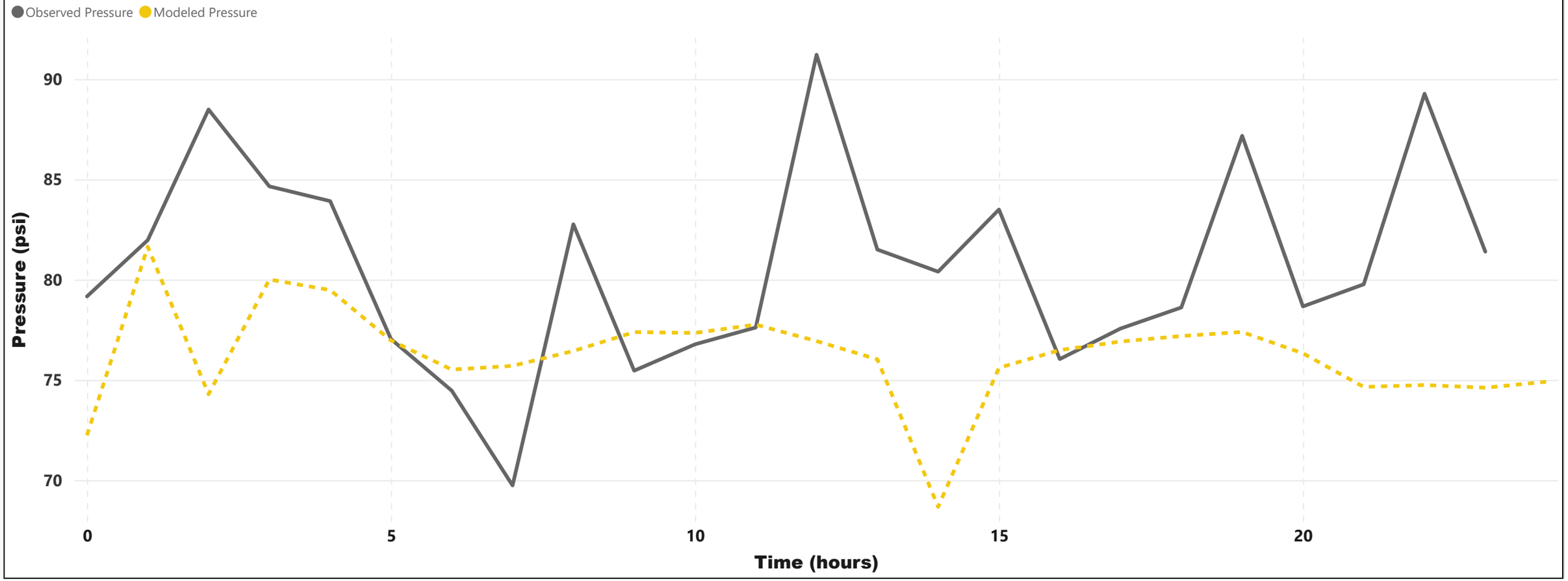
Pressure Recorder ID

PR-1 | PR-2 | PR-3 | PR-4 | PR-5 | PR-6 | PR-7 | PR-8 | **PR-9** | PR-10 | PR-11 | PR-12 | PR-13 | PR-14 | PR-15 | PR-16

Pressure Recorder Location



Model Calibration Results

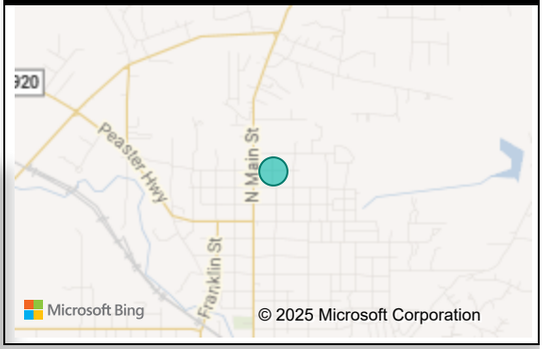


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

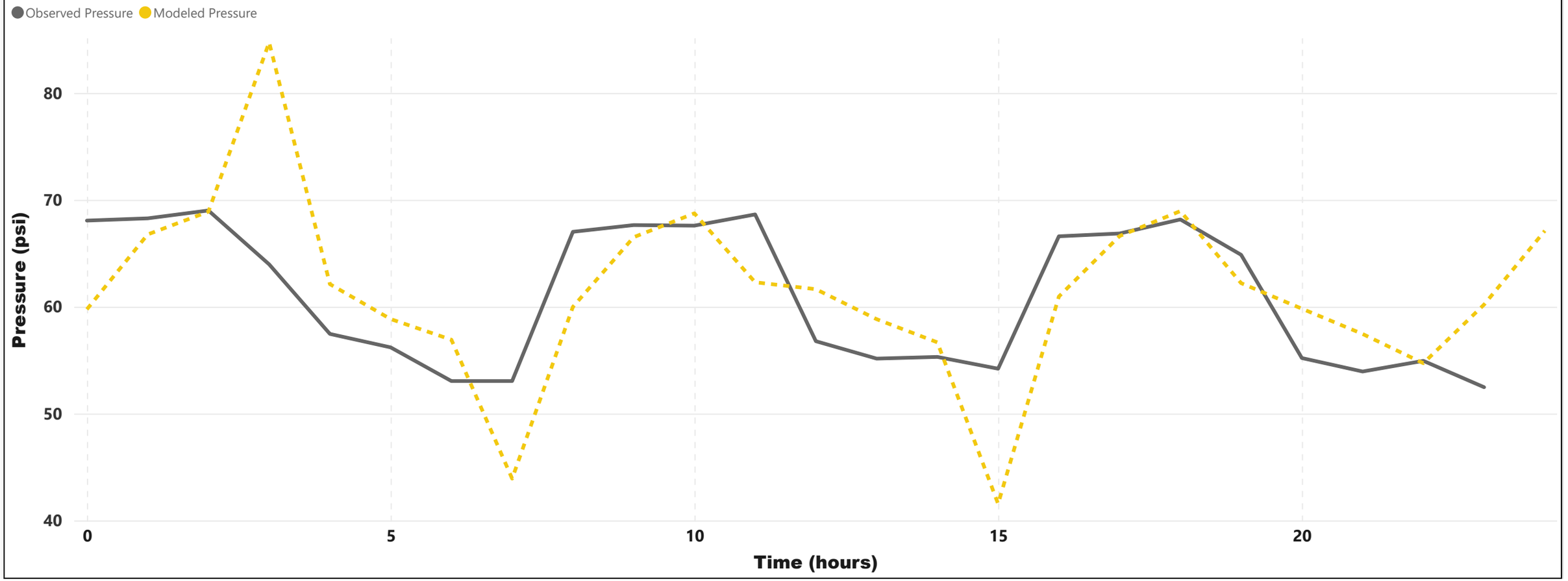
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Pressure Recorder Location



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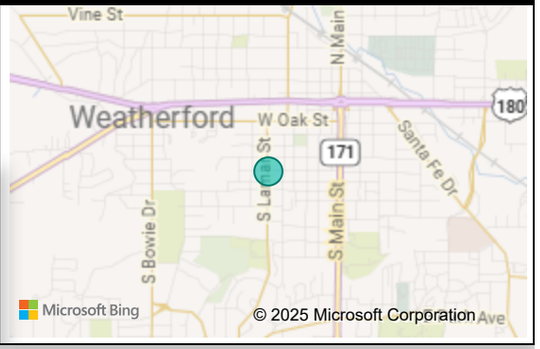


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

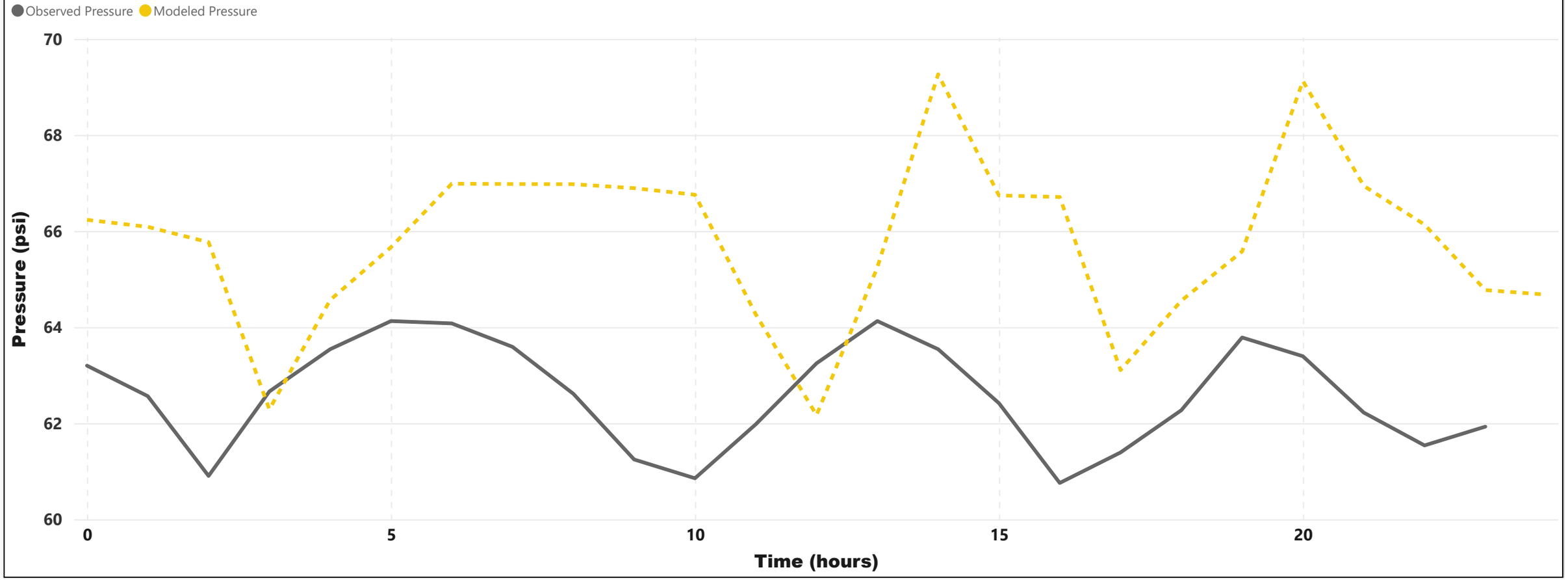
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Pressure Recorder Location



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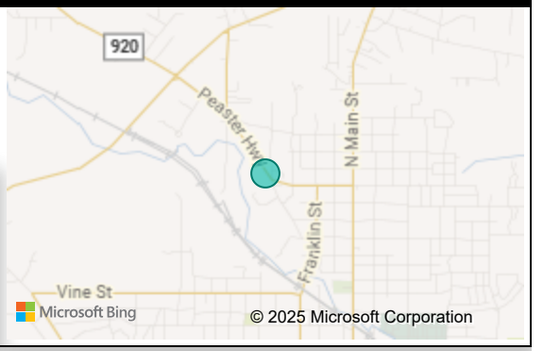


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

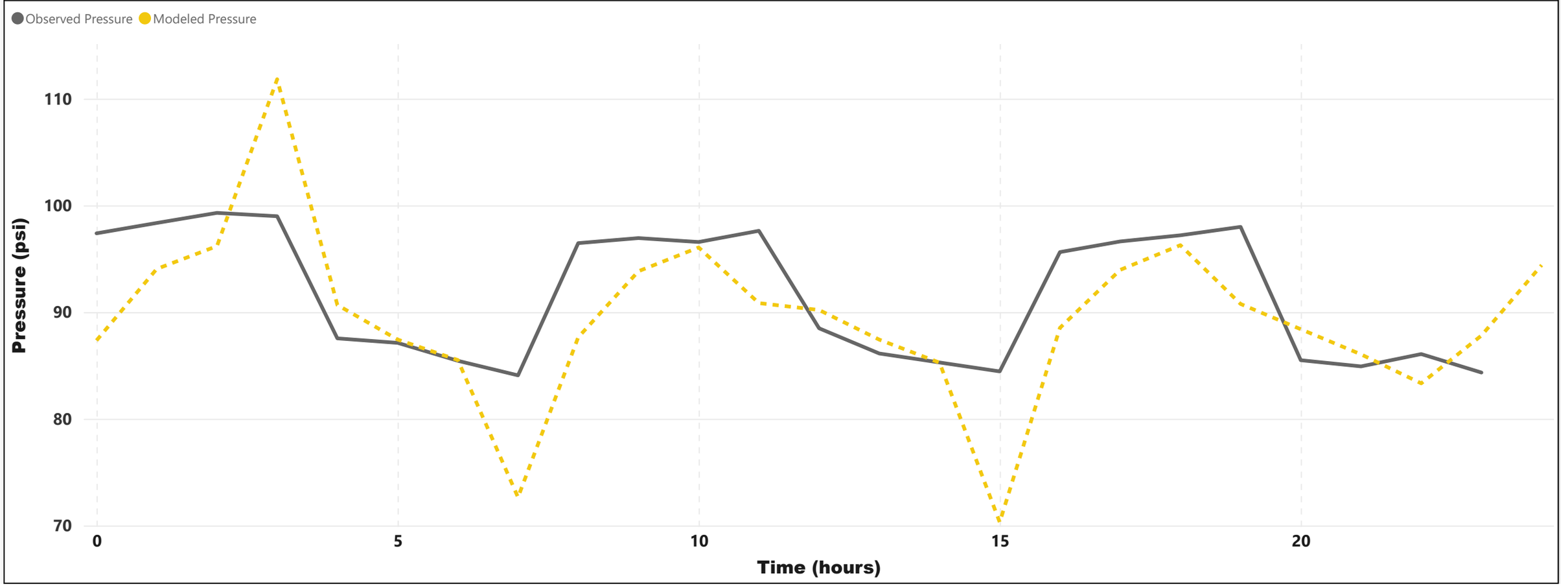
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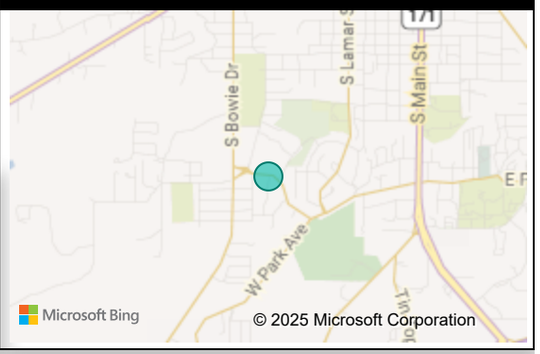


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

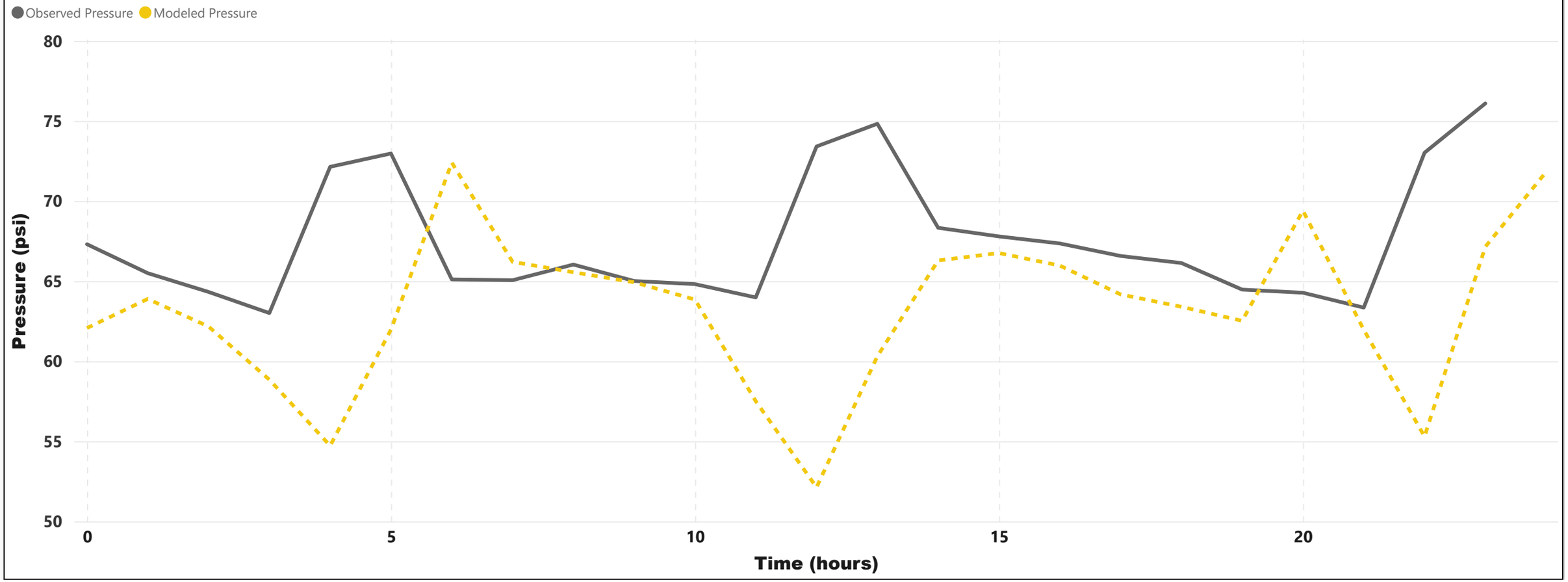
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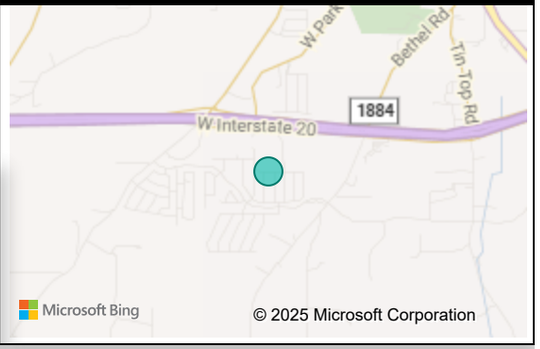


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

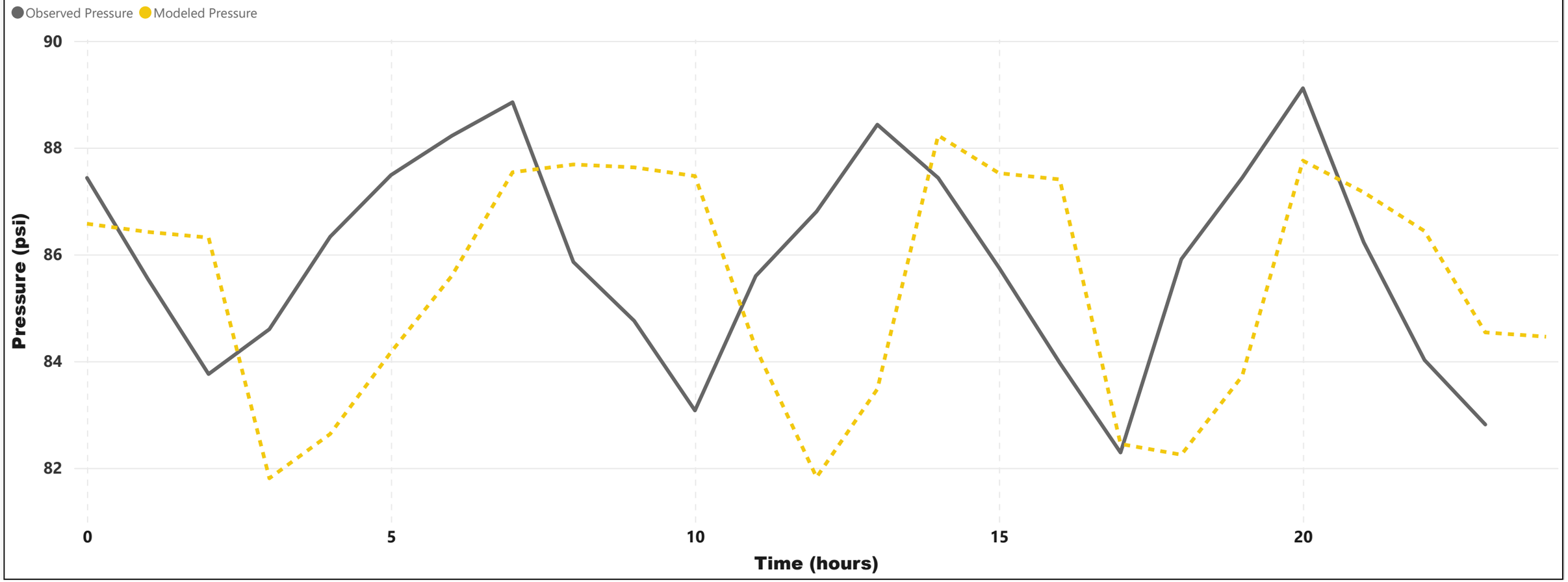
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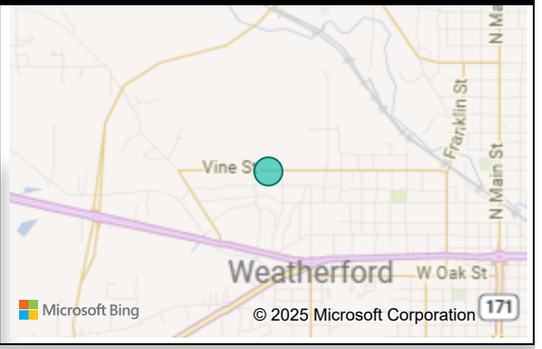


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

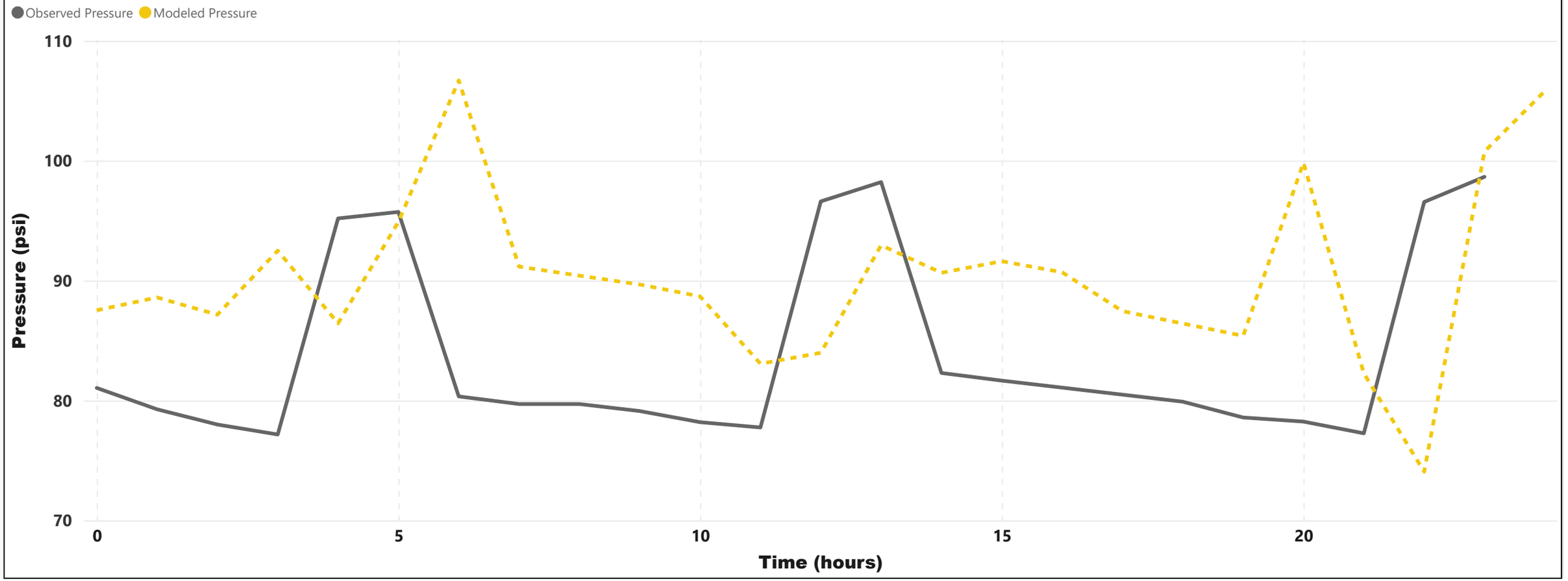
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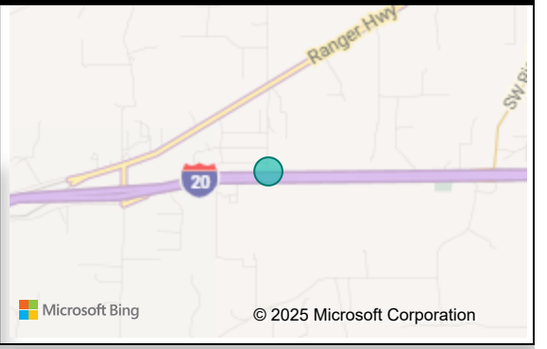


City of Weatherford
W/WW Master Plan Update
Water Model Pressure Calibration

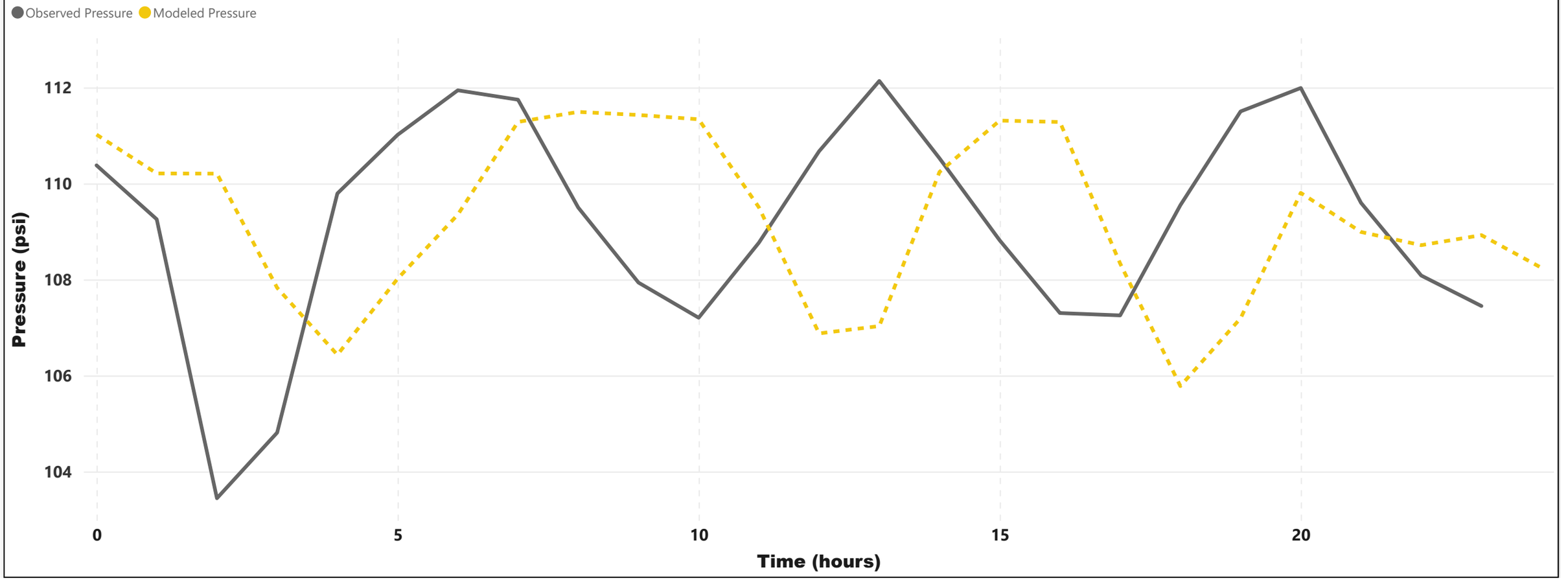
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Pressure Recorder Location



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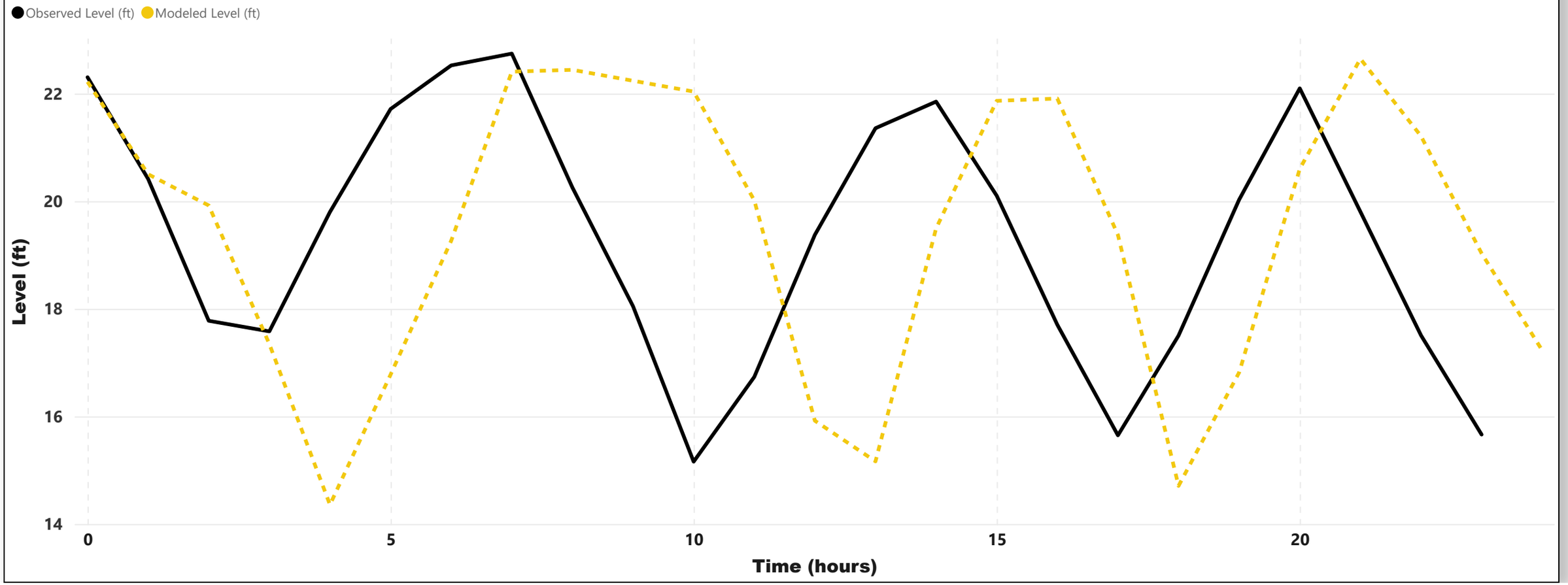


Appendix C
W/WW Master Plan Update
Water Model EST Calibration

EST

Dubellette	Franklin	Newport	Oakridge	West Park

Model Calibration Results

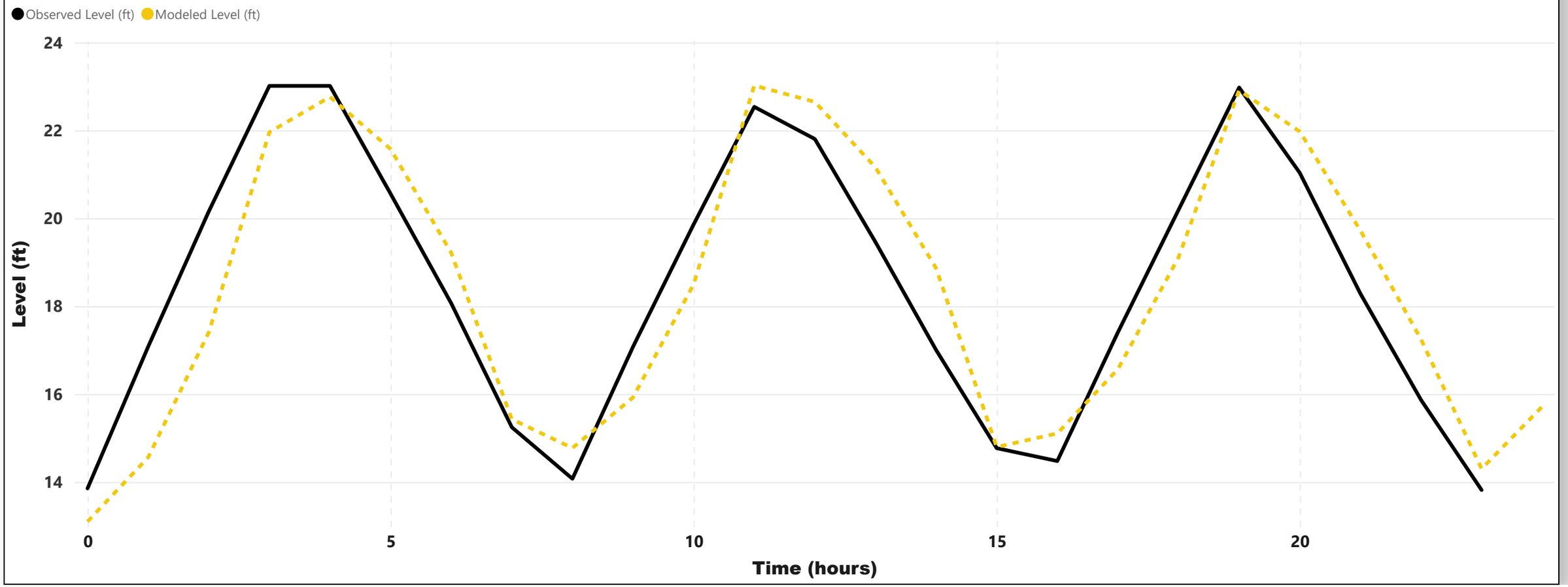


Appendix C
W/WW Master Plan Update
Water Model EST Calibration

EST

Dubellette	Franklin	Newport	Oakridge	West Park

Model Calibration Results

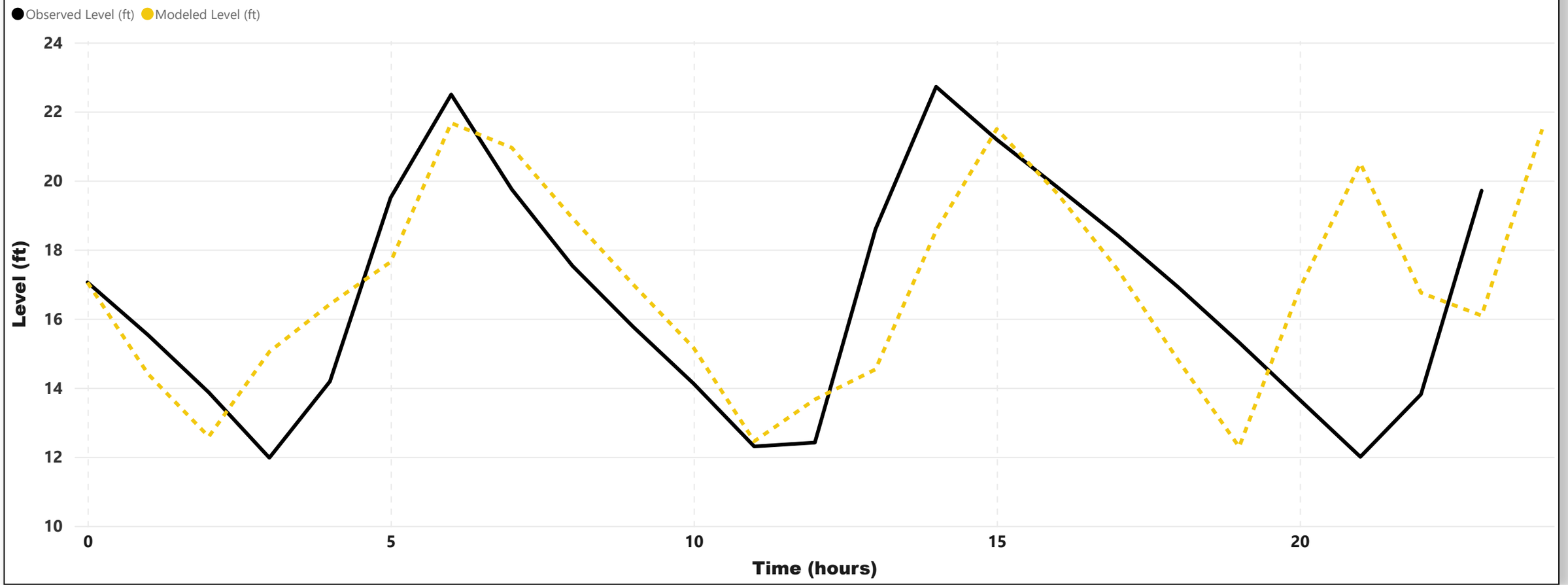


Appendix C
W/WW Master Plan Update
Water Model EST Calibration

EST

Dubellette	Franklin	Newport	Oakridge	West Park

Model Calibration Results

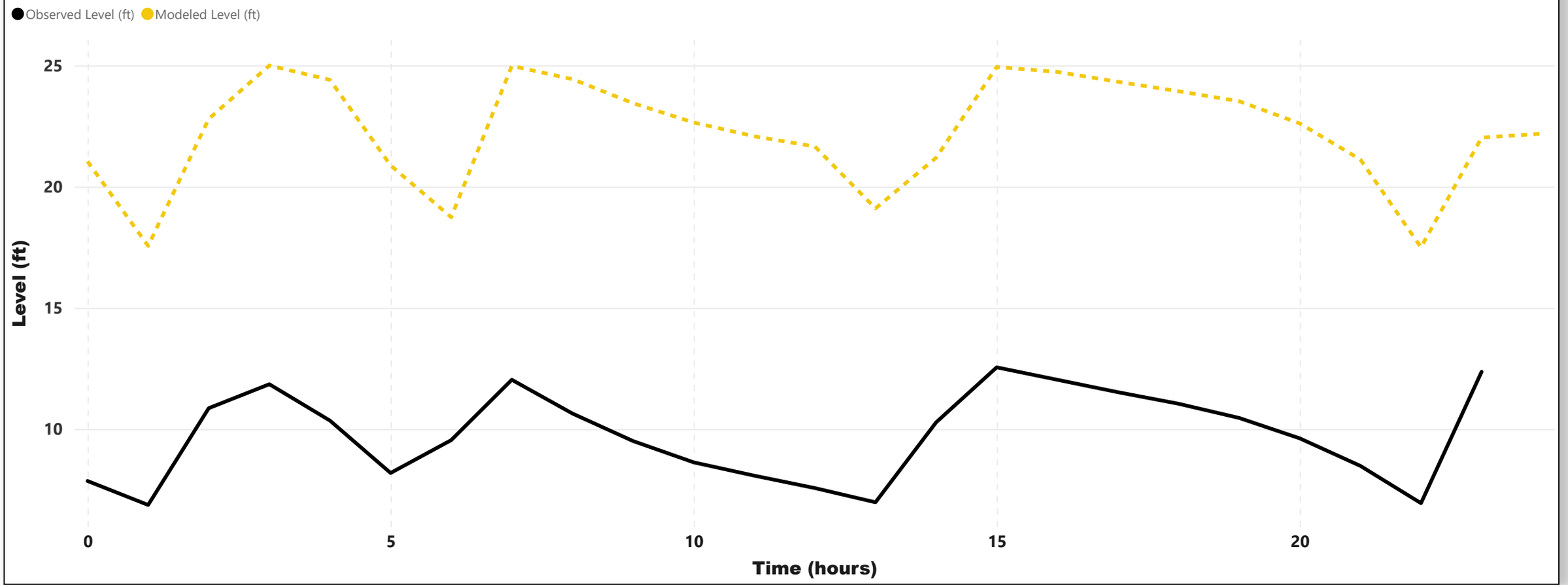


Appendix C
W/WW Master Plan Update
Water Model EST Calibration

EST

Dubellette	Franklin	Newport	Oakridge	West Park

Model Calibration Results

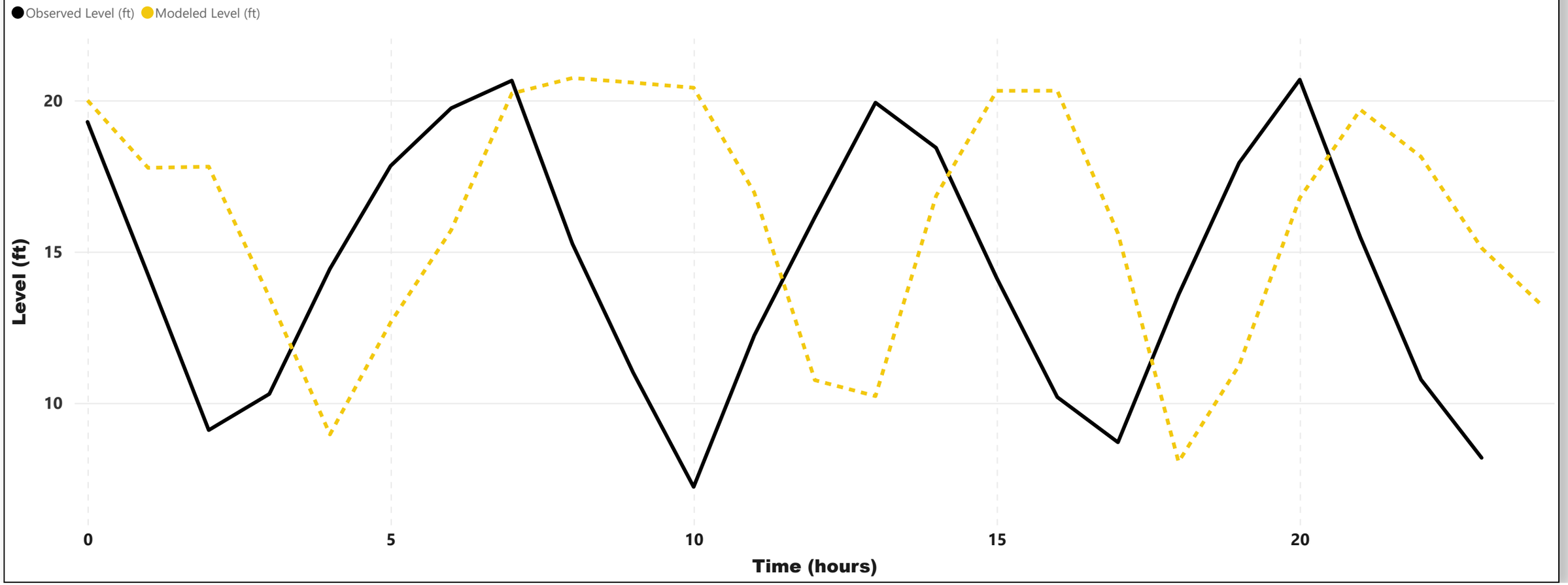


Appendix C
W/WW Master Plan Update
Water Model EST Calibration

EST

Dubellette	Franklin	Newport	Oakridge	West Park

Model Calibration Results

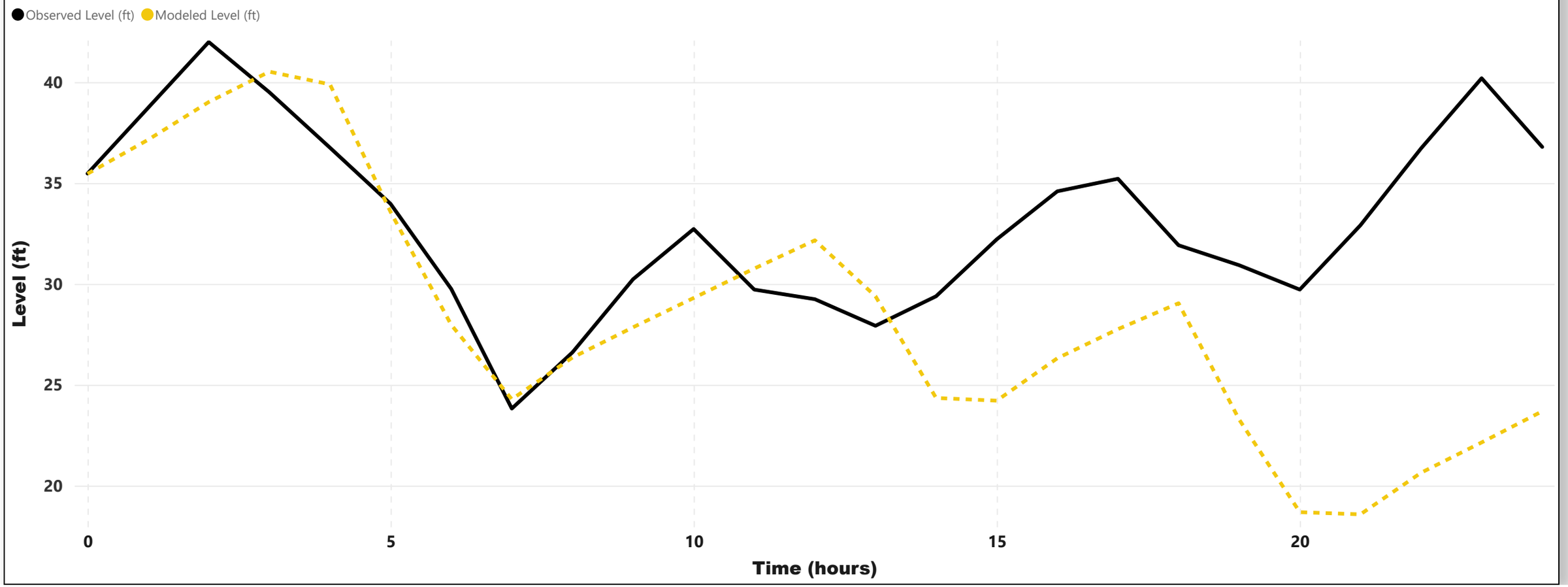


Appendix C
W/WW Master Plan Update
Water Model GST Calibration

GST

College Hill | Harberger

Model Calibration Results

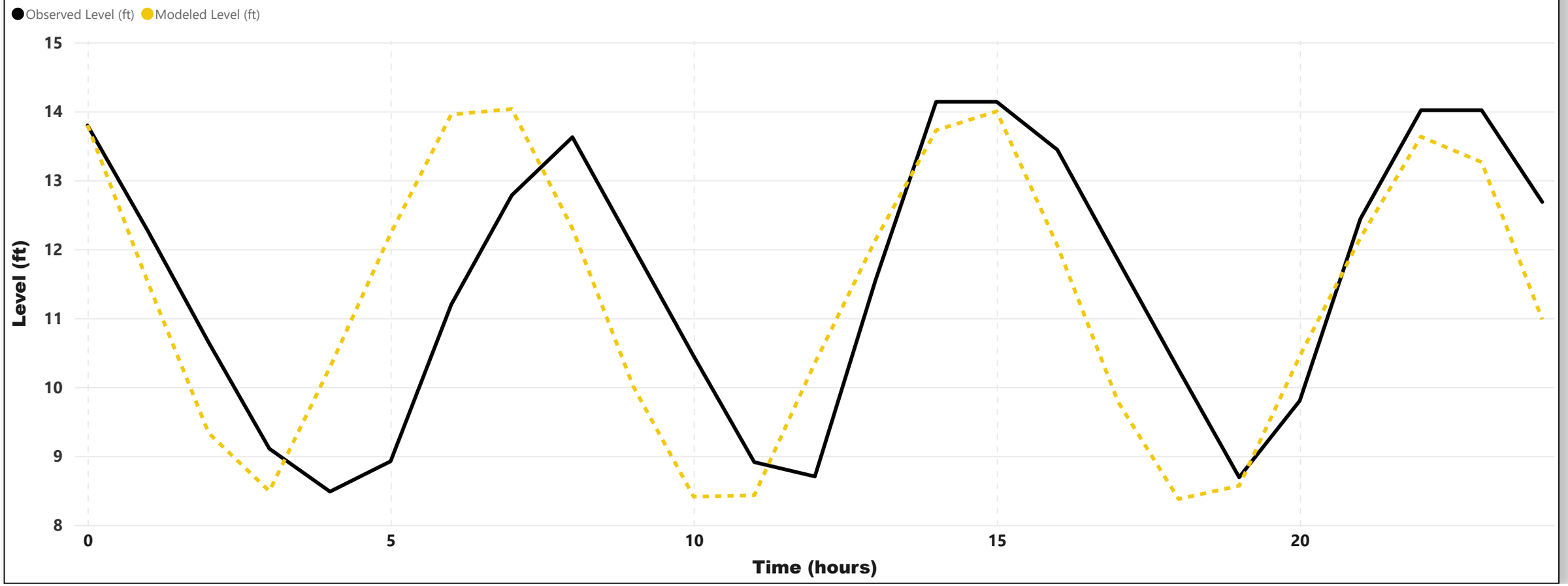


Appendix C
W/WW Master Plan Update
Water Model GST Calibration

GST

College Hill | Harberger

Model Calibration Results



Appendix D
TCEQ ACR Letters

Kathleen Hartnett White, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
Larry R. Soward, *Commissioner*
Glenn Shankle, *Executive Director*

File PWS 1840005/CO
CN 600754865
RN 102004678

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

May 17, 2005

RECEIVED
JUN 02 2005
TCEQ
CENTRAL FILE ROOM

Ms. Tina E. Hanson, P.E.
Freese and Nichols, Incorporated
4055 International Plaza, Suite 200
Fort Worth, Texas 76109

Subject: Requests for Minimum Alternative Capacity Requirements
Request for an Exception to the Maximum Hydraulic Loading Rates
City of Weatherford - PWS I.D. #1840005
Parker County, Texas

Dear Ms. Hanson:

We received your letter dated November 5, 2004, and associated data on February 17, 2005. Your letter requests minimum alternative raw water pump capacity, treatment plant capacity and service pump capacity requirements for the subject public water system be granted under the Texas Commission on Environmental Quality's (TCEQ) requirements specified in 30 TAC §290.45(g) in lieu of those specified within 30 TAC §290.45(b)(2). You provided 30 days of full-scale pilot data requesting that the TCEQ grant an exception to the maximum allowable hydraulic loading rate (HLR) of 10 gallons per minute per square-foot (gpm/sf) for the Trident upflow roughing filter process as historically approved for these units. Also, an exception to the TCEQ's finished filter HLR of 5.0 gpm/sf as specified in 30 TAC §290.45(d)(11)(iv) was requested. We have addressed each of these requests below separately.

Alternative Capacity Requirements

The new minimum alternative capacities listed below were calculated using an equivalency ratio and the specifications in 30 TAC §290.45(g)(2). Based on our review, we are **granting** the following minimum alterative capacity requirements:

Raw water pumps (with the largest out of service):	0.59 gpm/connection
Water treatment plant production:	0.59 gpm/connection
Service pump capacity (per pressure plane)-	
Two or more pumps with a total capacity of:	1.96 gpm/connection
or	
At least 1,000 gpm with the largest out of service and the ability to meet a peak hour demand of:	0.64 gpm/connection

Your submitted daily usage data indicated that a maximum daily demand of 6.771 million gallons (MG) occurred on August 7, 2003, with 9,222 active connections. This does result in a peak demand of 0.51 gpm/connection. However, with a safety factor of 1.15, this results in an equivalency ratio of 0.98 and only a slight reduction in the minimum required capacities.

These new minimum alternative capacity requirements are contingent upon the continuing collection of daily usage data and the maintenance of records. All alternative capacity requirements are subject to periodic review. They may be revised or revoked if water demand conditions change or if is found that the alternative capacity requirements have resulted in the degradation of potable water quality or quantity.

Roughing Filter HLR

The roughing filter was piloted at a HLR range of 13.0 to 14.0 gpm/sf. Our review indicated that 54 of the end-of-run recorded roughing filter's turbidity levels were 5.0 NTU or greater. Also, nearly all of the recorded roughing filter's post backwash turbidity levels were greater than 5.0 NTU and were as high as 17.4 NTU. After discussion between the Technical Review and Oversight Team staff, we will **grant** the requested roughing filter HLR of 12.9 gpm/sf of surface area under the following conditions:

1. **The TCEQ will require the Weatherford surface water treatment plant to provide a 1.0-log inactivation of *giardia lamblia* and a 2.0-log inactivation of viruses through disinfection**. The current TCEQ approved CT study for this plant only requires a 0.5-log inactivation of *giardia lamblia* through disinfection. Therefore, a revised CT study must be submitted to the TCEQ for review and approval prior to the increase in full-scale operation at this granted HLR.

2. The plant operators must record the turbidity of each roughing filter at least once each eight-hour shift one of the Trident units is in operation at any flow rate. The highest roughing filter turbidity level for each 24-hour period must be recorded and reported on the Surface Water Monitoring, Operating and Reporting forms that are submitted to the TCEQ each month.

Finished Filter HLR

The finished filter was piloted at a HLR range of 6.5 to 7.0 gpm/sf. The submitted data indicated a maximum individual finished filter effluent turbidity level of 0.29 NTU during the pilot study period with a 95th percentile level of 0.12 NTU. Based on our review we are **granting** the requested finished filter HLR of 6.45 gpm/sf of finished filter surface area under the following conditions:

1. The individual finished filter effluent turbidity levels must be 0.3 NTU, or less, at least 95% of the time.

2. An individual finished filter effluent cannot exceed 1.0 NTU at anytime.

Based on the granted roughing and finished filters' HLRs and your report, each Trident unit will have a gross production of 2.67 MGD. With one unit out of service, this results in 8.01 MGD of gross filtered water. It is noted that the net filtered water available for customer use, after in-plant use for backwashing the finished filters, is 2.220 MGD or 6.660 MGD with one unit out of service. This is less than the 6.77 MG peak daily customer demand.

All exceptions are subject to periodic review by the TCEQ Public Drinking Water and Regional staff and may be revised or revoked if it is found that the granting of the exception has resulted in a degradation of water quality or quantity.

If you have any questions concerning this letter, or if we may be of further assistance, please contact me at the letterhead's address or by telephone at (512) 239-4798.

Sincerely,

James "Red" Weddell

James "Red" Weddell, P.E.
Technical Review & Oversight Team
Public Drinking Water Section - MC155
Water Supply Division

JSW

cc: TCEQ Dallas/Fort Worth Regional Office
David Laughlin, P.E., TCEQ Utilities Technical Review Team - MC153
Jack C. Schulze, P.E., TCEQ Technical Review & Oversight Team - MC155

Jon Niermann, *Chairman*
Emily Lindley, *Commissioner*
Bobby Janecka, *Commissioner*
Toby Baker, *Executive Director*

PWS_1840005_CO_20220816_ACR

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 16, 2022

Mr. Richard Shaffer, P.E.
Director of Water Utilities
City of Weatherford
917 Eureka Street
Weatherford, Texas 76086

Re: City of Weatherford - PWS ID No. 1840005
Review of Granted Alternative Capacity Requirements
Parker County, Texas
RN102004678 | CN600754865

Dear Mr. Shaffer,

This letter supersedes and replaces only the water treatment plant production capacity alternative capacity requirement (ACR) portion of our prior letter dated May 17, 2005. All other ACRs and exceptions granted in the prior letter remain and are not being modified by this letter. Our letter dated May 17, 2005, is enclosed for your reference.

On June 2, 2022, the Texas Commission on Environmental Quality (TCEQ) received your letter and associated data dated May 23, 2022, requesting an alternative capacity requirement (ACR) for the City of Weatherford public water system (PWS) be granted under the requirements specified in Title 30 of the Texas Administrative Code (TAC) §290.45(g). The regulations found in Title 30 of the Texas Administrative Code (30 TAC) §290.45(b)(2)(B) require surface water providers to have a treatment plant capacity of 0.6 gallons per minute per connection under normal rated design flow. You have requested an ACR for surface water treatment plant capacity for the PWS plant site located on West Lake Drive in Weatherford, Texas. This plant site treats surface water through dual treatment trains running in parallel that combine in a blending tank on the surface water treatment plant site. The treatment trains contained on the plant site have TCEQ Plant IDs: TP15028EP and TP20844EP, respectively.

The TCEQ Technical Review and Oversight Team (TROT) reviews requests for ACRs based on an evaluation of a system's maximum daily demand (MDD) and the actual number of connections served at that time. Based on our review, we are **granting** a new ACR as follows:

Total Production (Purchased + Groundwater + Surface Water) 0.47 gpm/connection

Your submitted daily usage data from January 2019 to April 2022 indicated a MDD of 7,664,233 gallons on August 22,2019. The number of active connections during August 2019 was 13,115. Using the specifications in §290.45(g)(2) and a safety factor of 1.15, we calculated an equivalency ratio of 0.78. The above ACR was calculated using this equivalency ratio and the specifications in 30 TAC §290.45(g)(2).

Condition of Granted ACR

Condition 1:

- **This ACR is contingent upon the continuing collection and retention of the most recent three (3) consecutive years of daily usage data.**

All ACRs are subject to periodic review. They may be revised or revoked if water demand conditions change or if evidence is found that granting it has resulted in the degradation of potable water quality or quantity. This letter must be kept on file at the water system for as long as this ACR is valid and made available to TCEQ staff upon request.

Please note that this ACR is not intended to waive compliance with any other TCEQ requirement in 30 TAC Chapter 290. Noncompliance with any condition stated in this letter may result in an enforcement action as specified in 30 TAC §290.39(l)(5). This ACR cannot be used as a defense in any enforcement action resulting from noncompliance with any other requirement in 30 TAC Chapter 290.

If you have questions concerning this letter, or if we can be of additional assistance, please contact James Belcher at James.Belcher@tceq.texas.gov, by telephone at (512) 239-1620, or by correspondence at the following address:

Texas Commission on Environmental Quality
Technical Review and Oversight Team (MC 159)
P.O. Box 13087
Austin, Texas 78711-3087

Sincerely,

Stephanie Escobar

Stephanie Escobar, Team Leader
Technical Review and Oversight Team
Plan and Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

SJE/JRB

Enclosure 1: TCEQ Technical Review and Oversight Team letter dated May 17, 2005

cc: The Honorable Paul Paschall, Mayor of City of Weatherford, P.O. Box 255, Weatherford, TX 76086-0255

Appendix E
Water Distribution System Risk-Based Assessment Mapping

0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

0.25 MG Dubellette EST
Ground Elev. = 1,165.83'
Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

0.5 MG Newport EST
Ground Elev. = 1,172'
Overflow Elev. = 1,320'

2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
(3) - 2,610 gpm Pumps

0.5 MG West Park EST
Ground Elev. = 1,166'
Overflow Elev. = 1,257'

West Lake PS
(1) - 710 gpm Pump
(1) - 740 gpm Pump
(1) - 400 gpm Pump

0.2 MG "New" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

0.25 MG Oakridge EST
Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD Dr. Paul Philips Water Purification Plant

Lake Weatherford
Willow Park
Hudson Oaks
Annetta North

PRESSURE PLANES
- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

AGE SCORE
- 1
- 2
- 4
- 6
- 8
- 10

0 2,000 4,000
SCALE IN FEET

FIGURE E-1
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
RISK-BASED ASSESSMENT
AGE SCORE

LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

1858 WEATHERFORD TRUE TEXAS

FREESE AND NICHOLS

Created By Freese and Nichols, Inc.
Job No.: WEAN002
Location: H:\W_WW_PLANNING\01_DELIVERABLES\00_FINAL_REPORT\02_FINAL_MP_REPORT\01_APPENDICES\Appendix_E\Appendix_E_PRO_PROJECT\Appendix_E_PRO_PROJECT.aprx\Figure_E-01\V_RBA_LOF_Age
Updated: Wednesday, July 23, 2025 8:37 AM
User Name: DB17

0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
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Overflow Elev. = 1,234.94'

14.0 MGD Dr. Paul Philips Water Purification Plant

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

PRESSURE PLANES

- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

MATERIAL SCORE

- 1
- 3
- 5
- 7
- 9
- 10

0 2,000 4,000
SCALE IN FEET

FIGURE E-2
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
RISK-BASED ASSESSMENT
MATERIAL SCORE

LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Location: H:\W_WW_PLANNING\01_DELIVERABLES\00_FINAL_REPORT\02_FINAL_MP_REPORT\01_APPENDICES\Appendix_E\Appendix_E_PRO_PROJECT\Appendix_E_PRO_PROJECT.aprx\{Figure_E-02}-W_RBA_LOF_Material
Updated: Wednesday, July 23, 2025 8:37 AM
User Name: DB817

0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

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Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

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(1) - 740 gpm Pump
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14.0 MGD Dr. Paul Philips Water Purification Plant

Lake Weatherford
Willow Park
Hudson Oaks
Annetta North

0 2,000 4,000
SCALE IN FEET

PRESSURE PLANES
- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

WO HISTORY SCORE
- 1
- 5
- 10

FIGURE E-3
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
RISK-BASED ASSESSMENT
WORK ORDER HISTORY SCORE

LEGEND
- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Updated: Wednesday, July 23, 2025 8:37 AM
User Name: 08817

0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

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Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

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Ground Elev. = 1,172'
Overflow Elev. = 1,320'

2.0 MG College Hill GST
Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
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0.5 MG West Park EST
Ground Elev. = 1,166'
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Overflow Elev. = 1,234.94'

14.0 MGD Dr. Paul Philips Water Purification Plant

Lake Weatherford

Willow Park

Hudson Oks

Annetta North

PRESSURE PLANES
- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

RESILIENCY SCORE
- 1
- 10

0 2,000 4,000
SCALE IN FEET

FIGURE E-4
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
RISK-BASED ASSESSMENT
RESILIENCY SCORE

LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Updated: Wednesday, July 23, 2025 8:37 AM
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0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
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Overflow Elev. = 1,186.46'

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Overflow Elev. = 1,320'

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Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
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(1) - 740 gpm Pump
(1) - 400 gpm Pump

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0.1 MG "Old" West Lake Standpipe
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Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD Dr. Paul Philips Water Purification Plant

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

PRESSURE PLANES

- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

DIAMETER SCORE

- 1
- 4
- 8
- 10

0 2,000 4,000
SCALE IN FEET

FIGURE E-5
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
RISK-BASED ASSESSMENT
DIAMETER SCORE

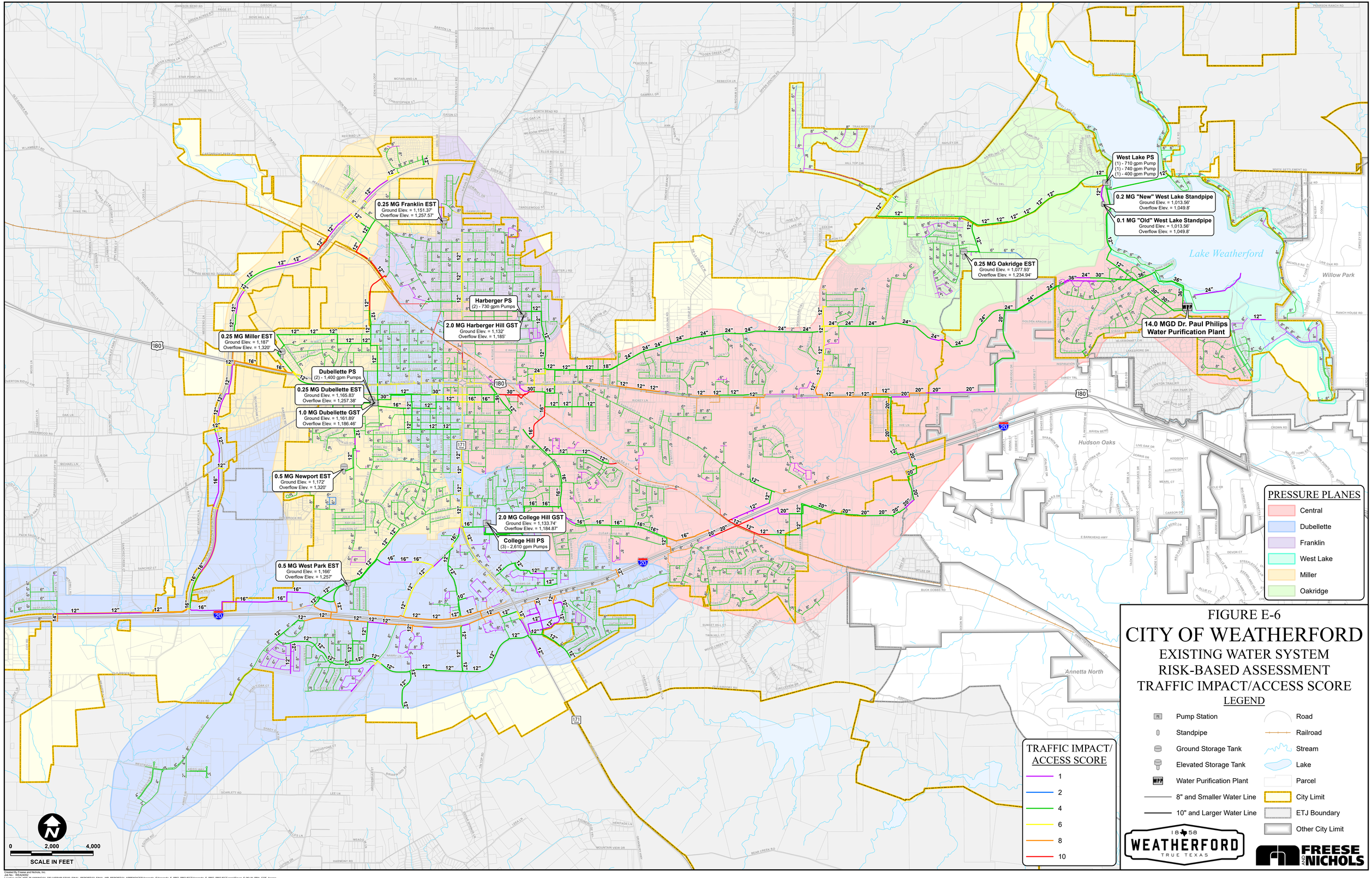
LEGEND

- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Updated: Wednesday, July 23, 2025 8:38 AM
User Name: DB817



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Updated: Wednesday, July 23, 2025 8:36 AM
User Name: DB817

0.25 MG Franklin EST
Ground Elev. = 1,151.37'
Overflow Elev. = 1,257.57'

Harberger PS
(2) - 730 gpm Pumps

2.0 MG Harberger Hill GST
Ground Elev. = 1,132'
Overflow Elev. = 1,185'

0.25 MG Miller EST
Ground Elev. = 1,187'
Overflow Elev. = 1,320'

Dubellette PS
(2) - 1,400 gpm Pumps

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Ground Elev. = 1,165.83'
Overflow Elev. = 1,257.38'

1.0 MG Dubellette GST
Ground Elev. = 1,161.89'
Overflow Elev. = 1,186.46'

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Overflow Elev. = 1,320'

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Ground Elev. = 1,133.74'
Overflow Elev. = 1,184.87'

College Hill PS
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0.5 MG West Park EST
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Overflow Elev. = 1,257'

West Lake PS
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(1) - 740 gpm Pump
(1) - 400 gpm Pump

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Overflow Elev. = 1,049.8'

0.1 MG "Old" West Lake Standpipe
Ground Elev. = 1,013.56'
Overflow Elev. = 1,049.8'

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Ground Elev. = 1,077.93'
Overflow Elev. = 1,234.94'

14.0 MGD Dr. Paul Philips Water Purification Plant

Lake Weatherford
Willow Park
Hudson Oaks
Annetta North

0 2,000 4,000
SCALE IN FEET

PRESSURE PLANES
- Central
- Dubellette
- Franklin
- West Lake
- Miller
- Oakridge

CRITICAL CUSTOMER SCORE
- 1
- 6
- 8
- 10

FIGURE E-7
CITY OF WEATHERFORD
EXISTING WATER SYSTEM
RISK-BASED ASSESSMENT
CRITICAL CUSTOMER SCORE

LEGEND
- Pump Station
- Standpipe
- Ground Storage Tank
- Elevated Storage Tank
- Water Purification Plant
- 8" and Smaller Water Line
- 10" and Larger Water Line
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Location: H:\W_WW_PLANNING\01_DELIVERABLES\00_FINAL_REPORT\02_FINAL_MP_REPORT\01_APPENDICES\Appendix_E\Appendix_E_PRO_PROJECT\Appendix_E_PRO_PROJECT.aprx\{Figure_E-07}-W_RBA_COF_CritCust
Updated: Wednesday, July 23, 2025 8:37 AM
User Name: DB817

Appendix F
Pump Station Condition Assessment Sheets

Dubellette Pump Station

Inspection Date: **Inspector:**

Facility Information	
Address:	212 Raymond George Way
Year in Service:	
Type of Facility:	
Number of Pumps:	3
Design Point:	1,400 gpm @ 200' TDH
Horsepower:	125 RPM: 1,780 (2) & 1,750 (1)
Disinfection:	
Electrical Service:	480 V, 3 PH, 350 -Wire
Utility Transformer:	225 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antennae / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required



CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	20%	
Electrical – MCC, motor starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	old conduits
Instrumentation and Controls - SCADA Cabinet, Antenna, Radio, Fiber Communications	1	15%	
Structure - Foundation, Walls, Roof, Hatches, Corrosion, Cracks, Leaking	1	15%	
Piping and Valves	2	10%	
Mechanical - HVAC, Flow Meters, Actuator	2	10%	
Site - Drainage, Access Drive/Paving, Gates and Fencing, Security, Fire Suppression	1	10%	
Condition Rating	-	100%	

Additional Notes:

Harberger Hill Pump Station

Inspection Date: **Inspector:**

Facility Information	
Address:	707 Narrow Street
Year in Service:	
Type of Facility:	
Number of Pumps:	2
Design Point:	730 gpm @ 205' TDH
Horsepower:	50 & 60 RPM: 3,600 & 3,550
Disinfection:	
Electrical Service:	240 V, 3 PH, 500 -Wire
Utility Transformer:	86 KVA; Pad / (Pole Mounted)
Monitoring:	None / SCADA (Antennae / (Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required



CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	3	20%	
Electrical – MCC, motor starters/VFD, Panelboards, Grounding, Back-up Power, Cables	5	20%	
Instrumentation and Controls - SCADA Cabinet, Antenna, Radio, Fiber Communications	2	15%	
Structure - Foundation, Walls, Roof, Hatches, Corrosion, Cracks, Leaking	2	15%	
Piping and Valves	3	10%	
Mechanical - HVAC, Flow Meters, Actuator	3	10%	old
Site - Drainage, Access Drive/Paving, Gates and Fencing, Security, Fire Suppression	3	10%	fencing
Condition Rating	-	100%	

Additional Notes:

West Lake Pump Station

Inspection Date: **Inspector:**

Facility Information	
Address:	801 West Lake Drive
Year in Service:	
Type of Facility:	
Number of Pumps:	3
Design Point:	710 gpm @ 240' TDH; 740 gpm @ 355' TDH; 400 gpm @ 350' TDH
Horsepower:	75 (2) and 40 (1) RPM: 3,600
Disinfection:	
Electrical Service:	480 V, 3 PH, _____-Wire
Utility Transformer:	225 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antennae / (Fiber)) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required



CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	20%	
Electrical – MCC, motor starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Antenna, Radio, Fiber Communications	3	15%	
Structure - Foundation, Walls, Roof, Hatches, Corrosion, Cracks, Leaking	1	15%	
Piping and Valves	1	10%	
Mechanical - HVAC, Flow Meters, Actuator	3	10%	A/C not to code
Site - Drainage, Access Drive/Paving, Gates and Fencing, Security, Fire Suppression	1	10%	
Condition Rating	-	100%	

Additional Notes:

High Service Pump Station

Inspection Date: **Inspector:**

Facility Information	
Address:	118 West Lake Drive
Year in Service:	
Type of Facility:	
Number of Pumps:	
Design Point:	
Horsepower:	RPM:
Disinfection:	
Electrical Service:	480 V, 3 PH, _____-Wire
Utility Transformer:	2500 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antennae / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required



CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	3	20%	
Electrical – MCC, motor starters/VFD, Panelboards, Grounding, Back-up Power, Cables	5	20%	
Instrumentation and Controls - SCADA Cabinet, Antenna, Radio, Fiber Communications	3	15%	
Structure - Foundation, Walls, Roof, Hatches, Corrosion, Cracks, Leaking	1	15%	
Piping and Valves	3	10%	
Mechanical - HVAC, Flow Meters, Actuator	~~3~~ 4	10%	
Site - Drainage, Access Drive/Paving, Gates and Fencing, Security, Fire Suppression	1	10%	
Condition Rating	-	100%	

Additional Notes:

College Hill Pump Station

Inspection Date: **Inspector:**

Facility Information	
Address:	400 East Park Avenue
Year in Service:	
Type of Facility:	
Number of Pumps:	3
Design Point:	2,610 gpm @ 90' TDH
Horsepower:	75 RPM: 1,780
Disinfection:	
Electrical Service:	480 V, 3 PH, ____-Wire
Utility Transformer:	150 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antennae / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas ____ KW, ____ V, ____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	20%	
Electrical – MCC, motor starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Antenna, Radio, Fiber Communications	2	15%	
Structure - Foundation, Walls, Roof, Hatches, Corrosion, Cracks, Leaking	2	15%	
Piping and Valves	1	10%	
Mechanical - HVAC, Flow Meters, Actuator	4	10%	No Hvac
Site - Drainage, Access Drive/Paving, Gates and Fencing, Security, Fire Suppression	2	10%	
Condition Rating	-	100%	

Additional Notes:

Raw Water Pump Station

Inspection Date: **Inspector:**

Facility Information	
Address:	401 East Lake Drive
Year in Service:	
Type of Facility:	
Number of Pumps:	4
Design Point:	2,800 gpm @ 131' TDH
Horsepower:	125 RPM: 1,780
Disinfection:	
Electrical Service:	480 V, 3 PH, 350-Wire
Utility Transformer:	501 KVA; Pad / (Pole Mounted)
Monitoring:	None / SCADA (Antennae / (Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	20%	
Electrical – MCC, motor starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Antenna, Radio, Fiber Communications	2	15%	
Structure - Foundation, Walls, Roof, Hatches, Corrosion, Cracks, Leaking	5	15%	
Piping and Valves	3	10%	
Mechanical - HVAC, Flow Meters, Actuator	4	10%	not to code
Site - Drainage, Access Drive/Paving, Gates and Fencing, Security, Fire Suppression	2	10%	
Condition Rating	-	100%	

Additional Notes:

Benbrook Pump Station

WEATHERFORD TRUE TEXAS 1858

FREESE AND NICHOLS

Inspection Date: **Inspector:**

Facility Information	
Address:	7777 Lakeside Drive
Year in Service:	
Type of Facility:	
Number of Pumps:	4
Design Point:	2,700 gpm @ 330' TDH (2) and 3,500 gpm @ 370' TDH (2)
Horsepower:	450 RPM: 1,800
Disinfection:	
Electrical Service:	4160 V, 3 PH, _____-Wire
Utility Transformer:	1500 KVA, (Pad) / Pole Mounted
Monitoring:	None / SCADA (Antennae / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	20%	
Electrical – MCC, motor starters/VFD, Panelboards, Grounding, Back-up Power, Cables	3	20%	upgrade needed
Instrumentation and Controls - SCADA Cabinet, Antenna, Radio, Fiber Communications	3	15%	We lose Comm frequently
Structure - Foundation, Walls, Roof, Hatches, Corrosion, Cracks, Leaking	2	15%	
Piping and Valves	2	10%	
Mechanical - HVAC, Flow Meters, Actuator	3	10%	No A/C 2 of 4 vent fans not working
Site - Drainage, Access Drive/Paving, Gates and Fencing, Security, Fire Suppression	2	10%	access belongs to Corps of Engineers
Condition Rating	-	100%	

Additional Notes:

Appendix G
Water Distribution System CIP Opinion of Probable Construction Cost

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 1	**Phase: 5-Year**
Project Name:	**Center Point Road 12-inch Water Line Extension**

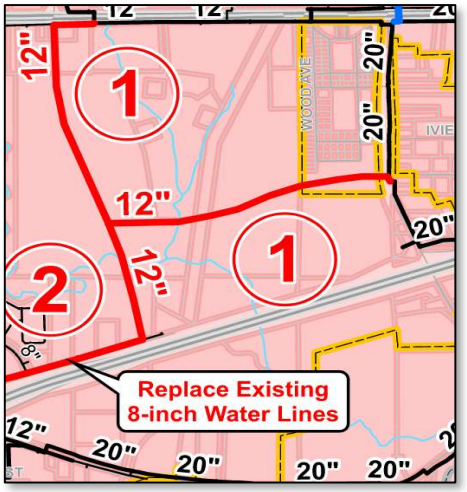
Project Description:

This project consists of the construction of a 12-inch water line from the existing 20-inch line along Center Point Road, looping back to the existing 12-inch line along Fort Worth Highway.

Project Drivers:

This project extends water service to proposed developments that are projected in the five-year planning period.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	6,300	LF	$ 300	$ 1,890,000
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 1,900,000**
		CONTINGENCY		30%	$ 570,000
				SUBTOTAL:	**$ 2,470,000**
		ENG/SURVEY		15%	$ 370,500
				SUBTOTAL:	**$ 2,840,500**
				Estimated Project Total:	**$ 2,840,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 2	**Phase: 5-Year**
Project Name:	**I-20 West 12-inch Water Line Replacement and Extension**

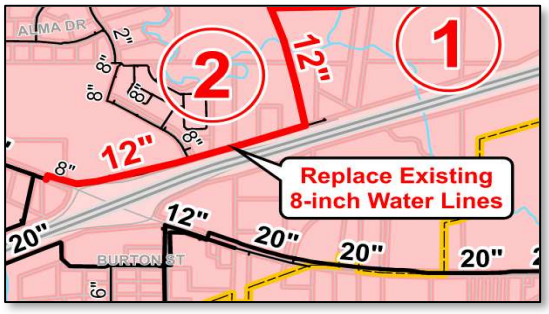
Project Description:

This project consists of the construction of a 12-inch water line replacing the existing 8-inch line along I-20, beginning at the existing 12-inch line along East Bankhead Drive. This project also consists of extending a 12-inch line to the proposed 12-inch line from Project #1.

Project Drivers:

This project extends water service to proposed developments that are projected in the five-year planning period.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	4,550	LF	$ 300	$ 1,365,000
2	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
				SUBTOTAL:	**$ 1,370,000**
				CONTINGENCY 30%	$ 411,000
				SUBTOTAL:	**$ 1,781,000**
				ENG/SURVEY 15%	$ 267,200
				SUBTOTAL:	**$ 2,048,200**
				Estimated Project Total:	**$ 2,048,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 3	**Phase: 5-Year**
Project Name:	**Ric Williamson South Loop 12-inch Water Line Extension Phase 1**

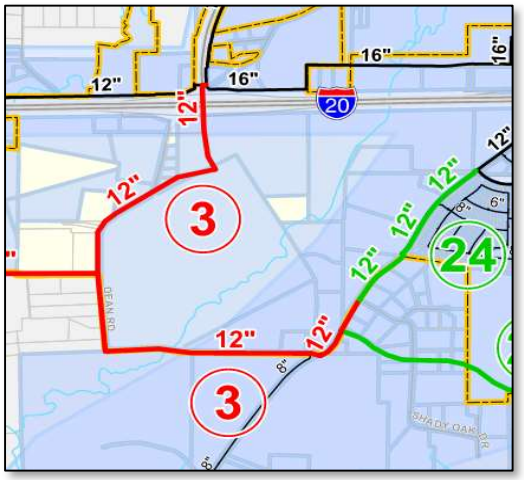
Project Description:

This project consists of the construction of a 12-inch water line extending south along the future Ric Williamson South Loop from the existing 16-inch line at the intersection of I-20 and Ric Williamson Memorial Highway. The line turns west to run along Old Brock Road and Dean Road to the existing 8-inch line along Old Dennis Road.

Project Drivers:

This project extends water service to proposed developments that are projected in the five-year planning period. This project also improves transmission capacity to the southwestern portion of the Dubellette Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	10,050	LF	$ 300	$ 3,015,000
2	12" Boring and Casing	460	LF	$ 600	$ 276,000
3	Concrete Pavement Repair	950	LF	$ 100	$ 95,000
				SUBTOTAL:	**$ 3,386,000**
		CONTINGENCY		30%	$ 1,015,800
				SUBTOTAL:	**$ 4,401,800**
		ENG/SURVEY		15%	$ 660,300
				SUBTOTAL:	**$ 5,062,100**
				Estimated Project Total:	**$ 5,062,100**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**4**	**Phase: 5-Year**
Project Name:	**Old Brock Road 12-inch Water Line Extension**	

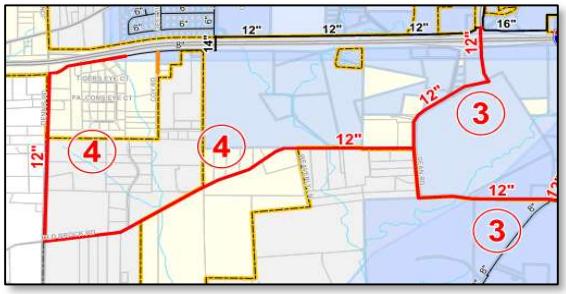
Project Description:

This project consists of the construction of a 12-inch water line along Old Brock Road, Dennis Road, and the I-20 Frontage Road from Project #3 to the existing 14-inch line that crosses I-20 from Roark Lane.

Project Drivers:

This project extends water service to proposed developments that are projected in the five-year planning period. This project also improves transmission capacity to the southwestern portion of the Dubellette Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	15,860	LF	$ 300	$ 4,758,000
2	Concrete Pavement Repair	375	LF	$ 100	$ 37,500
				SUBTOTAL:	**$ 4,795,500**
		CONTINGENCY		30%	$ 1,438,700
				SUBTOTAL:	**$ 6,234,200**
		ENG/SURVEY		15%	$ 935,200
				SUBTOTAL:	**$ 7,169,400**
				Estimated Project Total:	**$ 7,169,400**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**5**	**Phase: 5-Year**
Project Name:	**LaSalle 12/16-inch Water Line Extension Phase 1**	

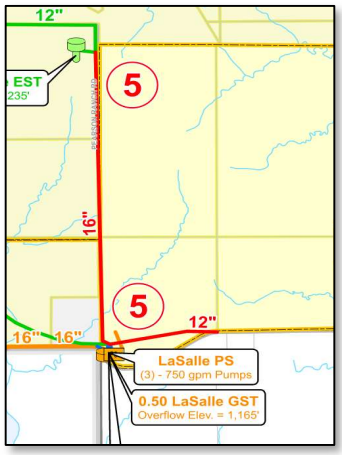
Project Description:

This project consists of the construction of a 16-inch water line along Pearson Ranch Road from the LaSalle Pump Station to the northern extents of the LaSalle Development. This project also consists of extending a 12-inch water line to loop around the LaSalle Development.

Project Drivers:

This project extends water service to proposed developments that are projected in the five-year planning period, and will establish the LaSalle Pressure Plane distribution system.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" WL & Appurtenances	7,750	LF	$ 400	$ 3,100,000
2	12" WL & Appurtenances	2,800	LF	$ 300	$ 840,000
3	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
				SUBTOTAL:	**$ 3,945,000**
		CONTINGENCY		30%	$ 1,183,500
				SUBTOTAL:	**$ 5,128,500**
		ENG/SURVEY		15%	$ 769,300
				SUBTOTAL:	**$ 5,897,800**
				Estimated Project Total:	**$ 5,897,800**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 6	**Phase: 5-Year**
Project Name:	**7th Street/Franklin Street 12-inch Water Line Replacement**

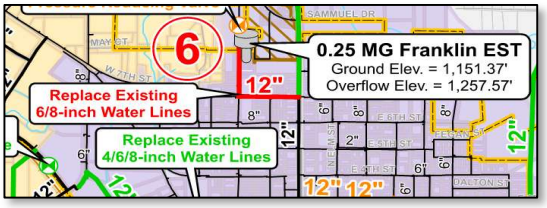
Project Description:

This project consists of the construction of a 12-inch water line replacing the existing 6/8-inch water lines along Franklin Street and 7th Street from the Franklin Elevated Storage Tank to the existing 12-inch line along Main Street.

Project Drivers:

This project improves transmission capacity and reduces existing hydraulic restrictions from the Harberger Pump Station to the Franklin Elevated Storage Tank.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	1,890	LF	$ 300	$ 567,000
				SUBTOTAL:	**$ 567,000**
		CONTINGENCY		30%	$ 170,100
				SUBTOTAL:	**$ 737,100**
		ENG/SURVEY		15%	$ 110,600
				SUBTOTAL:	**$ 847,700**
				Estimated Project Total:	**$ 847,700**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**7**	**Phase: 5-Year**
Project Name:	**Ric Williamson Northwest 12-inch Water Line Extension**	

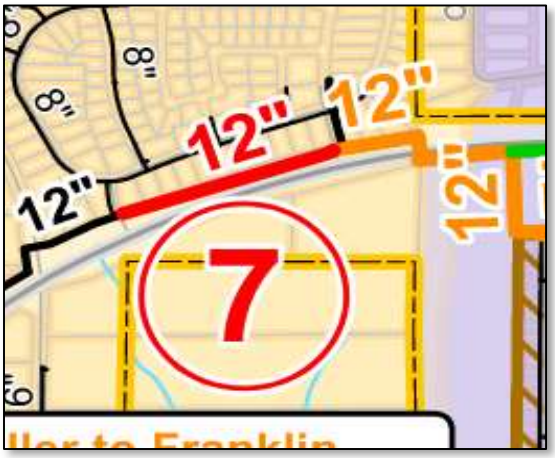
Project Description:

This project consists of the construction of a 12-inch water line along Ric Williamson Memorial Highway from the existing 12-inch water line at the intersection of Ric Williamson Memorial Highway and Berkley Drive to the under-design/construction 12-inch line at the intersection of Ric Williamson Memorial Highway and Dartmouth Drive.

Project Drivers:

This project improves transmission capacity and reduces existing hydraulic restrictions to the northern portion of the Miller Pressure Plane, and it is associated with transferring the existing residential development west of North Main Street from the Franklin Pressure Plane to the Miller Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	1,250	LF	$ 300	$ 375,000
				SUBTOTAL:	**$ 375,000**
		CONTINGENCY		30%	$ 112,500
				SUBTOTAL:	**$ 487,500**
		ENG/SURVEY		15%	$ 73,200
				SUBTOTAL:	**$ 560,700**
				Estimated Project Total:	**$ 560,700**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**8**	**Phase: 5-Year**
Project Name:	**Harberger Pump Station Expansion**	

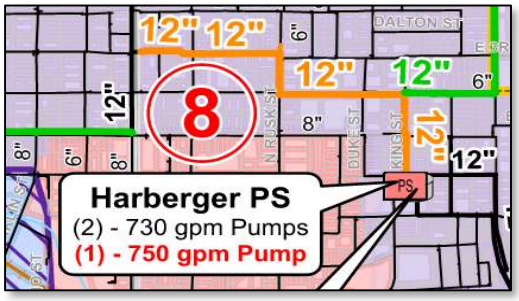
Project Description:

This project consists of expanding the Harberger Pump Station with one 750 gpm pump.

Project Drivers:

This project increases the firm pumping capacity of the Harberger Pump Station to meet the TCEQ 0.64 gpm/connection alternative pumping capacity requirement for the Franklin Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station - 1.08 MGD Expansion	1	LS	$ 864,000	$ 864,000
				SUBTOTAL:	**$ 864,000**
		CONTINGENCY		30%	$ 259,200
				SUBTOTAL:	**$ 1,123,200**
		ENG/SURVEY		15%	$ 168,500
				SUBTOTAL:	**$ 1,291,700**
				Estimated Project Total:	**$ 1,291,700**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**9**	**Phase: 5-Year**
Project Name:	**Ric Williamson North Loop 24-inch Water Line Extension Phase 1**	

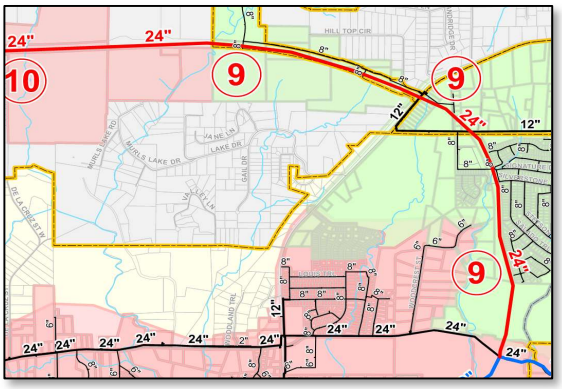
Project Description:

This project consists of the construction of a 24-inch water line along the Ric Williamson Memorial Highway North Loop from the existing 24-inch line along Meadowview Road to approximately 15,000 feet west.

Project Drivers:

This project will help establish the City's third major transmission main to convey water to the western portion of the Central Pressure Plane. The north loop transmission main improves transmission capacity from the City's Water Purification Plant and provides overall system resiliency.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" WL & Appurtenances	15,100	LF	$ 600	$ 9,060,000
2	24" Boring and Casing	300	LF	$ 1,200	$ 360,000
3	Concrete Pavement Repair	150	LF	$ 100	$ 15,000
				SUBTOTAL:	**$ 9,435,000**
		CONTINGENCY		30%	$ 2,830,500
				SUBTOTAL:	**$ 12,265,500**
		ENG/SURVEY		15%	$ 1,839,900
				SUBTOTAL:	**$ 14,105,400**
				Estimated Project Total:	**$ 14,105,400**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 10	**Phase: 5-Year**
Project Name:	**Ric Williamson North Loop 24-inch Water Line Extension Phase 2**

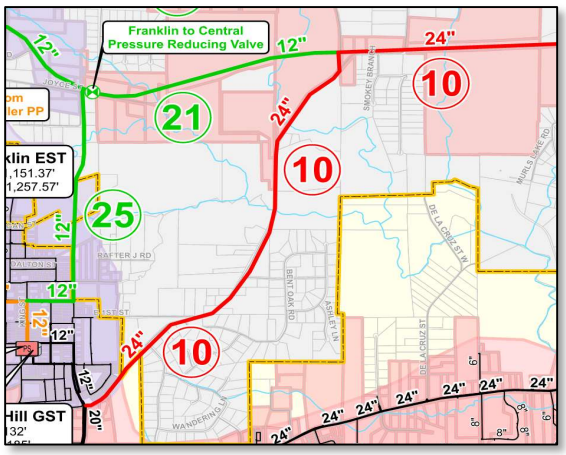
Project Description:

This project consists of the construction of a 24-inch water line along the Ric Williamson Memorial Highway North Loop and Upper Denton Road from the existing 20-inch water line at the intersection of Front Street and Tremont Street to the proposed 24-inch line from Project #9.

Project Drivers:

This project will help establish the City's third major transmission main to convey water to the western portion of the Central Pressure Plane. The north loop transmission main improves transmission capacity from the City's Water Purification Plant and provides overall system resiliency.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" WL & Appurtenances	10,250	LF	$ 600	$ 6,150,000
2	Concrete Pavement Repair	300	LF	$ 100	$ 30,000
				SUBTOTAL:	**$ 6,180,000**
		CONTINGENCY		30%	$ 1,854,000
				SUBTOTAL:	**$ 8,034,000**
		ENG/SURVEY		15%	$ 1,205,100
				SUBTOTAL:	**$ 9,239,100**
				Estimated Project Total:	**$ 9,239,100**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**11**	**Phase: 10-Year**
Project Name:	**Suzanne Trail 24-inch Water Line Extension**	

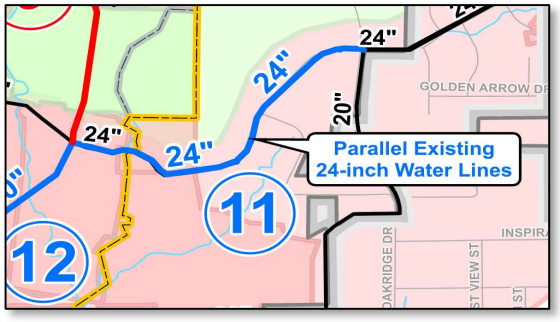
Project Description:

This project consists of the construction of a 24-inch line paralleling the existing 24-inch line along Suzanne Trail from the intersection of Suzanne Trail and North Oakridge Drive to the proposed 24-inch line from Project #9.

Project Drivers:

This project will help establish the City's third major transmission main to convey water to the western portion of the Central Pressure Plane. This project reduces the existing hydraulic restriction from the existing 36-inch line from the Water Purification Plant to the Ric Williamson Memorial Highway.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" WL & Appurtenances	4,750	LF	$ 600	$ 2,850,000
2	Concrete Pavement Repair	1,200	LF	$ 100	$ 120,000
				SUBTOTAL:	**$ 2,970,000**
		CONTINGENCY		30%	$ 891,000
				SUBTOTAL:	**$ 3,861,000**
		ENG/SURVEY		15%	$ 579,200
				SUBTOTAL:	**$ 4,440,200**
				Estimated Project Total:	**$ 4,440,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 12	**Phase: 10-Year**
Project Name:	**Ric Williamson North Loop 20-inch Water Line Extension**

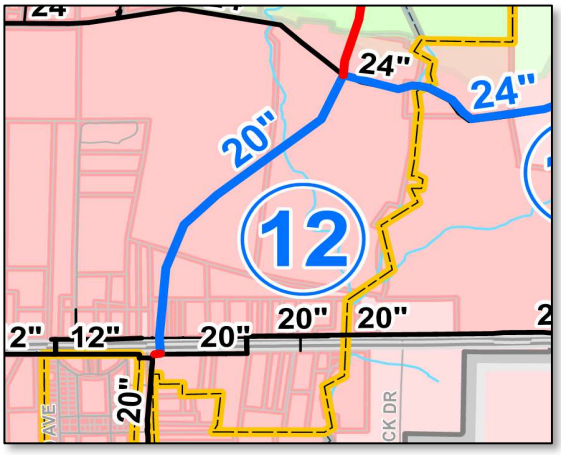
Project Description:

This project consists of the construction of a 20-inch water line along Ric Williamson Memorial Highway from the existing 20-inch line at the intersection of the Ric Williamson Memorial Highway and Fort Worth Highway to the proposed 24-inch line from Project #9.

Project Drivers:

This project will help establish the City's third major transmission main to convey water to the western portion of the Central Pressure Plane. This project reduces the existing hydraulic restriction from the existing 36-inch line from the Water Purification Plant to the Ric Williamson Memorial Highway.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	20" WL & Appurtenances	3,650	LF	$ 500	$ 1,825,000
2	20" Boring and Casing	150	LF	$ 1,000	$ 150,000
				SUBTOTAL:	**$ 1,975,000**
			CONTINGENCY	30%	$ 592,500
				SUBTOTAL:	**$ 2,567,500**
			ENG/SURVEY	15%	$ 385,200
				SUBTOTAL:	**$ 2,952,700**
				Estimated Project Total:	**$ 2,952,700**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 13 — **Phase:** 10-Year

Project Name: 0.50 MG Patriot EST and 12-inch Water Line Extension

Project Description:

This project consists of the construction of a 0.50 MG Elevated Storage Tank on Patriot Drive in the Dubellette Pressure Plane. This project also consists of a 12-inch water line from the under-design/construction 12-inch line along Tin Top Road to the existing 12-inch line along Bethel Road.

Project Drivers:

This project increases the elevated storage capacity of the Dubellette Pressure Plane to meet the TCEQ 100 gallons/connection requirement. This water line will also extend water service to proposed developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	5,700	LF	$ 300	$ 1,710,000
2	0.5 MG Elevated Storage Tank	1	LS	$ 5,000,000	$ 5,000,000
3	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
				SUBTOTAL:	**$ 6,715,000**
		CONTINGENCY		30%	$ 2,014,500
				SUBTOTAL:	**$ 8,729,500**
		ENG/SURVEY		15%	$ 1,309,500
				SUBTOTAL:	**$ 10,039,000**
				Estimated Project Total:	**$ 10,039,000**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**14**	**Phase: 10-Year**
Project Name:	**College Park Drive 24-inch Water Line Replacement**	

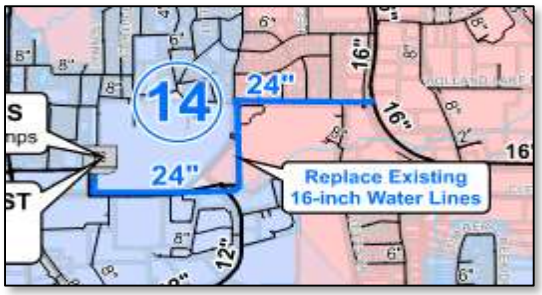
Project Description:

This project consists of the construction of a 24-inch water line replacing the existing 16-inch line from the College Hill Pump Station along College Park Drive to the existing 16-inch line along Santa Fe Drive.

Project Drivers:

This project will reduce existing hydraulic restrictions from the Central Pressure Plane to the College Hill Pump Station.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" WL & Appurtenances	5,500	LF	$ 600	$ 3,300,000
2	Concrete Pavement Repair	450	LF	$ 100	$ 45,000
				SUBTOTAL:	**$ 3,345,000**
				CONTINGENCY 30%	$ 1,003,500
				SUBTOTAL:	**$ 4,348,500**
				ENG/SURVEY 15%	$ 652,300
				SUBTOTAL:	**$ 5,000,800**
				Estimated Project Total:	**$ 5,000,800**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**15**	**Phase: 10-Year**
Project Name:	**Santa Fe Drive 12-inch Water Line Extension**	

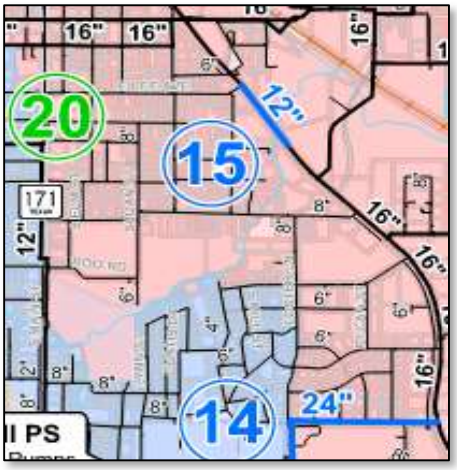
Project Description:

The project consists of the construction of a 12-inch water line along Santa Fe Drive from East Lee Avenue to the Holland Lake Trail, tying into existing 12-inch lines at both ends.

Project Drivers:

This project will loop two of the City's major transmission mains, improving system resiliency and reducing existing hydraulic restrictions in the Central Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	980	LF	$ 300	$ 294,000
2	Concrete Pavement Repair	980	LF	$ 100	$ 98,000
				SUBTOTAL:	**$ 392,000**
		CONTINGENCY		30%	$ 117,600
				SUBTOTAL:	**$ 509,600**
		ENG/SURVEY		15%	$ 76,500
				SUBTOTAL:	**$ 586,100**
				Estimated Project Total:	**$ 586,100**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**16**	**Phase: 10-Year**
Project Name:	**Clear Lake Road 16-inch Water Line Extension**	

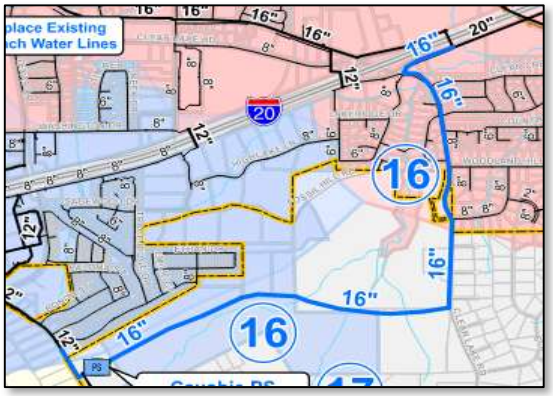
Project Description:

This project consists of the construction of a 16-inch water line from Causbie Road east to Clear Lake Road and then north to the existing 20-inch line along I-20.

Project Drivers:

This project will extend the Central Pressure Plane distribution system to the proposed Causbie Pump Station and Ground Storage Tank.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" WL & Appurtenances	13,700	LF	$ 400	$ 5,480,000
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 5,490,000**
		CONTINGENCY		30%	$ 1,647,000
				SUBTOTAL:	**$ 7,137,000**
		ENG/SURVEY		15%	$ 1,070,600
				SUBTOTAL:	**$ 8,207,600**
				Estimated Project Total:	**$ 8,207,600**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**17**	**Phase: 10-Year**
Project Name:	**Causbie Pump Station and 1.00 MG GST**	

Project Description:

This project consists of the construction of a 1.00 MG Ground Storage Tank and 2,800 gpm Pump Station along Causbie Road.

Project Drivers:

This project increases the firm pumping capacity to the Dubellette Pressure Plane to meet the TCEQ 0.64 gpm/connection alternative pumping capacity requirement. This project also provides additional water supply to the Dubellette Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station - New 4.00 MGD	1	PS	$ 7,000,000	$ 7,000,000
2	1.0 MG Ground Storage Tank	1	LS	$ 1,500,000	$ 1,500,000
				SUBTOTAL:	**$ 8,500,000**
		CONTINGENCY		30%	$ 2,550,000
				SUBTOTAL:	**$ 11,050,000**
		ENG/SURVEY		15%	$ 1,657,500
				SUBTOTAL:	**$ 12,707,500**
				Estimated Project Total:	**$ 12,707,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**18**	**Phase: 25-Year**
Project Name:	**High Service Pump Station #2 and Water Purification Plant Expansions**	

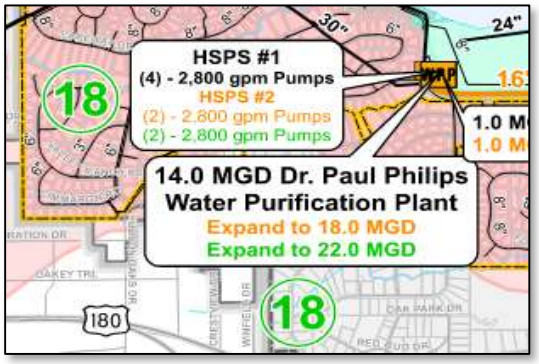
Project Description:

This project consists of adding two 2,800 gpm pumps to the High Service Pump Station #2 and a 4.00 MGD expansion of the Dr. Paul Philips Water Purification Plant.

Project Drivers:

This project increases the firm pumping capacity of the High Service Pump Station #2 to meet the TCEQ 0.64 gpm/connection alternative pumping capacity requirement. This project also increases the water purification plant capacity to meet the TCEQ 0.47 gpm/connection alternative treatment capacity requirement.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	4.0 MGD WPP Expansion	1	WPP	$ 10,000,000	$ 10,000,000
2	4.0 MGD Pump	2	EA	$ 2,000,000	$ 4,000,000
				SUBTOTAL:	**$ 14,000,000**
				CONTINGENCY 30%	$ 4,200,000
				SUBTOTAL:	**$ 18,200,000**
				ENG/SURVEY 15%	$ 2,730,000
				SUBTOTAL:	**$ 20,930,000**
				Estimated Project Total:	**$ 20,930,000**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 19 — **Phase:** 25-Year

Project Name: 1st Street 12-inch Water Line Replacement

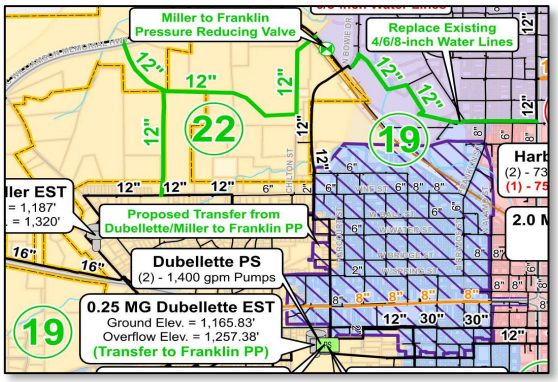
Project Description:

This project consists of the construction of a 12-inch water line replacing the existing 4/6/8-inch lines along 1st Street from the intersection of 1st Street and Main Street to the existing 12-inch line along Bowie Drive.

Project Drivers:

This project will enable the City to transfer the northern portion of the Dubellette Pressure Plane to the Franklin Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	4,700	LF	$ 300	$ 1,410,000
2	Concrete Pavement Repair	1,000	LF	$ 100	$ 100,000
				SUBTOTAL:	**$ 1,510,000**
		CONTINGENCY		30%	$ 453,000
				SUBTOTAL:	**$ 1,963,000**
		ENG/SURVEY		15%	$ 294,500
				SUBTOTAL:	**$ 2,257,500**
				Estimated Project Total:	**$ 2,257,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 20 — **Phase:** 25-Year

Project Name: New Dubellette Pump Station

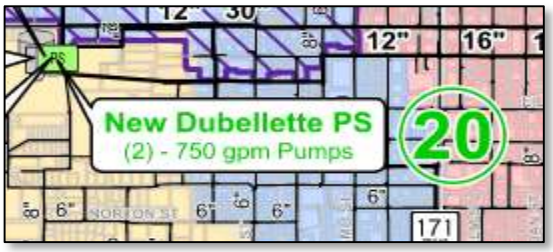
Project Description:

This project consists of the construction of a new pump station with two 750 gpm pumps near the Dubellette Ground Storage and Elevated Storage Tanks.

Project Drivers:

This project will enable the Dubellette Elevated Storage Tank to serve the Franklin Pressure Plane after it is transferred from the Dubellette Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Pump Station - New 2.16 MGD	1	PS	$ 3,780,000	$ 3,780,000
				SUBTOTAL:	**$ 3,780,000**
		CONTINGENCY		30%	$ 1,134,000
				SUBTOTAL:	**$ 4,914,000**
		ENG/SURVEY		15%	$ 737,100
				SUBTOTAL:	**$ 5,651,100**
				Estimated Project Total:	**$ 5,651,100**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 21	**Phase: 25-Year**
Project Name:	**Ric Williamson North Loop 12-inch Water Line Extension Phase 1**

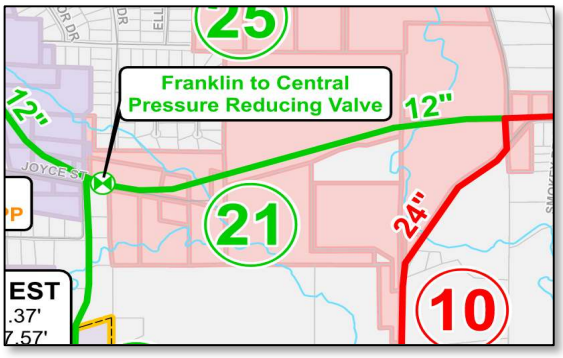
Project Description:

This project consists of the construction of a 12-inch water line along the Ric Williamson Memorial Highway from the intersection of Ric Williamson Memorial Highway and Tanglewood Street to the proposed 24-inch line from Project #10.

Project Drivers:

This project extends water service to proposed developments along the Ric Williamson Memorial Highway in the Central Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	5,400	LF	$ 300	$ 1,620,000
2	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 1,630,000**
		CONTINGENCY		30%	$ 489,000
				SUBTOTAL:	**$ 2,119,000**
		ENG/SURVEY		15%	$ 317,900
				SUBTOTAL:	**$ 2,436,900**
				Estimated Project Total:	**$ 2,436,900**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 22	**Phase: 25-Year**
Project Name:	**Northwest Miller Pressure Plane 12-inch Water Line Extensions**

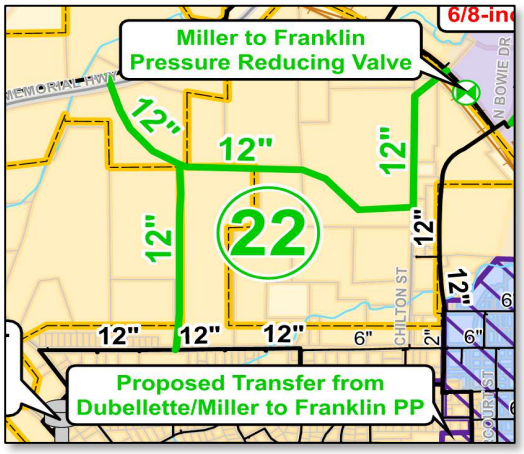
Project Description:

This project consists of the construction of 12-inch water lines looping through the northwest portion of the Miller Pressure Plane connecting to the existing 12-inch lines along Ric Williamson Memorial Highway, Vine Street, and the Union Pacific Railroad.

Project Drivers:

This project will extend water service to proposed developments in the Miller Pressure Plane and improve transmission capacity to the northern portion of the Miller Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	8,500	LF	$ 300	$ 2,550,000
2	12" Boring and Casing	100	LF	$ 600	$ 60,000
3	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
				SUBTOTAL:	**$ 2,615,000**
		CONTINGENCY		30%	$ 784,500
				SUBTOTAL:	**$ 3,399,500**
		ENG/SURVEY		15%	$ 510,000
				SUBTOTAL:	**$ 3,909,500**
				Estimated Project Total:	**$ 3,909,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**23**	**Phase: 25-Year**
Project Name:	**Ric Williamson South Loop 12-inch Water Line Extension Phase 2**	

Project Description:

This project consists of the construction of a 12-inch water line extending from the proposed 12-inch line along Old Dennis Road from Project #3 to the proposed 12-inch line along Bethel Road from Project #13.

Project Drivers:

This project will extend water service to proposed developments in the Dubellette Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	6,650	LF	$ 300	$ 1,995,000
2	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
				SUBTOTAL:	**$ 2,000,000**
		CONTINGENCY		30%	$ 600,000
				SUBTOTAL:	**$ 2,600,000**
		ENG/SURVEY		15%	$ 390,000
				SUBTOTAL:	**$ 2,990,000**
				Estimated Project Total:	**$ 2,990,000**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 24	**Phase: 25-Year**
Project Name:	**Old Dennis Road 12-inch Water Line Replacement**

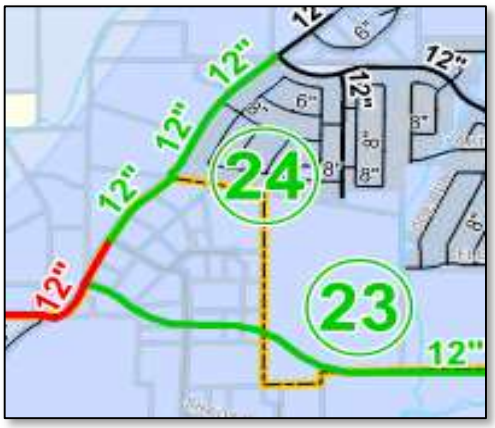
Project Description:

This project consists of the construction of a 12-inch water line replacing the 6/8-inch lines along Old Dennis Road from BB Fielder Drive to the proposed 12-inch line from Project #3.

Project Drivers:

This project will reduce hydraulic restrictions in the Dubellette Pressure Plane to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	2,900	LF	$ 300	$ 870,000
2	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
				SUBTOTAL:	**$ 875,000**
		CONTINGENCY		30%	$ 262,500
				SUBTOTAL:	**$ 1,137,500**
		ENG/SURVEY		15%	$ 170,700
				SUBTOTAL:	**$ 1,308,200**
				Estimated Project Total:	**$ 1,308,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 25	**Phase: 25-Year**
Project Name:	**Ric Williamson North Loop 12-inch Water Line Replacement and Extension Phase 2**

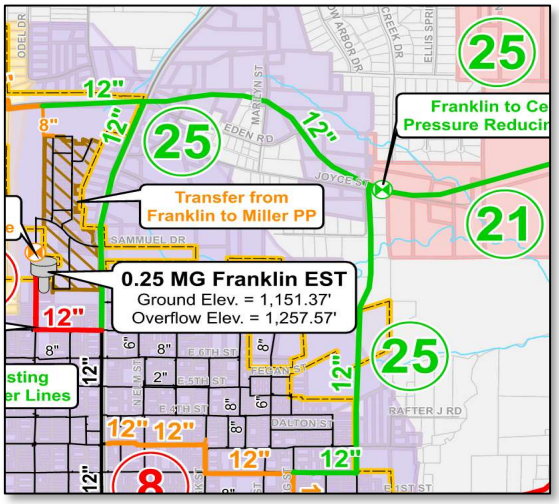
Project Description:

This project consists of constructing a 12-inch water line along Ric Williamson Memorial Highway from the under design/under construction 12-inch line to the proposed 12-inch line from Project #21. This project also consists of a 12-inch water line along Main Street to the existing 12-inch line at the intersection of 7th Street and Main Street, as well as a 12-inch water line looping back to the under-design/construction 12-inch line at the intersection of 2nd Street and King Street.

Project Drivers:

This project will extend the Miller Pressure Plane distribution system.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" WL & Appurtenances	13,400	LF	$ 300	$ 4,020,000
2	Pressure Reducing Valve	1	LS	$ 10,000	$ 10,000
3	Concrete Pavement Repair	1,000	LF	$ 100	$ 100,000
				SUBTOTAL:	**$ 4,130,000**
		CONTINGENCY		30%	$ 1,239,000
				SUBTOTAL:	**$ 5,369,000**
		ENG/SURVEY		15%	$ 805,400
				SUBTOTAL:	**$ 6,174,400**
				Estimated Project Total:	**$ 6,174,400**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 26	**Phase: 25-Year**
Project Name:	**0.50 MG LaSalle EST and Hydropneumatic Tank Decommission**

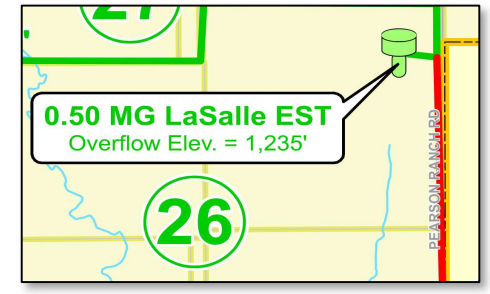
Project Description:

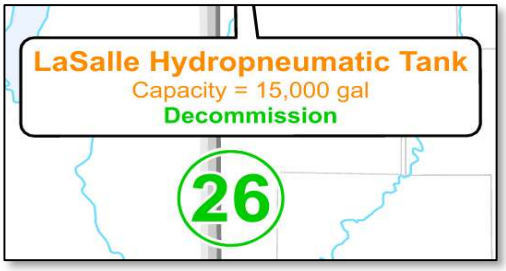
This project consists of the construction of a 0.50 MG Elevated Storage Tank along Pearson Ranch Road. This project also consists of decommissioning the LaSalle Hydropneumatic Tank along the southern extents of the LaSalle Development.

Project Drivers:

This project increases the elevated storage capacity of the LaSalle Pressure Plane to meet the TCEQ 100 gallons/connection requirement.

Vicinity Map





Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	0.5 MG Elevated Storage Tank	1	LS	$ 5,000,000	$ 5,000,000
2	Decommission Hydropneumatic Tank	1	LS	$ 250,000	$ 250,000
				SUBTOTAL:	**$ 5,250,000**
		CONTINGENCY		30%	$ 1,575,000
				SUBTOTAL:	**$ 6,825,000**
		ENG/SURVEY		15%	$ 1,023,800
				SUBTOTAL:	**$ 7,848,800**
				Estimated Project Total:	**$ 7,848,800**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 27	**Phase: 25-Year**
Project Name:	**LaSalle 12/16-inch Water Line Extension Phase 2**

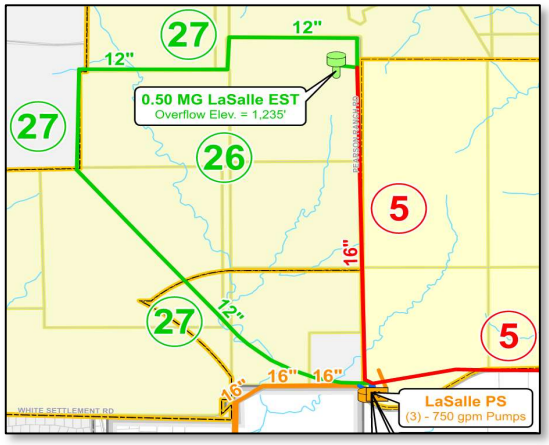
Project Description:

This project consists of the construction of a 12-inch water line from the LaSalle Pump Station and loops around the western extents of the LaSalle Pressure Plane to the proposed 12-inch water line from Project #5, and then a 16-inch water line to the proposed LaSalle Elevated Storage Tank from Project #26.

Project Drivers:

This project extends water service to proposed developments that are projected in the LaSalle Pressure Plane.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" WL & Appurtenances	450	LF	$ 400	$ 180,000
2	12" WL & Appurtenances	17,650	LF	$ 300	$ 5,295,000
				SUBTOTAL:	**$ 5,475,000**
		CONTINGENCY		30%	$ 1,642,500
				SUBTOTAL:	**$ 7,117,500**
		ENG/SURVEY		15%	$ 1,067,700
				SUBTOTAL:	**$ 8,185,200**
				Estimated Project Total:	**$ 8,185,200**

Comments:

Appendix H
Flow Monitoring Data and ADS Flow Monitoring Report

Flow Monitoring Report
Weatherford, TX

Freese and Nichols, Inc.
August 23, 2024



ADS ENVIRONMENTAL SERVICES

Temporary Flow Monitoring Study

Weatherford, TX

Prepared For:

Freese and Nichols, Inc.
2711 North Haskell Avenue, Suite 3300
Dallas, TX 75204

Prepared By:

ADS, LLC
340 The Bridge Street, Suite 204
Huntsville, AL 35806

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Introduction

ADS Environmental Services (ADS) was retained by the Freese and Nichols, Inc. (FNI) to gather and evaluate flow monitor and rainfall monitor data within portions of its existing sanitary sewer system in Weatherford, TX. The scope of this study is to characterize dry weather and wet weather flow conditions within areas within the existing sewer system to evaluate key performance indicators, and rank the relative severity of groundwater infiltration (GWI) and rainfall dependent infiltration and inflow (RDII) to assist FNI to direct subsequent planning, condition assessment, and rehabilitation activities.

Methodology

Dry weather and wet weather performance data were obtained within the study area by installing sewer flow monitors to observe and document existing flow conditions. A total of 12 flow monitors and two rainfall monitors were evaluated for a total of 99 days. Descriptions of the monitor basins, equipment, study period, and data format are detailed in the following sections.

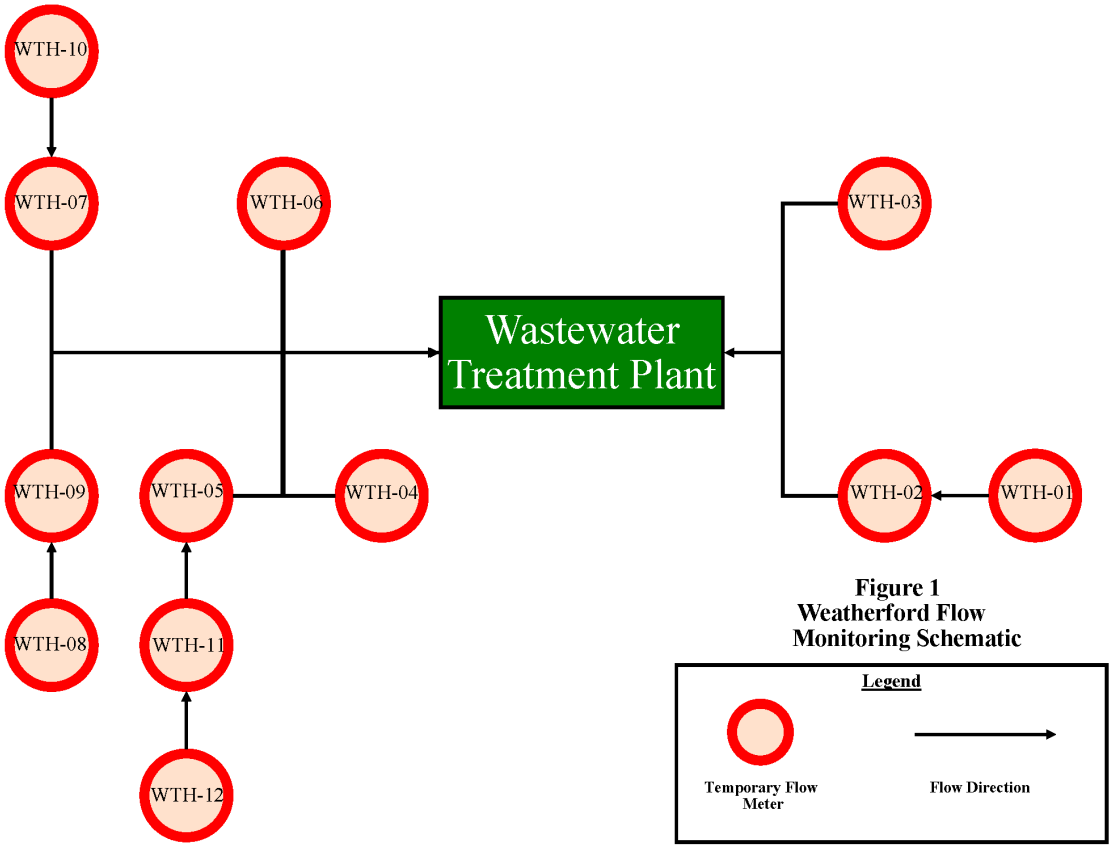
Flow Monitor and Rain Gauge Locations

Basins for this study were selected by FNI and ADS as a collaborative effort. Preliminary monitor locations for each basin were selected using Geographic Information System (GIS) mapping available from the City of Weatherford and FNI. Final locations were selected based on observed flow conditions, site access, and site safety considerations. Descriptions of each sewer basin and its associated flow monitor are provided in Table 1 . The manhole depth is measured from the rim of the manhole to the invert and Basin Size represents the net linear footage of each basin. A general schematic provided by FNI showing the upstream and downstream relationship between each flow monitor is provided in Figure 1.

TABLE 1: Flow Monitor Locations

Monitor	Diameter (inches)	MH Depth (inches)	Basin Size (LF)
WTH-01	12.25	100	107,957
WTH-02	17.50	78	27,090
WTH-03	17.75	180	46,528
WTH-04	16.50	117	63,934
WTH-04M	14.50	102	63,934
WTH-05	24.00	137	108,607
WTH-06	12.00	77	31,446
WTH-07	17.62	96	116,726
WTH-08	11.75	109	111,456
WTH-09	14.38	117	50,596
WTH-10	12.00	84	117,315
WTH-11	11.00	228	31,430
WTH-12	12.00	144	92,577

FIGURE 1: Flow Monitor Schematic



Flow Monitor Equipment

Sewer flow monitoring was performed using TRITON+® area-velocity flow monitors manufactured, installed, and maintained by ADS. Each flow monitor is mounted near the top of a manhole and is connected to flow depth and velocity sensors positioned in an incoming sewer. Each flow monitor is equipped with an ultrasonic depth sensor, a velocity sensor, and a pressure depth sensor.

Rainfall Monitor Equipment

Rainfall monitoring was performed using RAINALERT® III rainfall monitors manufactured, installed, and maintained by ADS. Each rainfall monitor is equipped with a TB6 standard tipping bucket rain gauge manufactured by HyQuest Solutions.

Study Period

The project began April 1, 2024 and ended July 8, 2024, a total of 99 days. Flow Monitor WTH-04 was moved on May 14 and reinstalled as WTH-04M on May 15, 2024 due to access complications with the homeowner.

Data Format

Flow depth (d), flow velocity (v), and flow rate (Q) data from each sewer flow monitor, as well as rainfall depth data from each rainfall monitor are maintained by ADS in PRISM™, a Cloud-based data management system. Archived data from the Study Period are accessible via secure user accounts at www.adsprism.com.

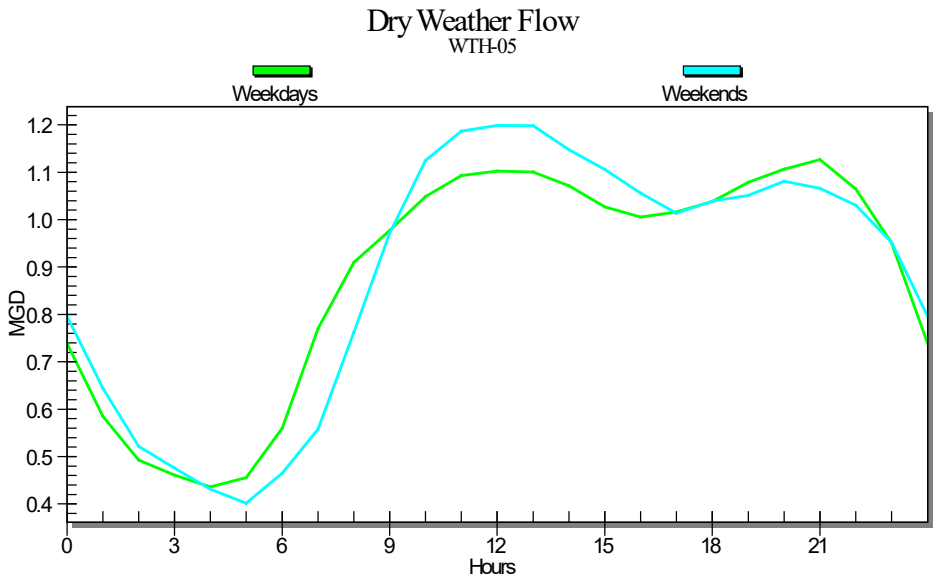
Results

Flow monitor and rainfall monitor data provide insight into sewer performance – revealing important information about how the existing sewer system accommodates observed flow rates. The following sections evaluate flow monitor data observed during both dry weather and wet weather periods using a variety of key performance indicators (KPIs).

Flow Rates and Peaking Factors

Dry weather flow conditions are characterized by evaluating flow monitor data observed during normal conditions, excluding wet weather events and the periods associated with the recovery from these events. The average dry day pattern is identified as a diurnal pattern and results from the collective sewer use of residential, commercial, institutional, and industrial users located upstream from a given flow monitor. Land use within a particular area affects the shape of the diurnal pattern. An example of a representative diurnal pattern observed during the Study Period is shown in Figure 2.

FIGURE 2: Dry Weather Hydrograph



The minimum, average, and maximum gross hourly dry weather flow rates (Q_{min-D}, Q_{avg-D}, and Q_{max-D}) are determined from the dry weather diurnal pattern for each flow monitor location and are provided for the Study Period in Table 2, along with the resulting dry weather peaking factor (PF_D). The maximum gross hourly wet weather flow rate (Q_{max-W}) determined for each flow monitor location is also provided, along with the resulting wet weather peaking factor (PF_W).

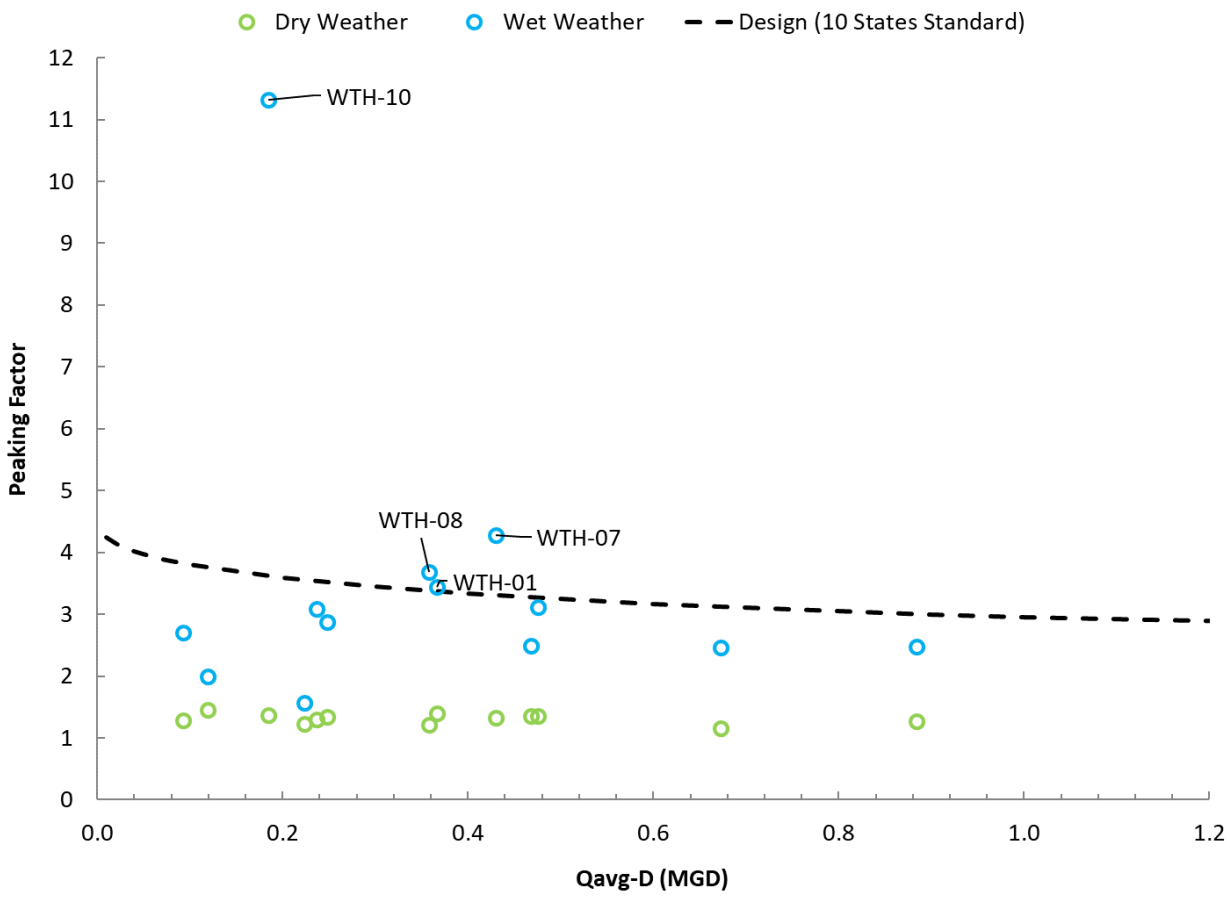
Peaking factors are commonly used to estimate maximum flow rates based on average flow rate estimates and play a key role in sewer design. Peaking factors are inversely proportional to the population served and generally decrease as the average dry weather flow rate increases. Dry weather and wet weather peaking factors observed during the Study Period are compared with corresponding design guidance from the American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF), and the results are shown for the Study Period are in Figure 3.

During dry weather conditions, all peaking factors fall within ASCE and WEF design guidelines. During wet weather conditions, Flow Monitors WTH-01, WTH-07, WTH-08 and WTH-10 exceeded ASCE and WEF design guidelines. The highest observed peaking factor was at site WTH-10 at 11.32 during wet weather.

TABLE 2: Dry and Wet Weather Flow Rates and Peaking Factors

Monitor	Q_{min-D} (MGD)	Q_{avg-D} (MGD)	Q_{max-D} (MGD)	Q_{max-W} (MGD)	Peaking Factor PF_D	Peaking Factor PF_W
WTH-01	0.212	0.367	0.513	1.265	1.40	3.45
WTH-02	0.264	0.476	0.646	1.484	1.36	3.12
WTH-03	0.059	0.119	0.173	0.237	1.45	1.99
WTH-04	0.112	0.248	0.331	0.714	1.33	2.88
WTH-04M	0.098	0.223	0.273	0.349	1.22	1.57
WTH-05	0.436	0.884	1.127	2.185	1.27	2.47
WTH-06	0.058	0.093	0.120	0.251	1.29	2.70
WTH-07	0.216	0.430	0.573	1.843	1.33	4.29
WTH-08	0.215	0.358	0.433	1.317	1.21	3.68
WTH-09	0.344	0.673	0.777	1.659	1.15	2.47
WTH-10	0.080	0.185	0.254	2.095	1.37	11.32
WTH-11	0.190	0.468	0.637	1.169	1.36	2.50
WTH-12	0.193	0.237	0.307	0.731	1.30	3.08

FIGURE 3: Peaking Factors Compared to Design Guidance



Depth-to-Diameter Ratios

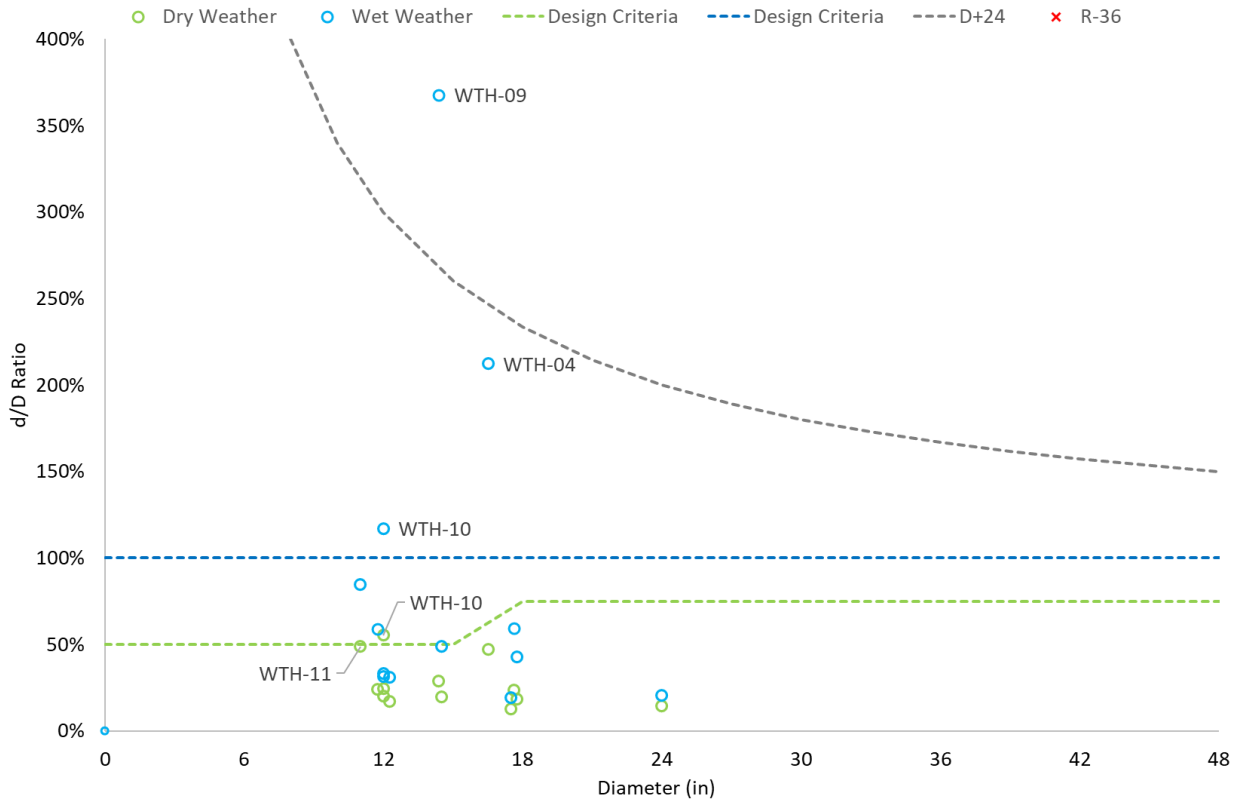
Once dry weather and wet weather flow rates are characterized, the hydraulic conditions under which they occur are evaluated. The maximum flow depth observed during dry weather (d_{max-D}) and wet weather (d_{max-W}) and their corresponding flow depth-to-diameter (d/D) ratios observed during the Study Period are provided in Table 3. The maximum dry weather flow depth is the maximum flow depth that is consistently observed each day during normal dry weather conditions. The maximum wet weather flow depth may or may not be directly associated with the maximum wet weather flow rate, depending on the hydraulic conditions observed at a given flow monitor location.

The d/D ratio is a performance indicator used to assess sewer capacity. Sewers are often designed to flow under open channel conditions with some reserve capacity. As a result, ASCE and WEF recommend that sewers with diameters up to 15 inches be designed to flow with dry weather d/D ratios of 50%, and larger diameter sewers be designed to flow with dry weather d/D ratios of 75%. Sewers are not generally designed to operate under surcharge conditions with wet weather d/D ratios greater than 100%. Observed wet weather d/D ratios are also compared to additional capacity assurance criteria, designed to highlight portions of the sewer system where flow depths are greater than 24 inches above the crown of the sewer (D+24) or are within 36 inches of the manhole rim (R-36). These design and capacity assurance criteria are useful for comparison to d/D ratios observed during the Study Period as shown in Figure 4.

TABLE 3: Dry and Wet Weather Depth-to-Diameter Ratios

Monitor	D (inches)	d_{max-D} (inches)	d_{max-D} / D (%)	d_{max-W} (inches)	d_{max-W} / D (%)	# of Surcharges
WTH-01	12.25	2.11	17%	3.81	31%	0
WTH-02	17.50	2.20	13%	3.36	19%	0
WTH-03	17.75	3.25	18%	7.56	43%	0
WTH-04	16.50	7.79	47%	35.01	212%	8
WTH-04M	14.50	2.85	20%	7.11	49%	0
WTH-05	24.00	3.43	14%	4.97	21%	0
WTH-06	12.00	2.94	25%	3.98	33%	0
WTH-07	17.62	4.17	24%	10.42	59%	0
WTH-08	11.75	2.81	24%	6.91	59%	0
WTH-09	14.38	4.13	29%	52.88	368%	4
WTH-10	12.00	6.63	55%	14.04	117%	3
WTH-11	11.00	5.36	49%	9.33	85%	0
WTH-12	12.00	2.40	20%	3.77	31%	0

FIGURE 4: d/D Ratios Compared to Design and Capacity Assurance Criteria



During the Study Period, all flow monitors except WTH-10 observed dry weather d/D ratios within design criteria recommended by ASCE and WEF, indicating there is sufficient capacity at most of the flow monitor locations to accommodate dry and wet weather flow rates. Flow Monitor S-13 is operating 55% full with a average depth of about 6.5 inches in dry weather.

During wet weather conditions three flow monitor locations, WTH-04, WTH-09 and WTH-10 exceeded design criteria recommended by ASCE and WEF, indicating there is insufficient capacity at those locations to accommodate observed wet weather flow rates without surcharge conditions. Wet weather surcharge conditions that exceeded the D+24 capacity assurance criteria were observed at Flow Monitor WTH-09. Flow Monitor WTH-09 experienced significant backwater conditions during the study.

Self-Cleansing Status

Self-cleansing is an important aspect of sanitary sewer design and is desired to minimize the deposition of silt, sediment, and debris. The Tractive Force Method is used to design sewers to achieve self-cleansing conditions based on a required critical shear stress (τ_c) and is recommended by ASCE and WEF to evaluate self-cleansing conditions.

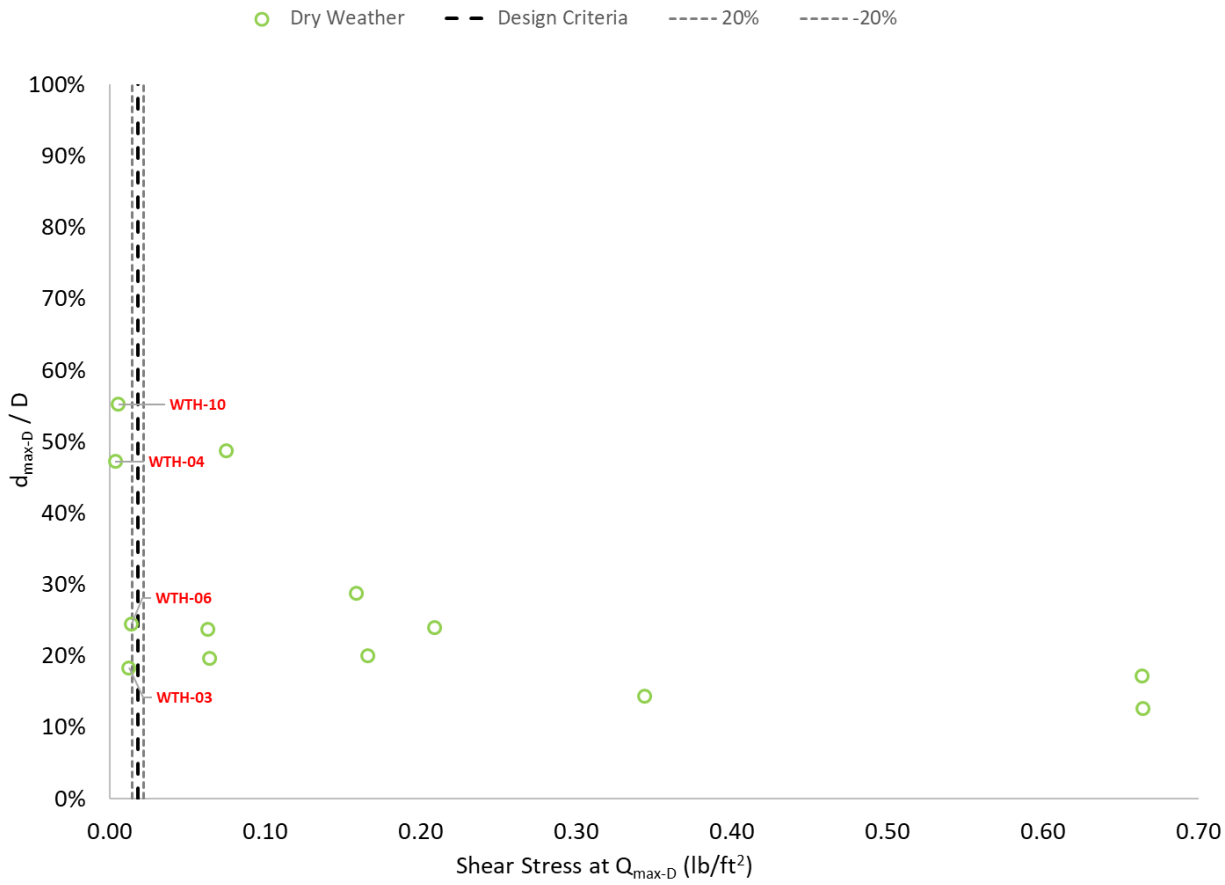
The Tractive Force Method can also be extended from the design of new sewers to the evaluation of existing sewers and was applied to evaluate the self-cleansing status of each flow monitor location. The maximum dry weather flow depth ($d_{max\text{-}D}$) and flow velocity ($v_{max\text{-}D}$) from each flow monitor location were used to compute the actual shear stress (τ) observed at the maximum dry weather flow rate ($Q_{max\text{-}D}$) during the Study Period, and the results are provided in Table 4.

The required critical shear stress recommended by ASCE and WEF for application of the Tractive Force Method is 0.0181 lb/ft^2. The actual shear stress achieved under normal dry weather conditions during the Study Period is compared to this design guidance in Figure 5. Sewers predicted to be self-cleansing are shown to the right of the recommended critical shear stress, and sewers predicted to be non-cleansing are shown to the left. Research by ADS has shown that the transition from self-cleansing to non-cleansing generally occurs within ±20% of this recommended value. As a result, the hydraulic conditions at each flow monitor location are classified as Class 1 – Self-Cleansing, Class 2 – Marginal Cleansing, or Class 3 – Non-Cleansing.

TABLE 4: Self-Cleansing Classification

Monitor	D (in)	$d_{max\text{-}D}$ (in)	$v_{max\text{-}D}$ (ft/s)	τ (lb/ft^2)	Silt (in)	Classification
WTH-01	12.25	2.11	8.14	0.6634	—	1
WTH-02	17.50	2.20	8.23	0.6642	—	1
WTH-03	17.75	3.25	1.20	0.0125	0.50	3
WTH-04	16.50	7.79	0.75	0.0039	8.00	3
WTH-04M	14.50	2.85	2.66	0.0644	—	1
WTH-05	24.00	3.43	6.37	0.3442	—	1
WTH-06	12.00	2.94	1.25	0.0142	—	3
WTH-07	17.62	4.17	2.80	0.0634	—	1
WTH-08	11.75	2.81	4.76	0.2090	—	1
WTH-09	14.38	4.13	4.40	0.1585	—	1
WTH-10	12.00	6.63	0.88	0.0057	0.50	3
WTH-11	11.00	5.36	3.10	0.0753	—	1
WTH-12	12.00	2.40	4.15	0.1662	—	1

FIGURE 5: Self-Cleansing Status Compared to Design Guidance



Based on hydraulic conditions observed during the Study Period, most flow monitor locations are defined as Class 1 – Self Cleansing. Four flow monitors are defined as Class 3– Non-Cleansing, three of which ADS field crews observed silt.

Groundwater Infiltration

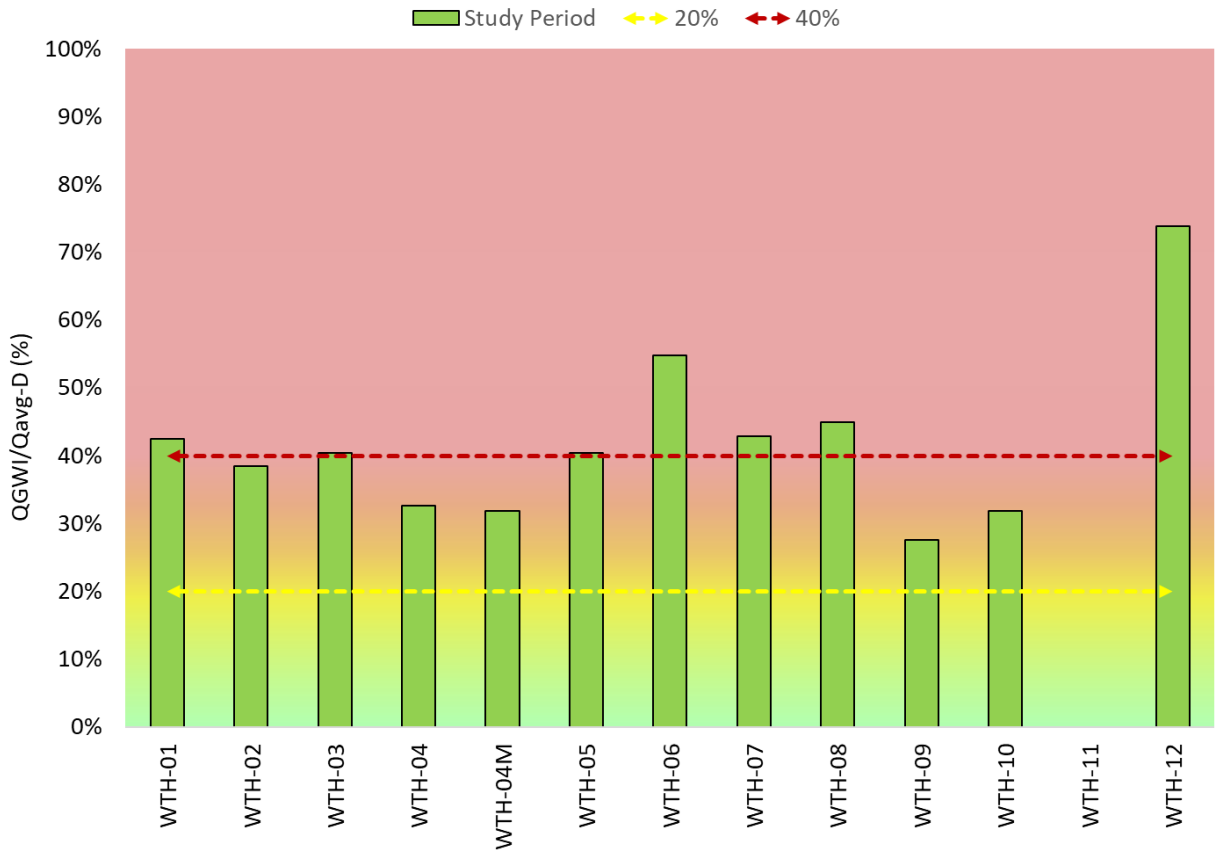
Infiltration and inflow (I/I) are common problems in sanitary sewer systems. While inflow typically gets the most attention in wet weather, groundwater infiltration can also be a significant problem in dry weather, silently stealing sewer capacity 24 hours per day, 7 days per week, 365 days per year. While groundwater infiltration (Q_{GWI}) is often of interest to wastewater professionals, it is not measured directly by flow monitors. Rather, it is assumed that $0 \leq Q_{GWI} \leq Q_{min\text{-}D}$ and is *estimated* using a variety of empirical methods. The Stevens-Schutzbach Method was used to estimate groundwater infiltration for the Study Period, and the results are provided in Table 5. Net flows are calculated by subtracting the $Q_{avg\text{-}D}$ for the upstream flow monitor from the $Q_{avg\text{-}D}$ for the downstream monitor.

TABLE 5: Wastewater Production and Groundwater Infiltration Estimates

Monitor	Gross $Q_{min\text{-}D}$ (MGD)	Gross $Q_{avg\text{-}D}$ (MGD)	Net Q_{GWI} (MGD)	Net $Q_{avg\text{-}D}$ (MGD)	Net $Q_{GWI}/Q_{avg\text{-}D}$ (%)
WTH-01	0.212	0.367	0.156	0.367	43%
WTH-02	0.264	0.476	0.183	0.476	38%
WTH-03	0.059	0.119	0.048	0.119	40%
WTH-04	0.112	0.248	0.081	0.248	33%
WTH-04M	0.098	0.223	0.071	0.223	32%
WTH-05	0.436	0.884	0.168	0.416	40%
WTH-06	0.058	0.093	0.051	0.093	55%
WTH-07	0.216	0.430	0.105	0.245	43%
WTH-08	0.215	0.358	0.161	0.358	45%
WTH-09	0.344	0.673	0.087	0.315	28%
WTH-10	0.080	0.185	0.059	0.185	32%
WTH-11*	0.190	0.468	<0.050	0.231	<20%
WTH-12	0.193	0.237	0.175	0.237	74%

A comparison of groundwater infiltration as a percent of average dry weather flow rate during the Study Period is provided in Figure 6. As a general rule-of-thumb, groundwater infiltration less than 20% of $Q_{avg\text{-}D}$ is considered reasonable, while groundwater infiltration over 40% is considered significant. During the Study Period 12 flow monitoring locations had groundwater infiltration estimates in excess of 20% of the average dry weather flow rate, while seven flow monitoring locations had groundwater infiltration estimates in excess of 40%. The minimum values at WTH-12 and WTH-11 were out of balance resulting in an inability to calculate the base infiltration at WTH-11, which indicates a minimal amount of base infiltration at this location.

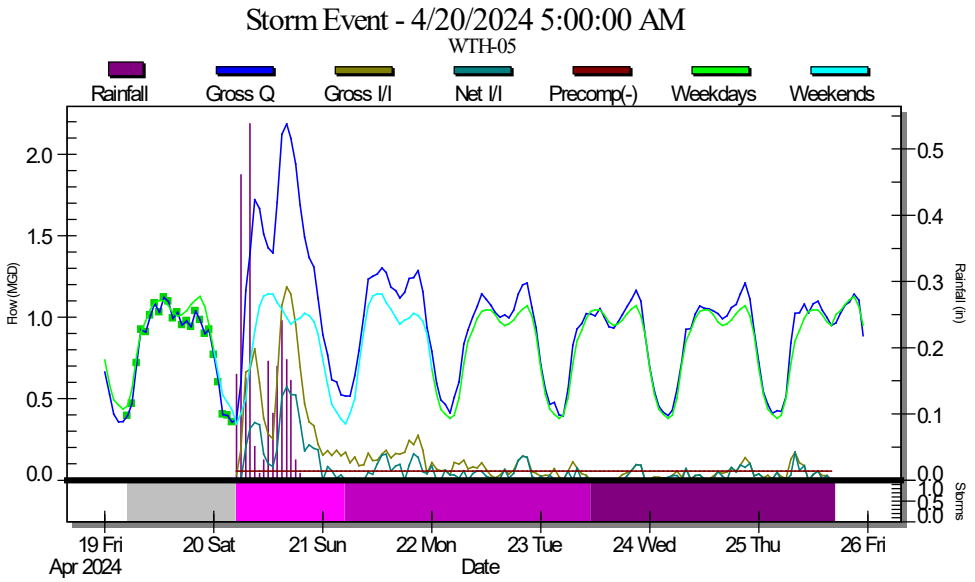
FIGURE 6: Groundwater Infiltration



Rainfall-Dependent Infiltration and Inflow

During wet weather events, significant amounts of extraneous water can enter a sewer system, resulting in sanitary sewer overflows (SSOs), basement backups, and/or problems at the wastewater treatment plant (WWTP). A comparison of flow monitor data from dry weather and wet weather periods provides a quantification of RDII, which is calculated by subtracting the measured flow during a rainfall event from the flow during an average dry day. A wet weather hydrograph from the Study Period is provided in Figure 7. The storm event is depicted by the purple bands, and a precompensation period prior to the storm is depicted by the light gray band. Adjustments to the average dry day pattern are made as needed to account for antecedent conditions prior to each storm event.

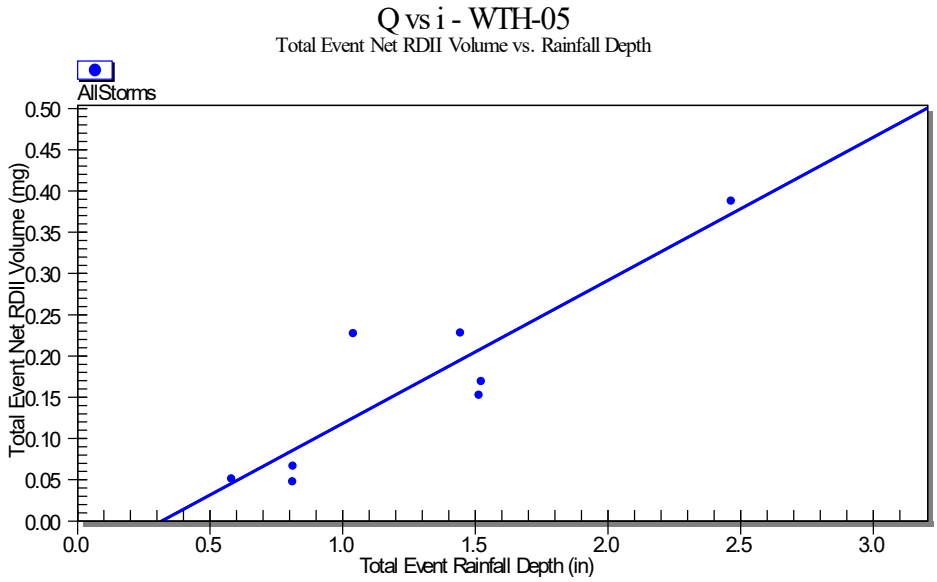
FIGURE 7: Wet Weather Hydrograph



Up to 10 storm events of interest were observed and evaluated for each flow monitor basin during the Study Period. The largest storm event evaluated began on 04/20 with a rainfall total of 2.91 inches. The maximum associated return frequency for this storm event was one-year at 720 minutes.

After the RDII calculations are made for each storm event, the results are plotted as a function of rainfall total. An example is shown in Figure 8 in which the relationship between the Storm Event RDII (MG) is plotted with respect to the Storm Event rainfall (inches) for all significant storm events. These relationships can then be used to evaluate the consistency of rainfall responses within the sanitary sewer system and estimate the RDII response for various rainfall amounts.

FIGURE 8: RDII Response vs. Rainfall Depth



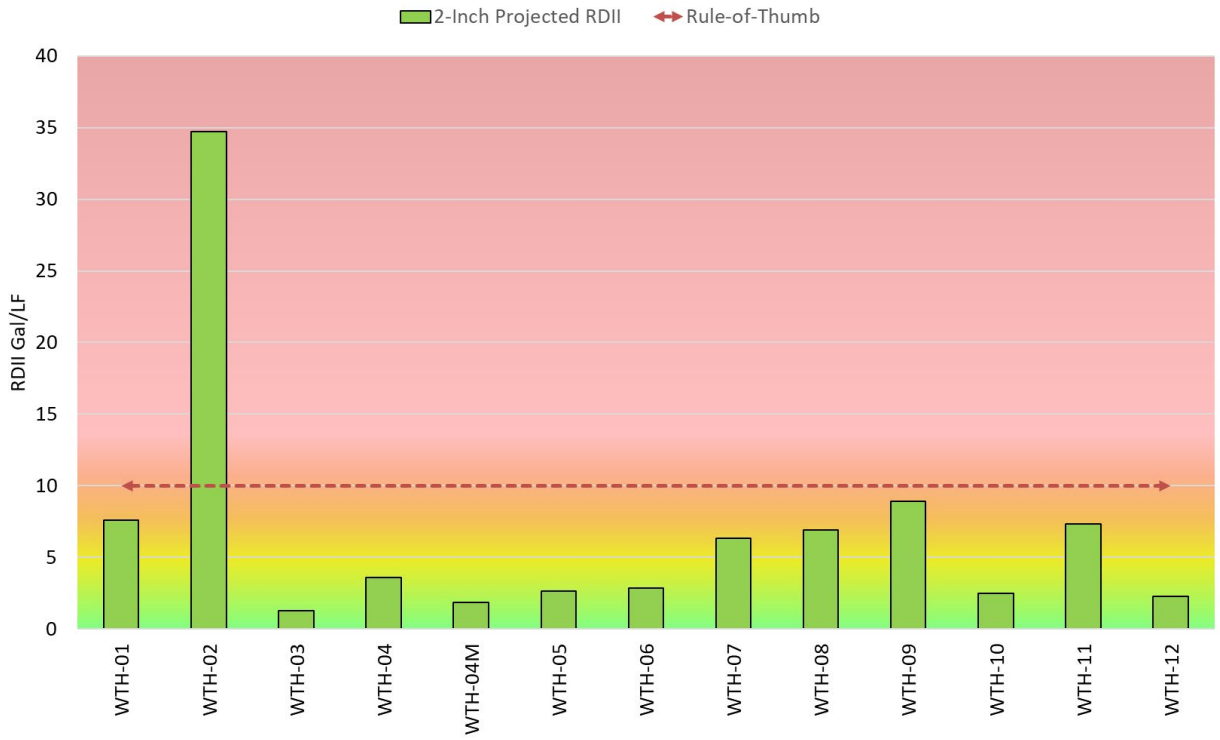
Net RDII volumes are computed by subtracting the Gross RDII volume of any upstream flow monitor basin from the Gross RDII volume measured at the outlet of each flow monitor basin. This process identifies and isolates RDII to the basin sizes shown. Normalized Net RDII is then calculated by dividing the net RDII volume by the associated basin size. Based on the results obtained during the Study Period, Net RDII are reported for each basin for a projected 2.00-inch storm event, and the results are summarized in Table 6.

TABLE 6: Net RDII for a Projected 2.00-inch Storm

Basin	Net RDII (MG)	Basin Size (LF)	Net RDII (Gal/LF)
WTH-01	0.82	107,957	7.60
WTH-02	0.94	27,090	34.70
WTH-03	0.06	46,528	1.29
WTH-04	0.23	63,934	3.60
WTH-04M	0.12	63,934	1.88
WTH-05	0.29	108,607	2.67
WTH-06	0.09	31,446	2.86
WTH-07	0.74	116,726	6.34
WTH-08	0.77	111,456	6.91
WTH-09	0.45	50,596	8.89
WTH-10	0.29	117,315	2.47
WTH-11	0.23	31,430	7.32
WTH-12	0.21	92,577	2.27

Normalized Net RDII results are compared with an industry rule-of-thumb for excessive RDII of 10 Gal/LF for a 2-inch rainfall event. Note WTH-02 has a projected RDII greater than this key performance indicator during the Study Period. A comparison of the normalized RDII to this rule-of-thumb is provided in Figure 9.

FIGURE 9: Normalized Net RDII Compared to Industry Rule-of-Thumb

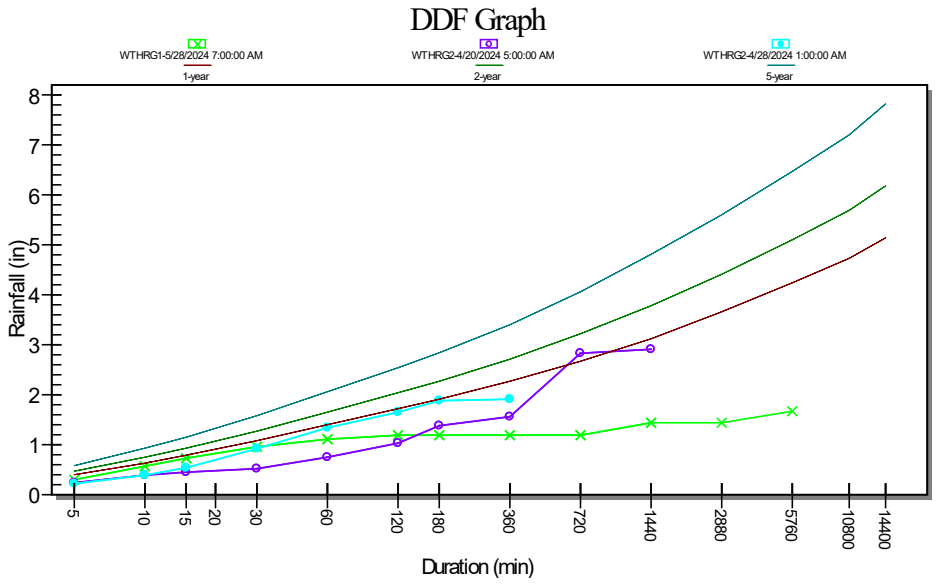


A summary of the observed storm events is provided in Table 7. All storms, with the exception of 4/20/24, had a maximum return frequency of less than one year at all durations. A Depth Duration Frequency comparison with the three largest observed events is shown in Figure 10.

TABLE 7: Storm Summary

Storm Event	RG01 (in)	RG02 (in)	Return Frequency
04/20/24	2.46	2.91	1 year, 720 minutes
04/28/24	1.44	1.91	< 1 year
05/02/24	0.81	0.72	< 1 year
05/04/24	1.04	1.14	< 1 year
05/12/24	0.58	0.71	< 1 year
05/16/24	0.84	0.78	< 1 year
05/28/24	1.67	1.18	< 1 year
05/30/24	1.53	0.81	< 1 year
06/11/24	1.52	0.94	< 1 year
06/12/24	0.82	0.08	< 1 year

FIGURE 10: Depth Duration Frequency



Summary

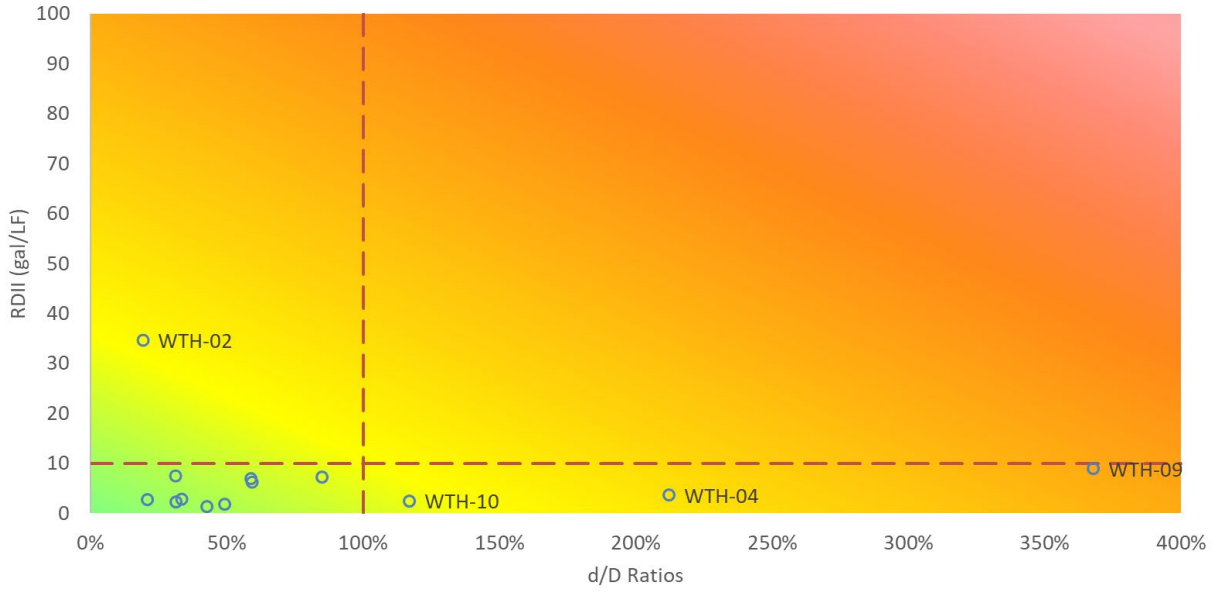
A summary of the key performance indicators during the Study Period is provided in Table 8. The purpose of these tables is to identify which flow monitoring locations have observed key performance indicators throughout the Study Period. The column labeled "Class 2 or Class 3" refers to the Self-Cleansing status, with Class 2 representing Marginal-Cleansing and Class 3 Non-Cleansing. The ground water infiltration column signifies locations which exceeded the 20% rule of thumb.

Table 8: Key Performance Indicators in Excess of Design Guidance Summary Table

Basin	PF_W	d_{max-D} / D	d_{max-W} / D	# of Surcharges	Class 2 or Class 3	Net Q_{GWI}/Q_{avg-D}	RDII	Total
WTH-01	X					X		2
WTH-02						X	X	2
WTH-03					3	X		2
WTH-04			X	8	3	X		3
WTH-04M						X		1
WTH-05						X		1
WTH-06					3	X		2
WTH-07	X					X		2
WTH-08	X					X		2
WTH-09			X	4		X		3
WTH-10	X	X	X	3	3	X		6
WTH-11						X		1
WTH-12						X		2

Figure 11 displays wet weather d/D ratios in relationship with respect to normalized Net RDII. The graphic is broken down into four quadrants utilizing the 10 gal/LF for RDII rule-of-thumb and 100 % wet weather d/D ratio design guidance as dividers. Quadrant 1 (bottom left) show locations that are considered to have low RDII and did not experience surcharge conditions. Quadrant 2 (top left) represents excessive RDII conditions that are able to be contained within the pipe. Quadrant 3 (bottom right) denotes locations that experienced surcharge conditions without excessive amounts of RDII. Lastly, Quadrant 4 (top right) identifies locations that have both excessive RDII and are experiencing surcharge conditions during wet weather. A red "x" indicates a location that reached depths within 36-inches of the rim.

FIGURE 11: Wet Weather d/D ratio vs RDII-Projected 2-inch Storm



Conclusions and Recommendations

Specific recommendations for further planning, evaluation, or condition assessment activities based on flow monitor and rainfall monitor data from the Study Period are provided below.

Dry Weather Performance

- All of the dry weather peaking factors were within standard design criteria recommended by ASCE and WEF, indicating that dry weather peak flows are within anticipated ranges based on average dry weather flows.

- Flow Monitor WTH-10 exceeded dry weather d/D design criteria provided by ASCE and WEF during dry weather. This location operates with depths on average around 6.5 inches during dry weather. Further investigation is recommended to determine the cause of dry weather capacity limitations.

- Dry weather d/D ratios at all remaining flow monitor locations were within standard design criteria recommended by ASCE and WEF, indicating that sufficient capacity is available at the flow monitor locations to convey routine dry weather flows.

- Based on hydraulic conditions observed, four flow monitors are defined as Class 3 – Non-Cleansing. The city should watch for debris accumulation in sewers located near this flow monitor. ADS field crews observed silt at Flow Monitors WTH-03, WTH-04 and WTH-10. The WTH-04 location had significant silt recorded up to 8 inches. Preventing sediment and debris accumulation is one way to reduce the risk of SSOs due to blockages.

Wet Weather Performance

- Most of the wet weather peaking factors were within the standard design criteria recommended by ASCE and WEF during the Study Period. Flow Monitors WTH-01, WTH-07, WTH-08 and WTH-10 exceeded the design criteria indicating that these locations are affected by RDII to varying degrees. The largest wet weather peaking factor was 11.32 and was observed at Flow Monitor WTH-10 during the Study Period.

- Flow Monitors WTH-04, WTH-09 and WTH-10 flow monitor locations observed d/D ratios that exceeded standard design criteria recommended by ASCE and WEF, indicating that insufficient capacity is available at these flow monitor locations to convey wet weather flows observed during the Study Period.

- Flow Monitor WTH-09 observed depths within the D+24 assurance criteria and had significant backwater observed restricting the capacity. This is an indication of a downstream restrictions. This location has a greater risk of experiencing a sanitary sewer overflow (SSO) during wet weather.

Groundwater Infiltration

- During the Study Period, all 13 flow monitors had groundwater infiltration estimates in excess of 20% of the average dry weather flow rate. Seven Flow Monitors were in excess of 40% groundwater base infiltration estimates during the Study Period. Further condition assessment activities such as closed-circuit television (CCTV) inspections in these areas may reveal groundwater infiltration sources that are consuming dry weather capacity.

Rainfall-Dependent Inflow and Infiltration

- During the Study Period, Basins WTH-02 had a projected RDII greater than 10 Gal/LF, above the accepted industry rule-of-thumb for excessive RDII. Manhole inspections, smoke testing, and CCTV inspections are recommended to locate and identify individual defects contributing to RDII in within these basins.

Definitions

Basin – a designation given to a series of interconnected sewers within a sanitary sewer system that collect and convey wastewater to a common manhole, pump station, or wastewater treatment plant. The size and geographic extent of a given basin are system specific. Basin designations are established to provide a consistent nomenclature for system components to facilitate effective planning, operation, and maintenance.

CCTV Inspection – a common diagnostic method used to visually inspect and document the general location, connectivity, and condition of a sewer. CCTV inspection is accomplished using a variety of specially designed camera systems.

Depth-to-Diameter (d/D) Ratio – a ratio of maximum flow depth to sewer diameter. d/D ratios are often calculated to describe both dry weather and wet weather periods and are one measure used to assess sewer capacity utilization. In this study, d/D ratios are computed using hourly average data.

Infiltration – water than enters a sanitary sewer system from the ground through defective system components including, but not limited to, defective sewers, manholes, service connections, or other system appurtenances. Infiltration is primarily dependent on groundwater elevations but may also be influenced by storm events and leaking water mains.

Inflow – storm water runoff that enters a sanitary sewer system from direct connections including, but not limited to, building downspouts, clean-outs, foundation drains, sump pumps, basement and area drains, and cross connections with storm sewer systems.

Manhole Inspection – a common diagnostic method used to visually inspect and document the location and condition of a manhole. Manhole inspection can be accomplished using confined space entry or non-entry techniques.

Peaking Factor (PF) – a ratio of maximum flow rate to average flow rate. Peaking factors are often calculated to describe by dry weather and wet weather periods, where maximum flow rates are compared to average dry weather flow rates. In this study, peaking factors are computed using hourly average data.

Rain-Dependent Infiltration and Inflow (RDII) – the collective infiltration and inflow that enter a sewer system as a direct result of rainfall.

Sanitary Sewer Overflow (SSO) – a discharge of untreated wastewater from a sanitary sewer system, caused by a variety of reasons including, but not limited to, inadequate sewer design and construction, insufficient operation and maintenance, power failures, and vandalism.

Sanitary Sewer System – a collection of sewers, manholes, pump stations, and other appurtenances designed for the collection and transportation of wastewater.

Sewer Cleaning – a common method used to dislodge and removed accumulated debris, grease, and roots within a sewer line to achieve desired conditions for CCTV inspection. Under routine conditions, sewer cleaning is performed using hydraulic jetting and vacuum debris removal techniques.

Sewer System Evaluation Survey – a detailed investigation of a selected portion of a sanitary sewer system to identify system defects that contribute to infiltration and inflow. The results of such an investigation are used to provide recommendations for system planning, operation, and maintenance.

Smoke Testing – a common diagnostic method used to locate and identify potential infiltration and inflow sources within a sanitary sewer system. During smoke testing, a special non-toxic, non-staining smoke is blown into a selected portion of the system. Potential infiltration and inflow sources are evidence by visible smoke.

Tractive Force Method – a method used to evaluate the self-cleansing status of gravity sewers. This approach is recommended by the American Society of Civil Engineers and the Water Environment Federation.

References

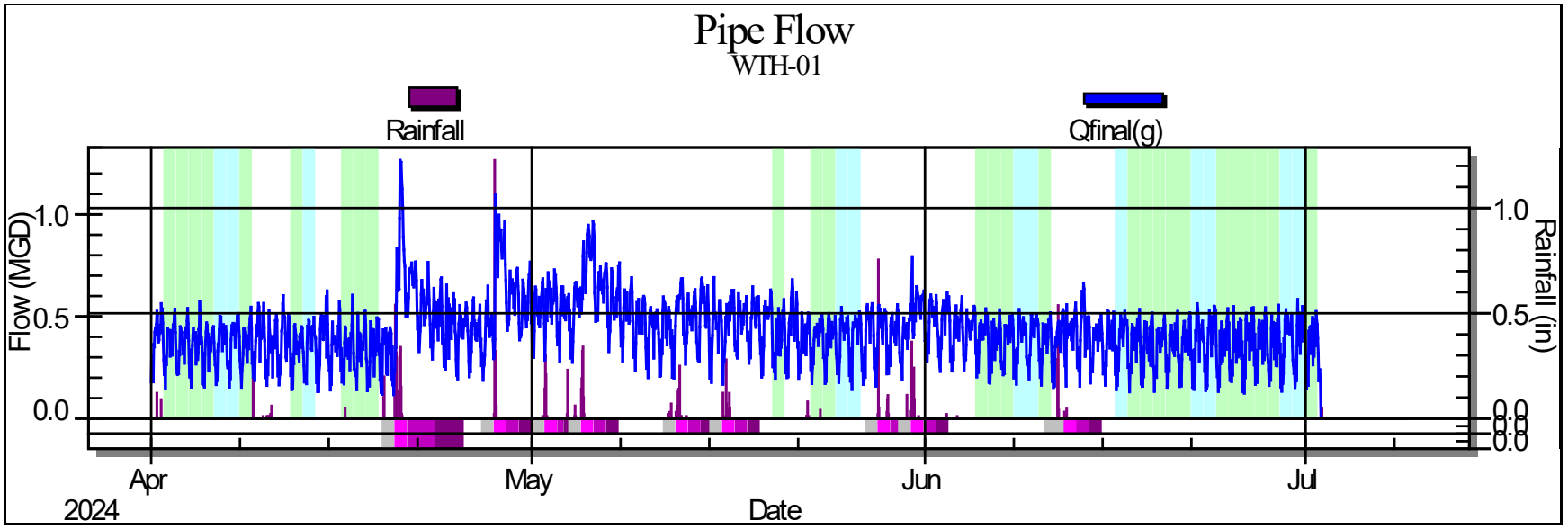
1. Perica, Sanja et al (2018). NOAA Atlas 14, Volume 11, Version 2, Precipitation-Frequency Atlas of the United States: Texas, National Oceanic and Atmospheric Administration, National Weather Service; Silver Spring, MD.

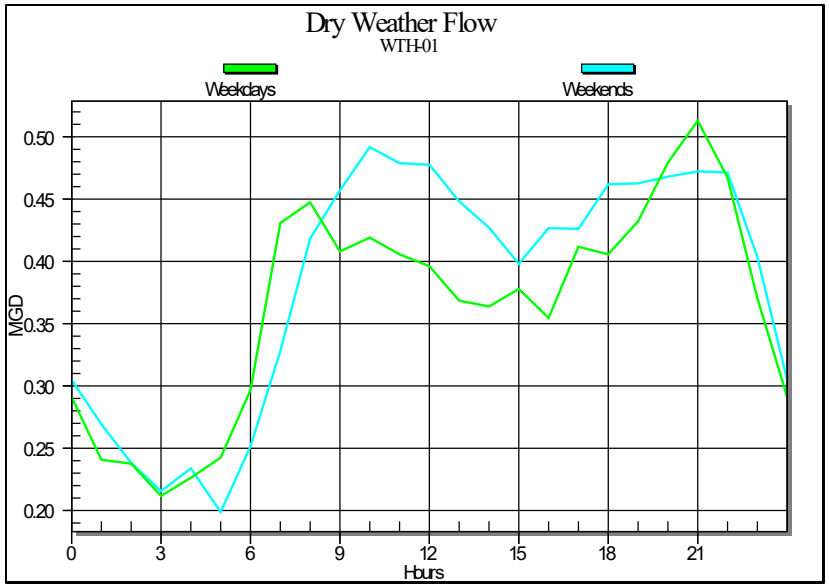
2. Bizier, Paul, Editor (2007). Gravity Sanitary Sewer Design and Construction, ASCE Manuals and Reports on Engineering Practice No. 60, American Society of Civil Engineers: Reston, VA.

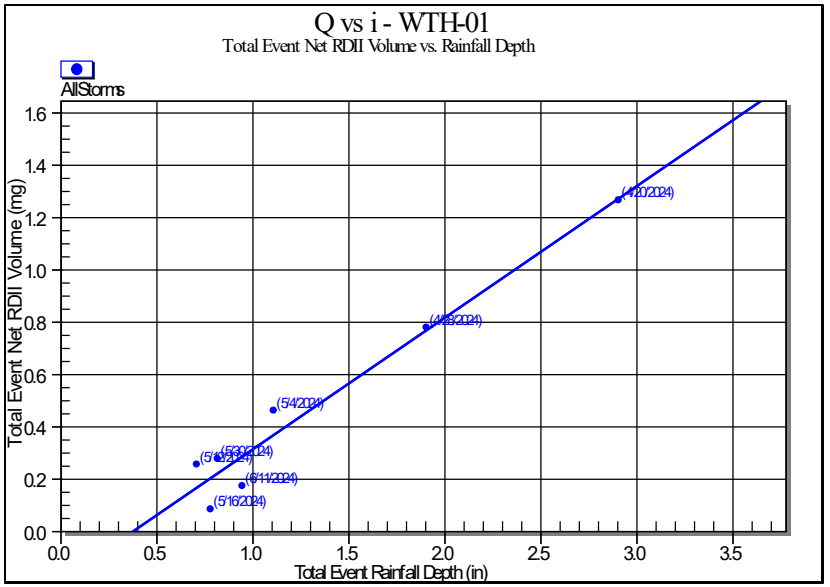
3. Enfinger, K.L. and Surber, M.L. (2016). "Depth Perception – Tracking Sewer Performance Using Design Guidelines and Regulatory Expectations," Proceedings of the Water Environment Federation Technical Exhibition and Conference; New Orleans, LA; Water Environt Federation: Alexandria, VA.

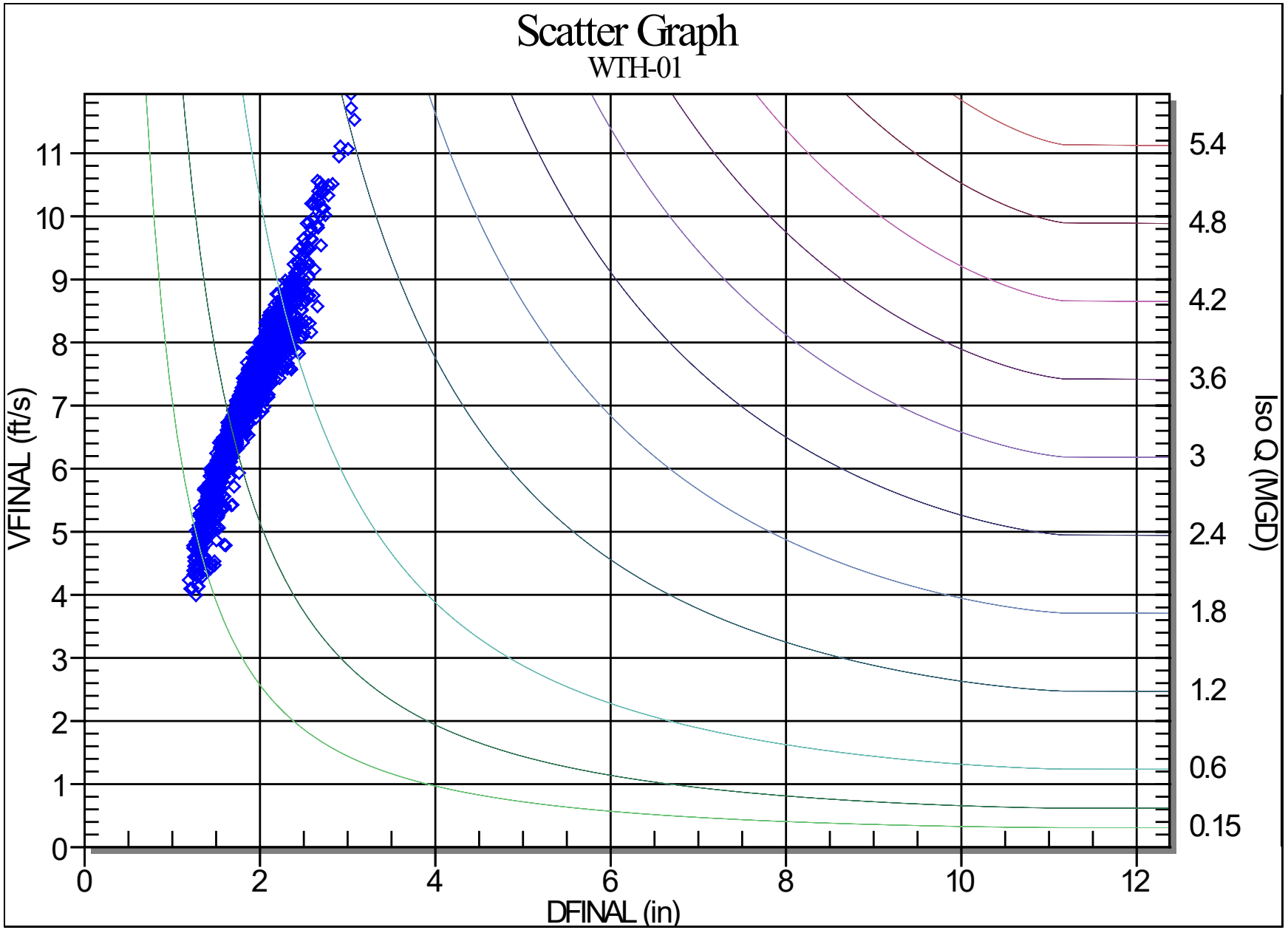
4. Enfinger, K.L. and Mitchell, P.S. (2010). "Scattergraph Principles and Practice – Evaluating Self-Cleansing in Existing Sewers Using the Tractive Force Method," Proceedings of the World Environmental and Water Resources Congrees; Providence, RI. American Society of Civil Engineers: Reston, VA.

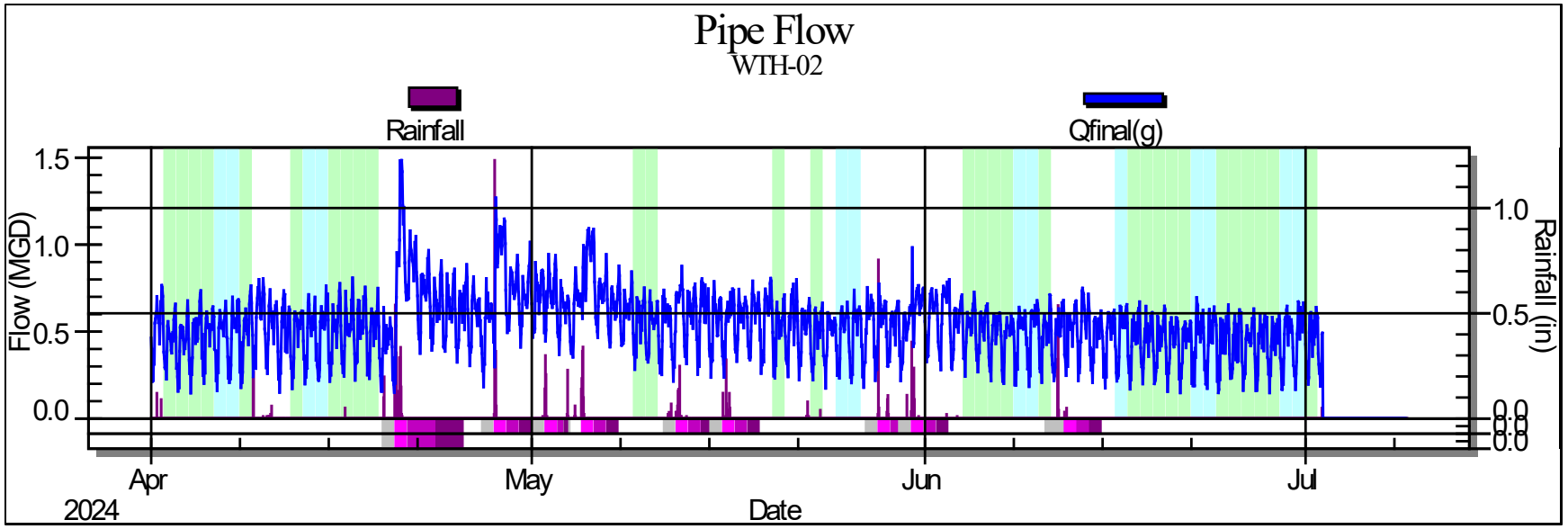
Appendix A

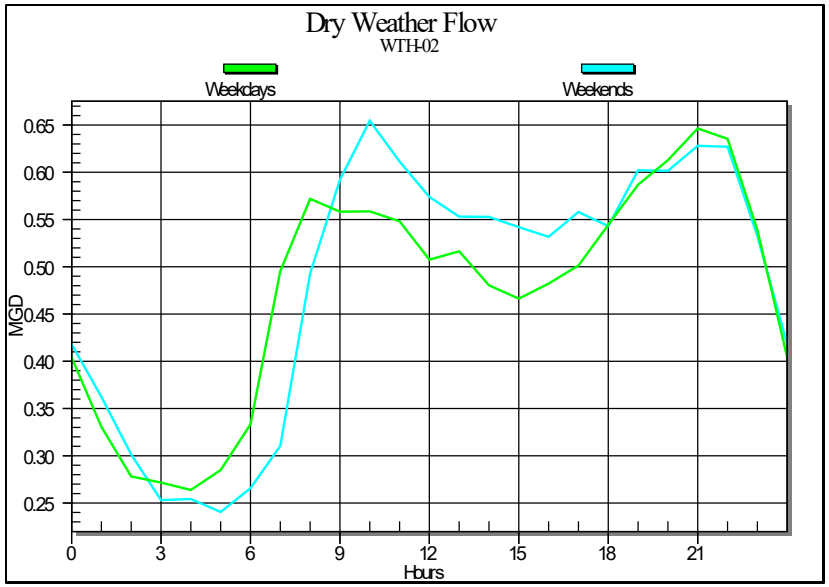

Pipe Flow
WTH-01
Rainfall
Qfinal(g)
Flow (MGD)
1.0
0.5
0.0
Rainfall (in)
1.0
0.5
0.0
0.0
0.0
Apr
2024
May
Jun
Jul
Date

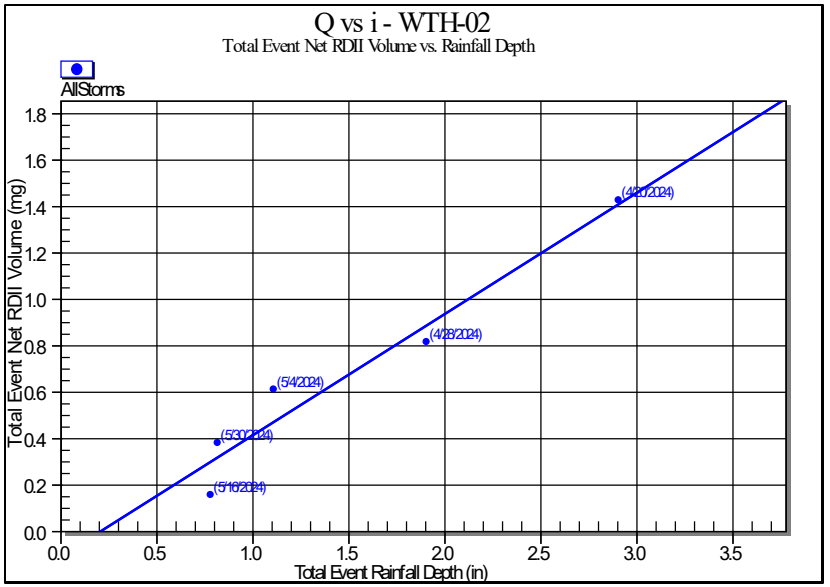

Dry Weather Flow
WTH-01
Weekdays
Weekends
MGD
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0
3
6
9
12
15
18
21
Hours

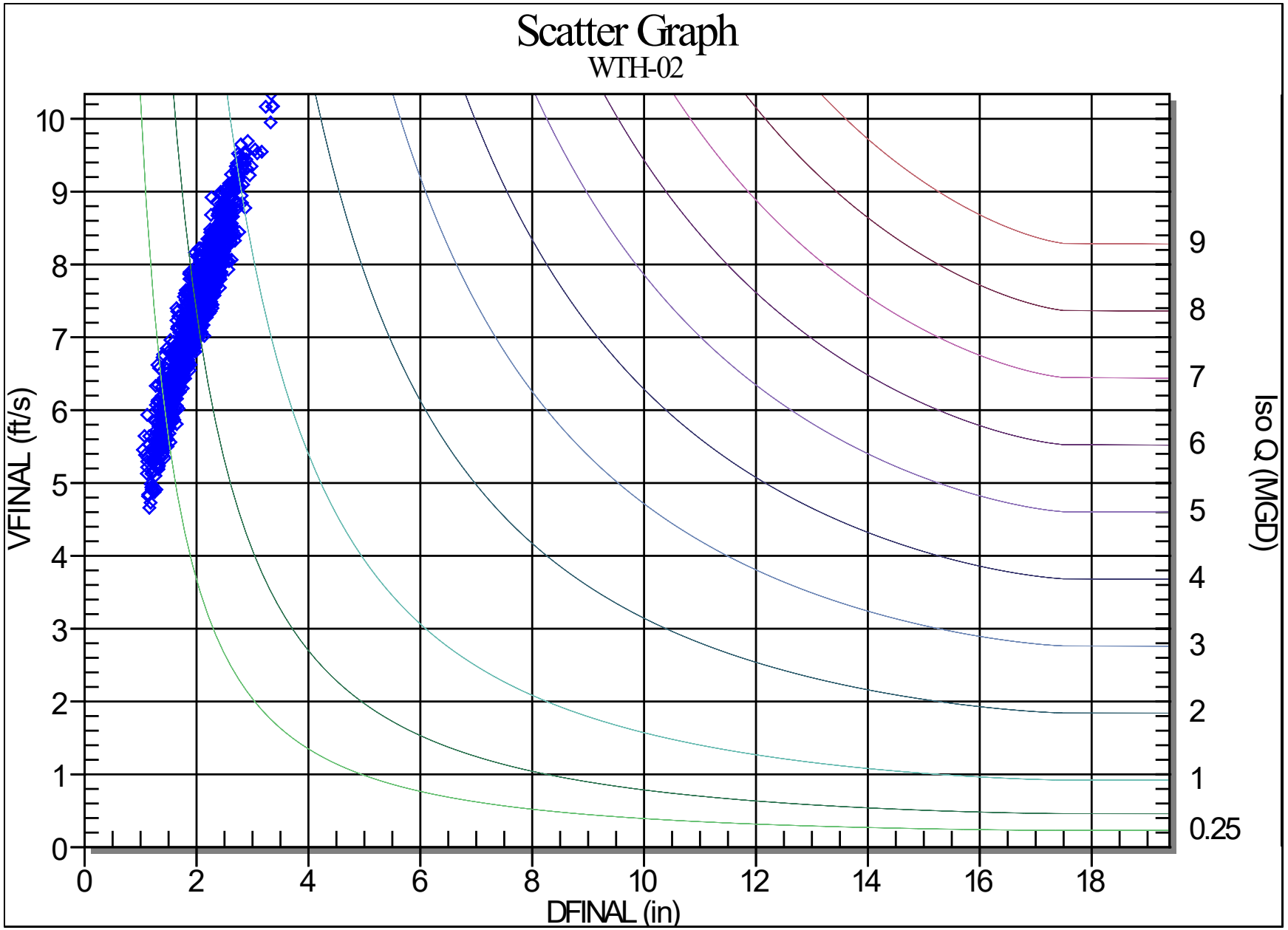

Q vs i - WTH-01
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Total Event Rainfall Depth (in)
(4/20/2024)
(4/29/2024)
(5/4/2024)
(5/30/2024)
(6/11/2024)
(5/16/2024)

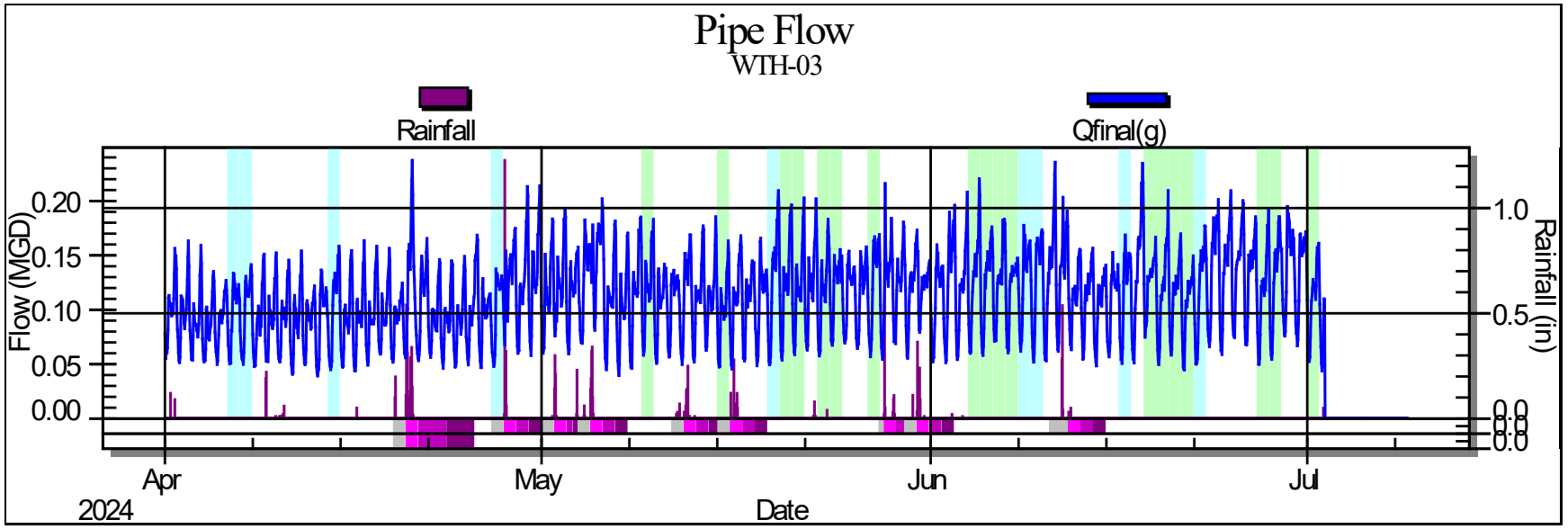

Scatter Graph
WTH-01
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0
1
2
3
4
5
6
7
8
9
10
11
0
2
4
6
8
10
12
5.4
4.8
4.2
3.6
3
2.4
1.8
1.2
0.6
0.15

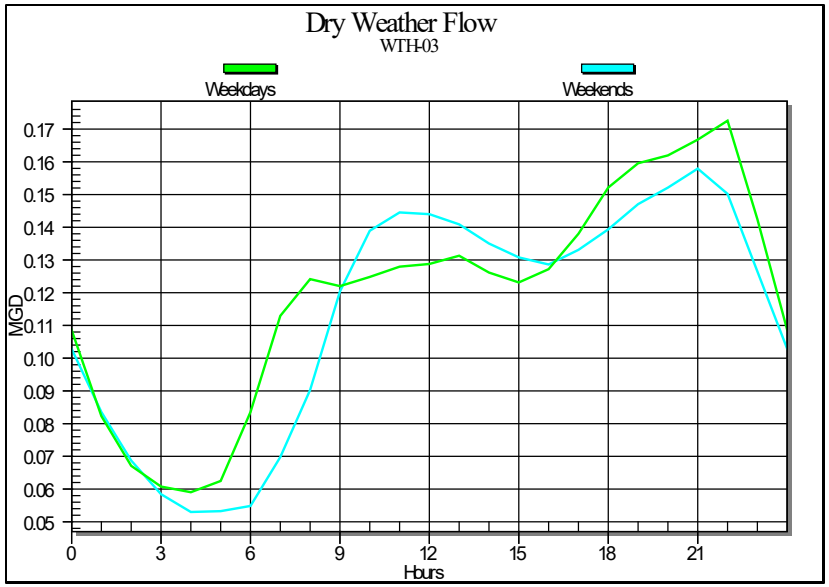

Pipe Flow
WTH-02
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
1.5
1.0
0.5
0.0
Apr
2024
May
Jun
Jul
Date

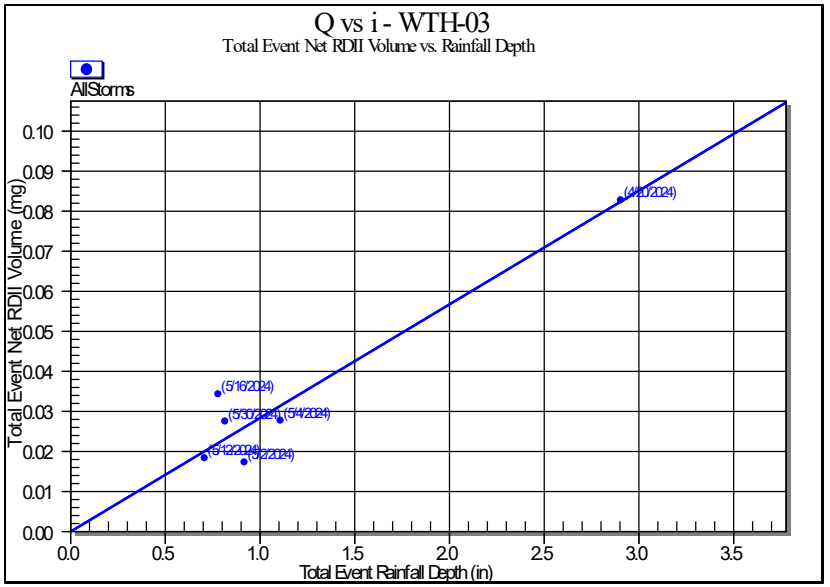

Dry Weather Flow
WTH-02
Weekdays
Weekends
MGD
Hours

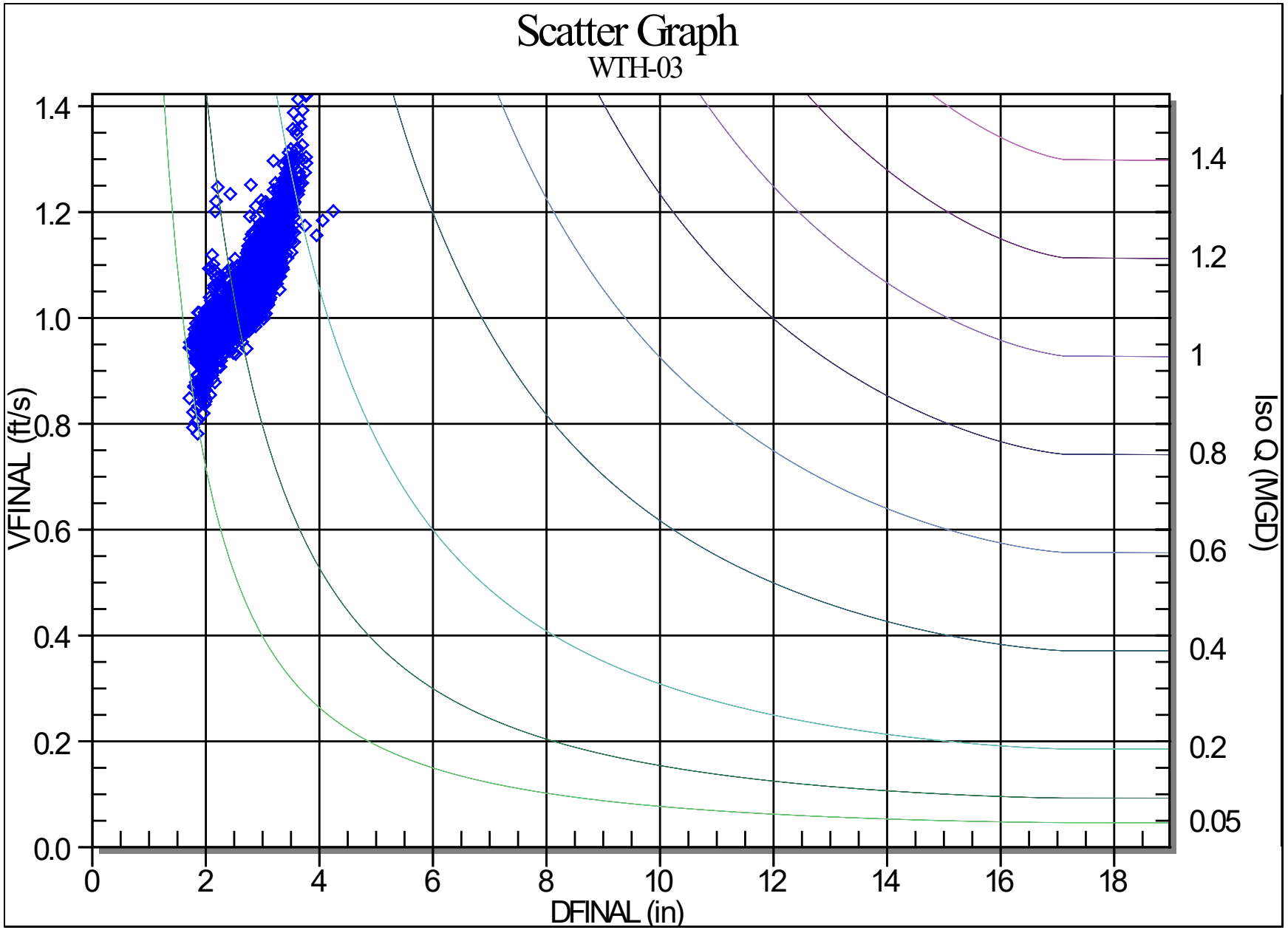

Q vs i - WTH-02
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)

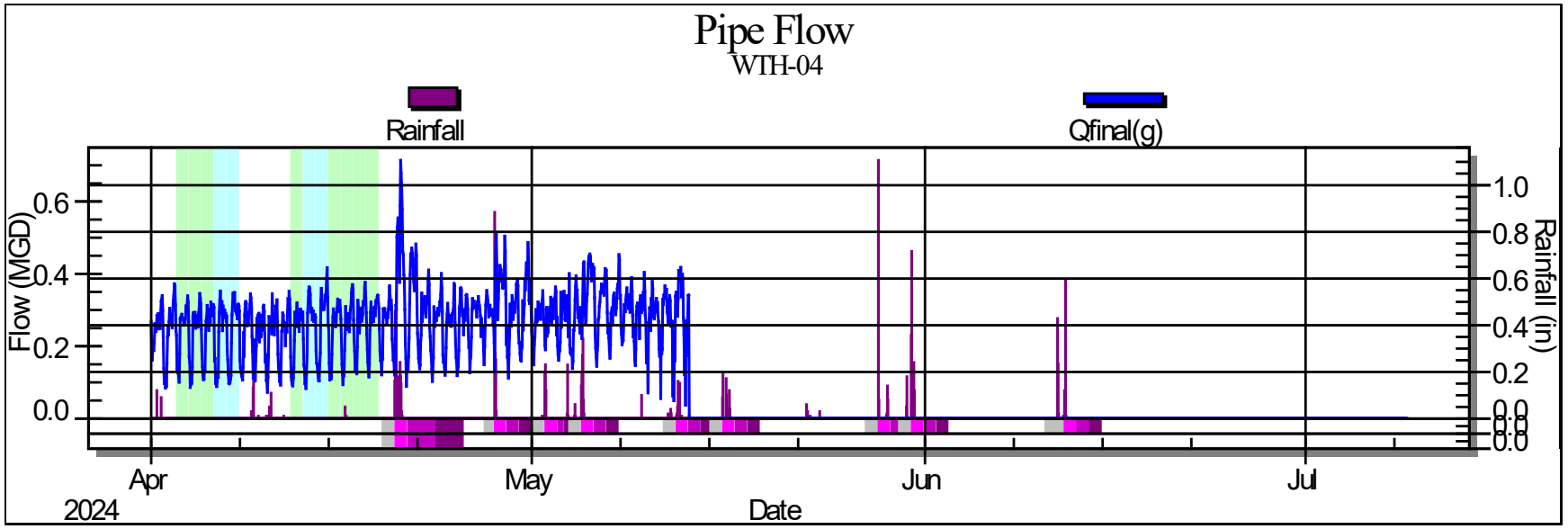

Scatter Graph
WTH-02
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0
1
2
3
4
5
6
7
8
9
10
0
2
4
6
8
10
12
14
16
18
0.25

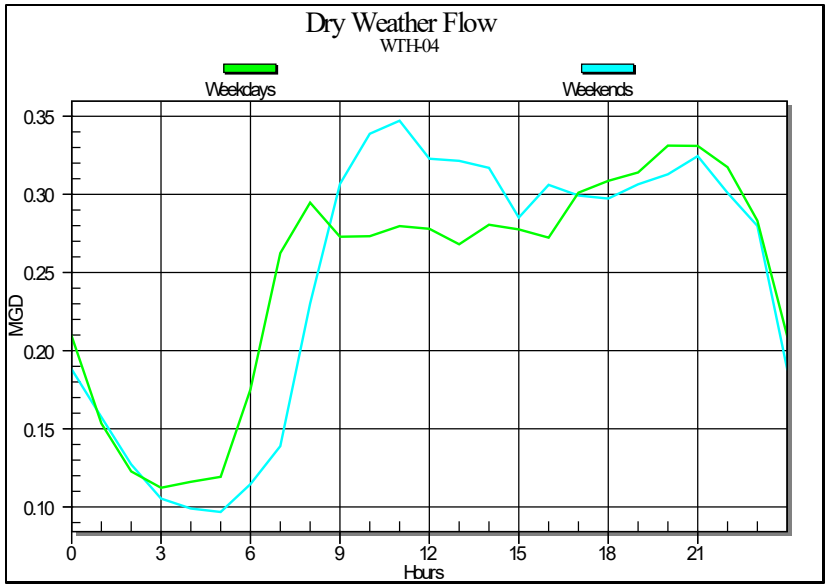

Pipe Flow
WTH-03
Rainfall
Qfinal(g)
Flow (MGD)
0.20
0.15
0.10
0.05
0.00
1.0
0.5
0.0
Rainfall (in)
Apr
2024
May
Jun
Jul
Date

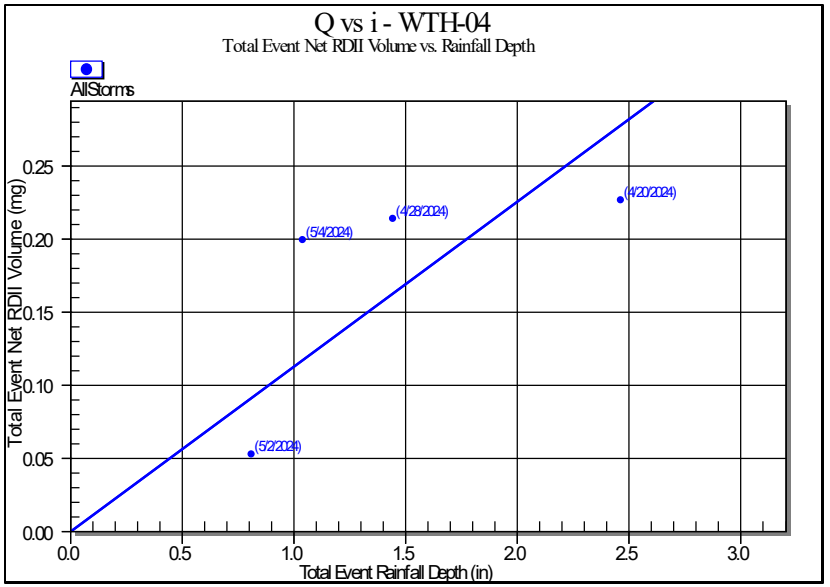

Dry Weather Flow
WTH-03
Weekdays
Weekends
MGD
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0
3
6
9
12
15
18
21
Hours

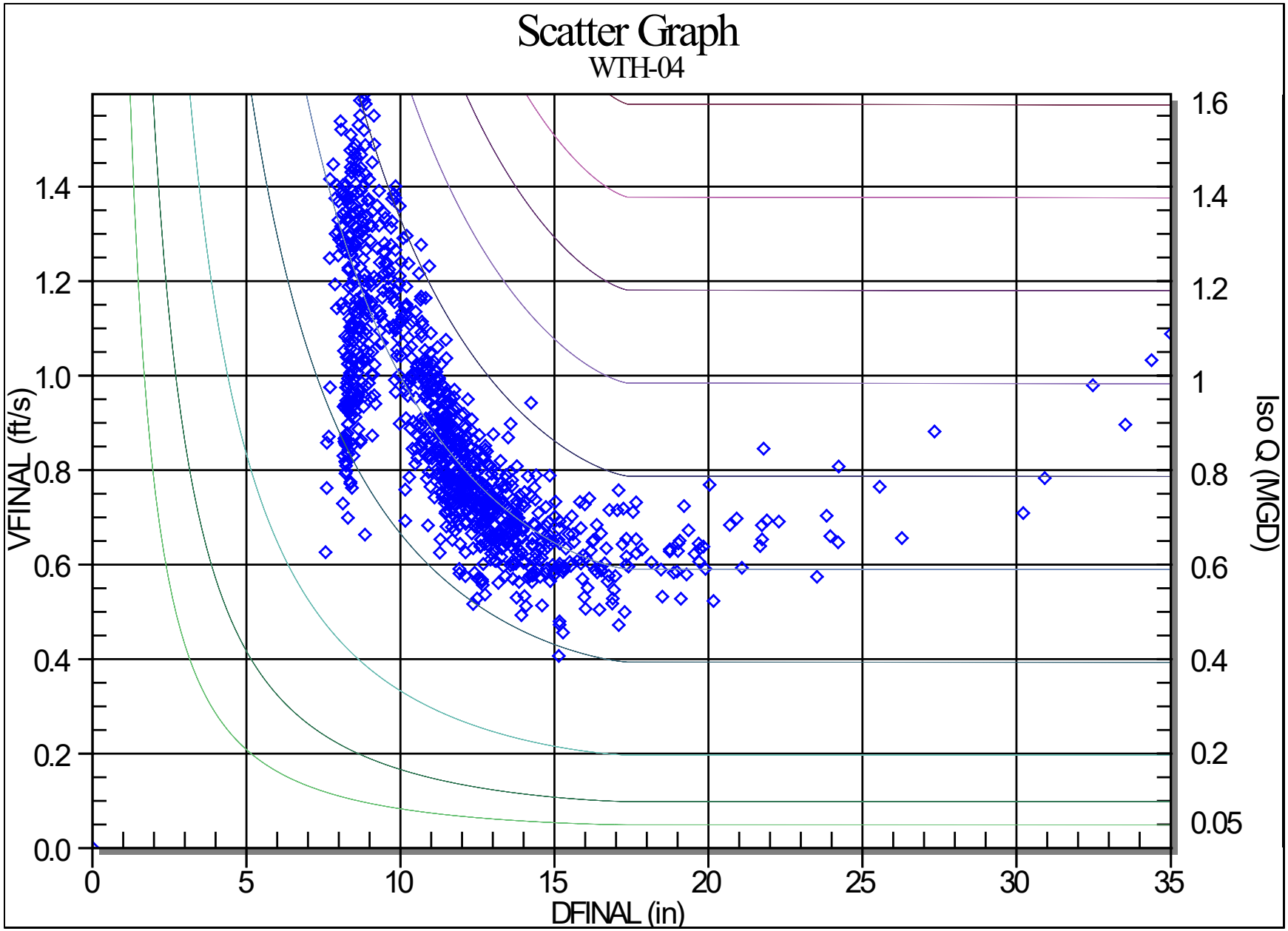

Q vs i - WTH-03
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Total Event Rainfall Depth (in)
(5/16/2024)
(5/30/2024)
(5/4/2024)
(5/22/2024)

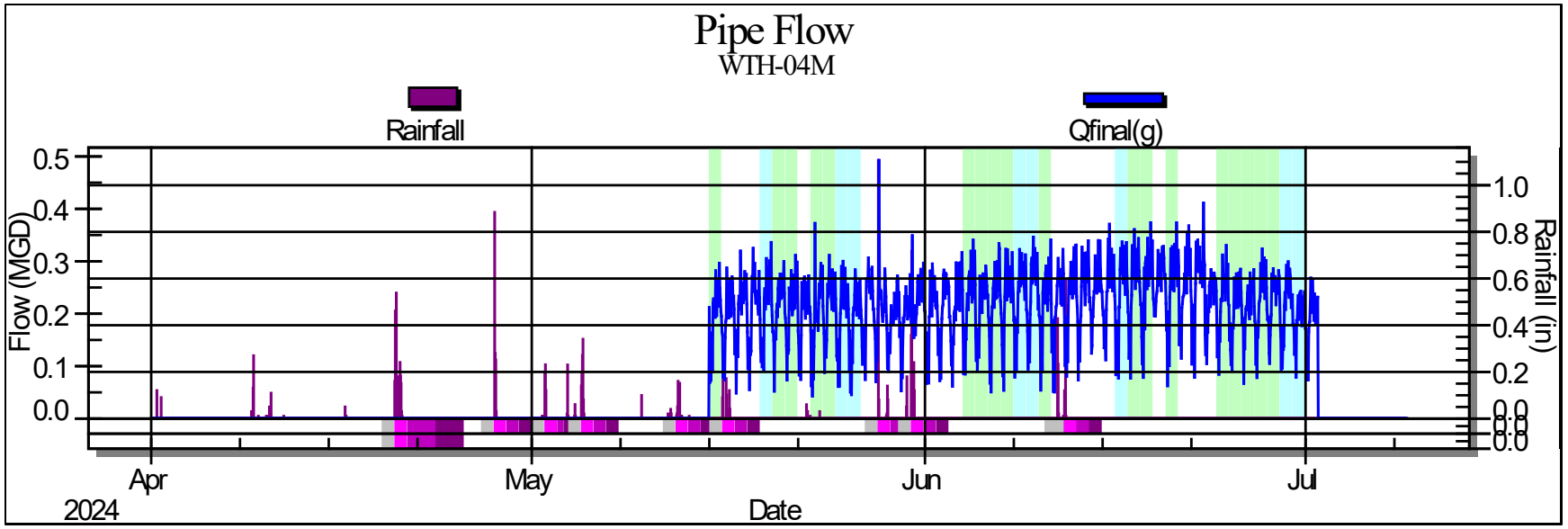

Scatter Graph
WTH-03
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
2
4
6
8
10
12
14
16
18
0.05
1

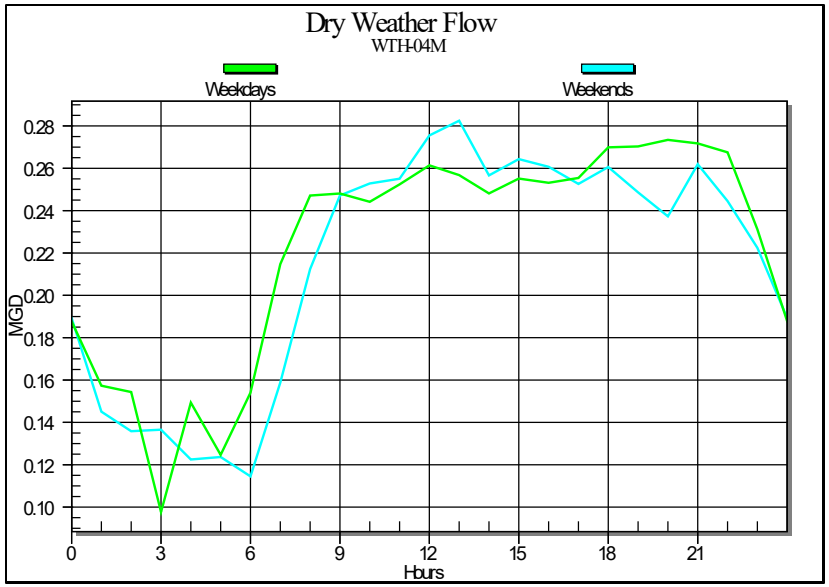

Pipe Flow
WTH-04
Rainfall
Qfinal(g)
Flow (MGD)
0.6
0.4
0.2
0.0
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall (in)
Apr
2024
May
Jun
Jul
Date

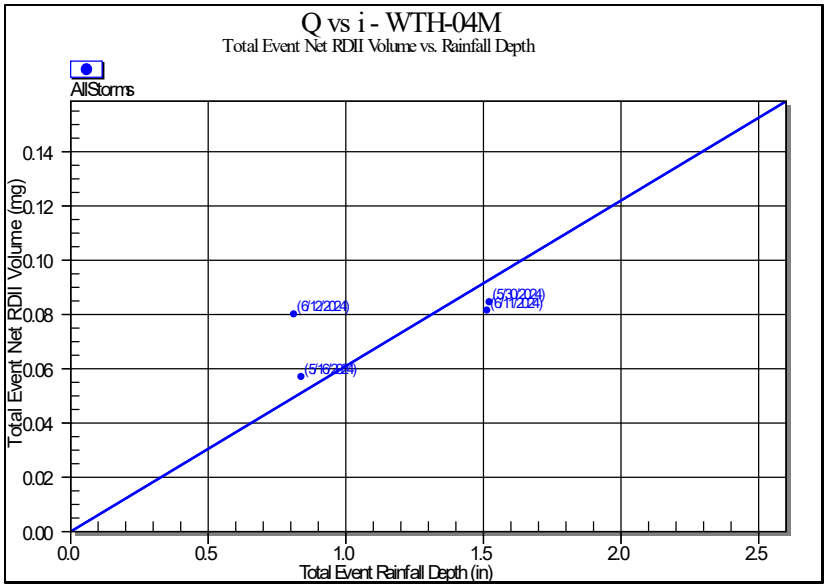

Dry Weather Flow
WTH-04
Weekdays
Weekends
MGD
0.35
0.30
0.25
0.20
0.15
0.10
0
3
6
9
12
15
18
21
Hours

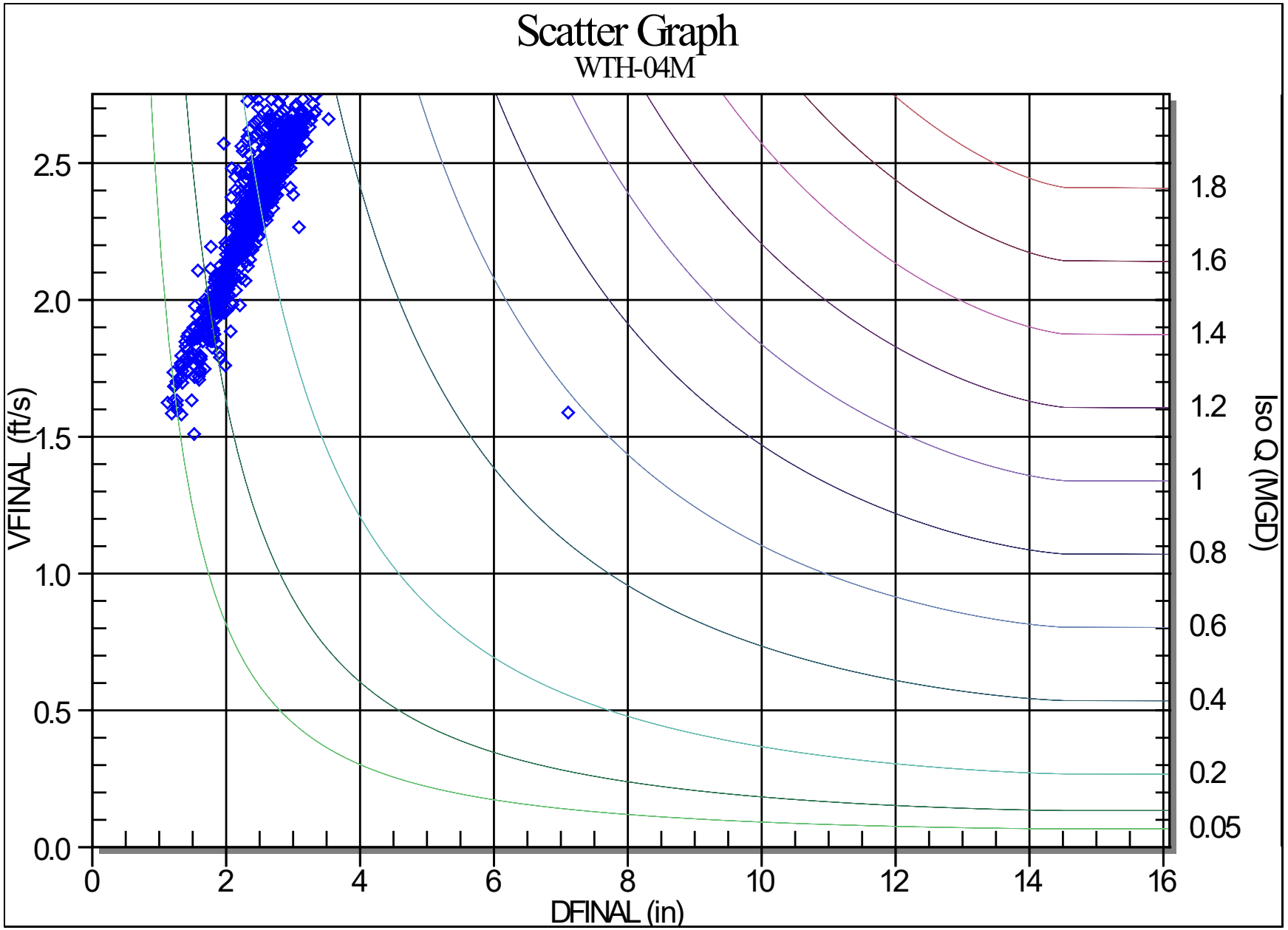

Q vs i - WTH-04
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.25
0.20
0.15
0.10
0.05
0.00
(4/20/2024)
(4/28/2024)
(5/4/2024)
(5/22/2024)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)

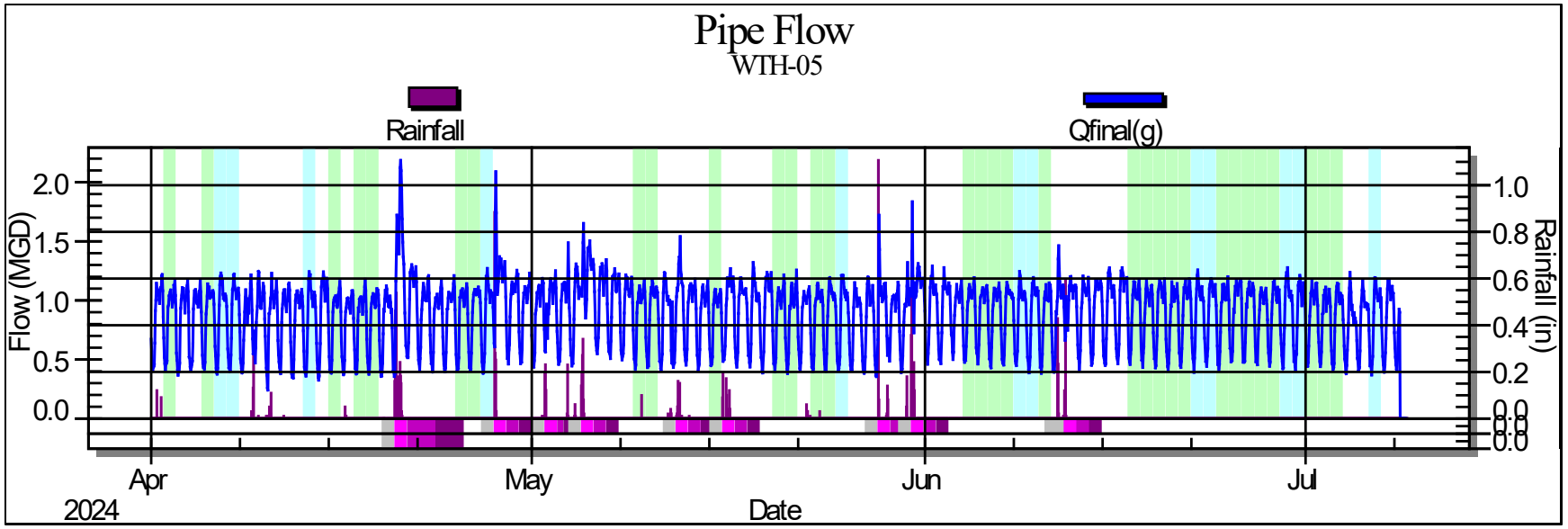

Scatter Graph
WTH-04
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
5
10
15
20
25
30
35
0.05
1
1.6

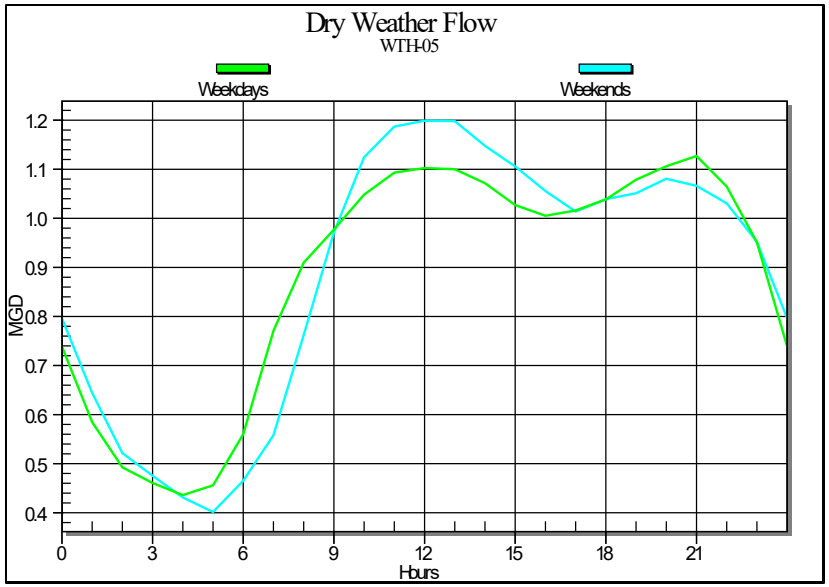

Pipe Flow
WTH-04M
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
0.5
0.4
0.3
0.2
0.1
0.0
1.0
0.8
0.6
0.4
0.2
0.0
Apr
2024
May
Jun
Jul
Date

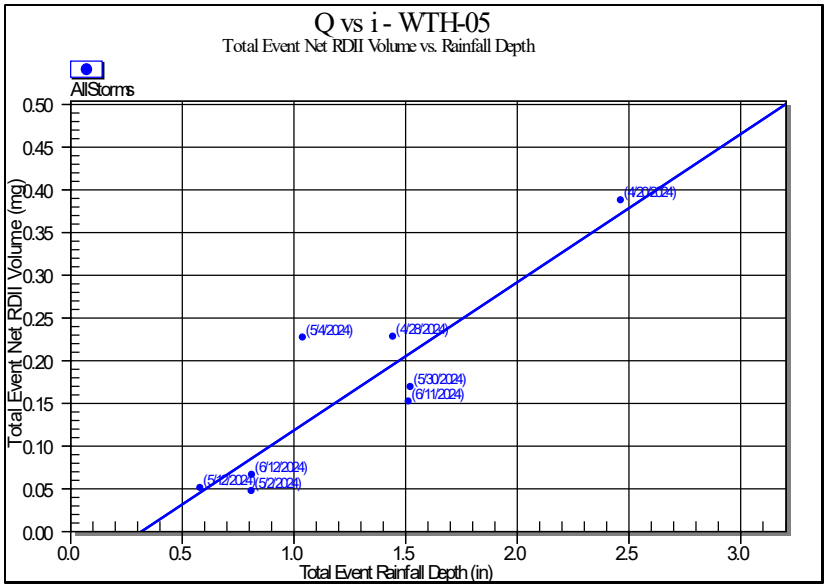

Dry Weather Flow
WTH-04M
Weekdays
Weekends
MGD
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0
3
6
9
12
15
18
21
Hours

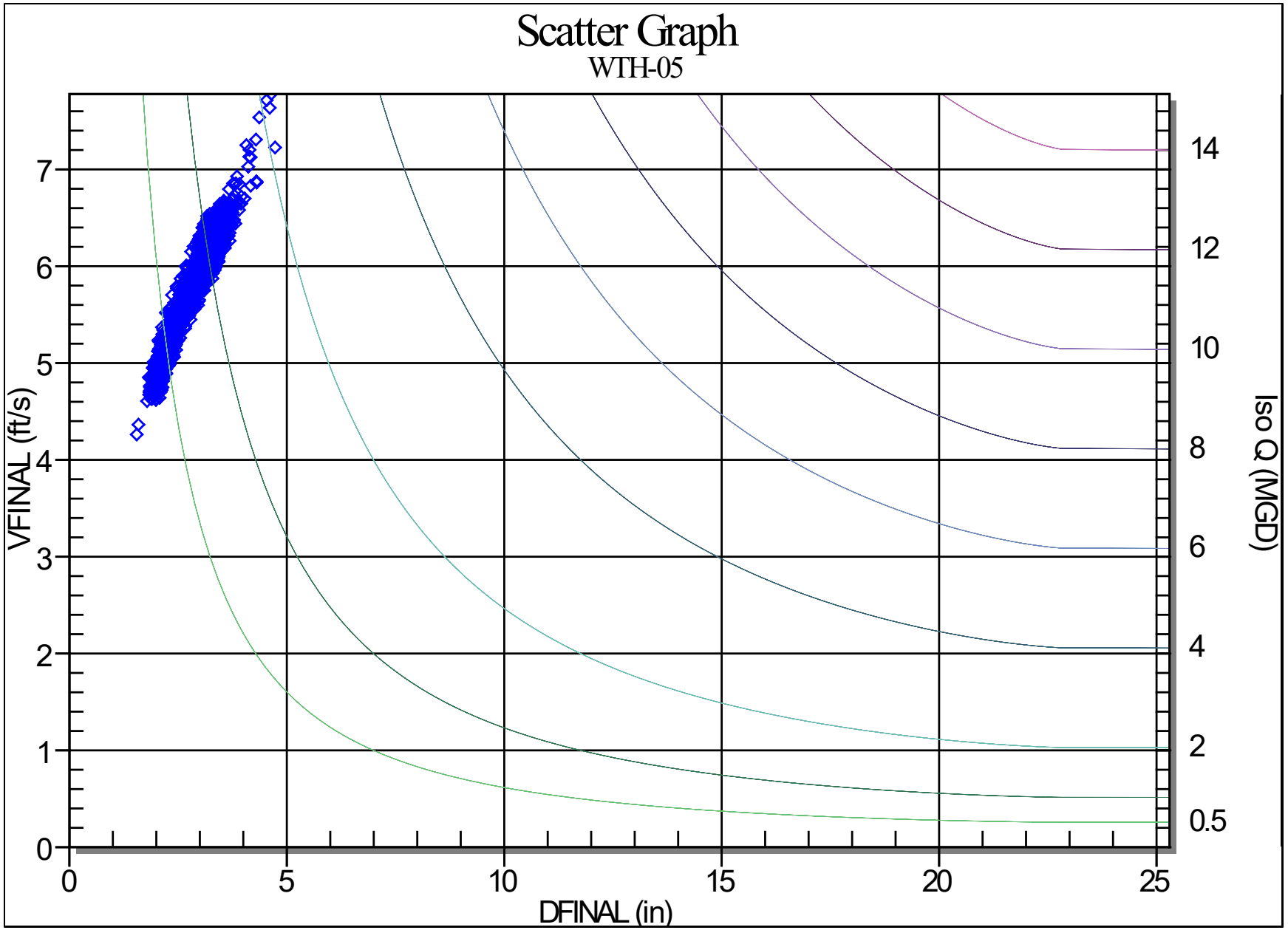

Q vs i - WTH-04M
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.5
1.0
1.5
2.0
2.5
Total Event Rainfall Depth (in)

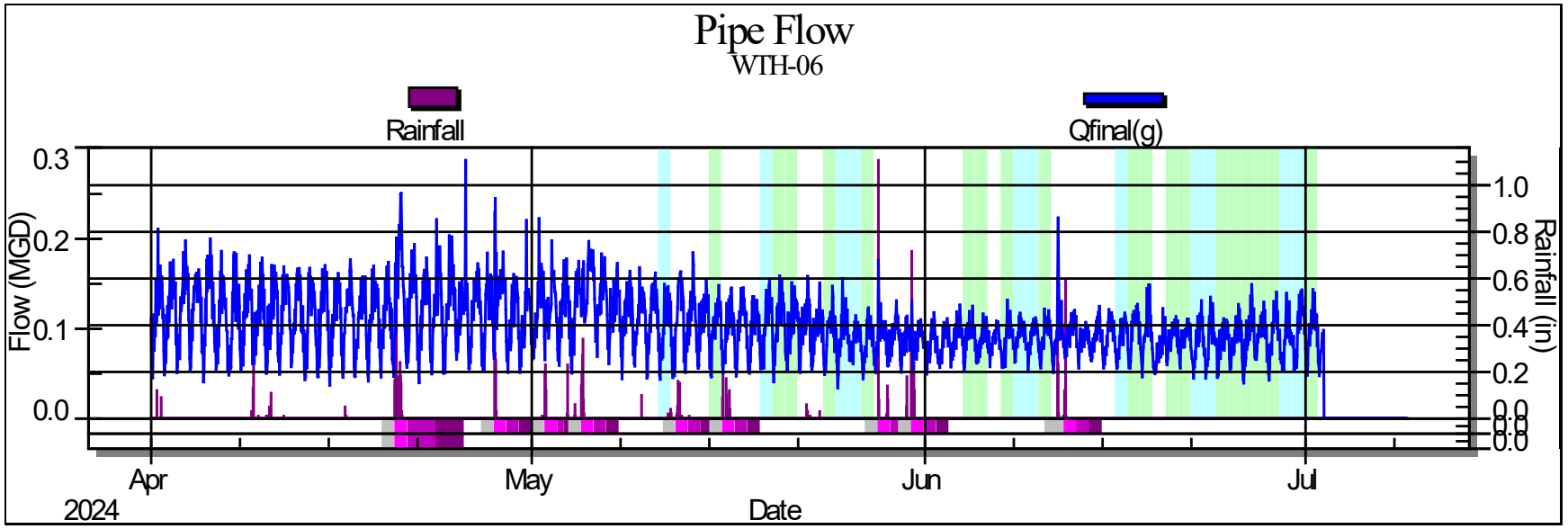

Scatter Graph
WTH-04M
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.5
1.0
1.5
2.0
2.5
0
2
4
6
8
10
12
14
16
0.05
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8

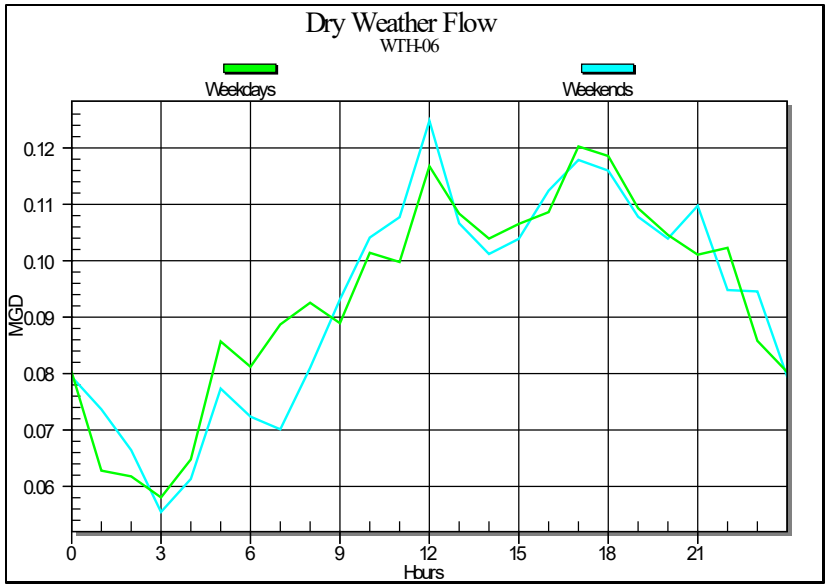

Pipe Flow
WTH-05
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
2.0
1.5
1.0
0.5
0.0
1.0
0.8
0.6
0.4
0.2
0.0
Apr
2024
May
Jun
Jul
Date

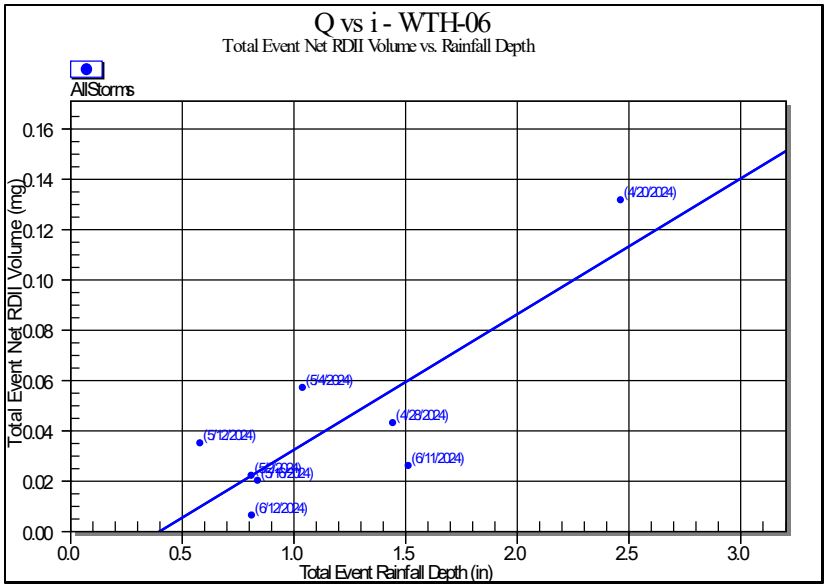

Dry Weather Flow
WTH-05
Weekdays
Weekends
MGD
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0
3
6
9
12
15
18
21
Hours

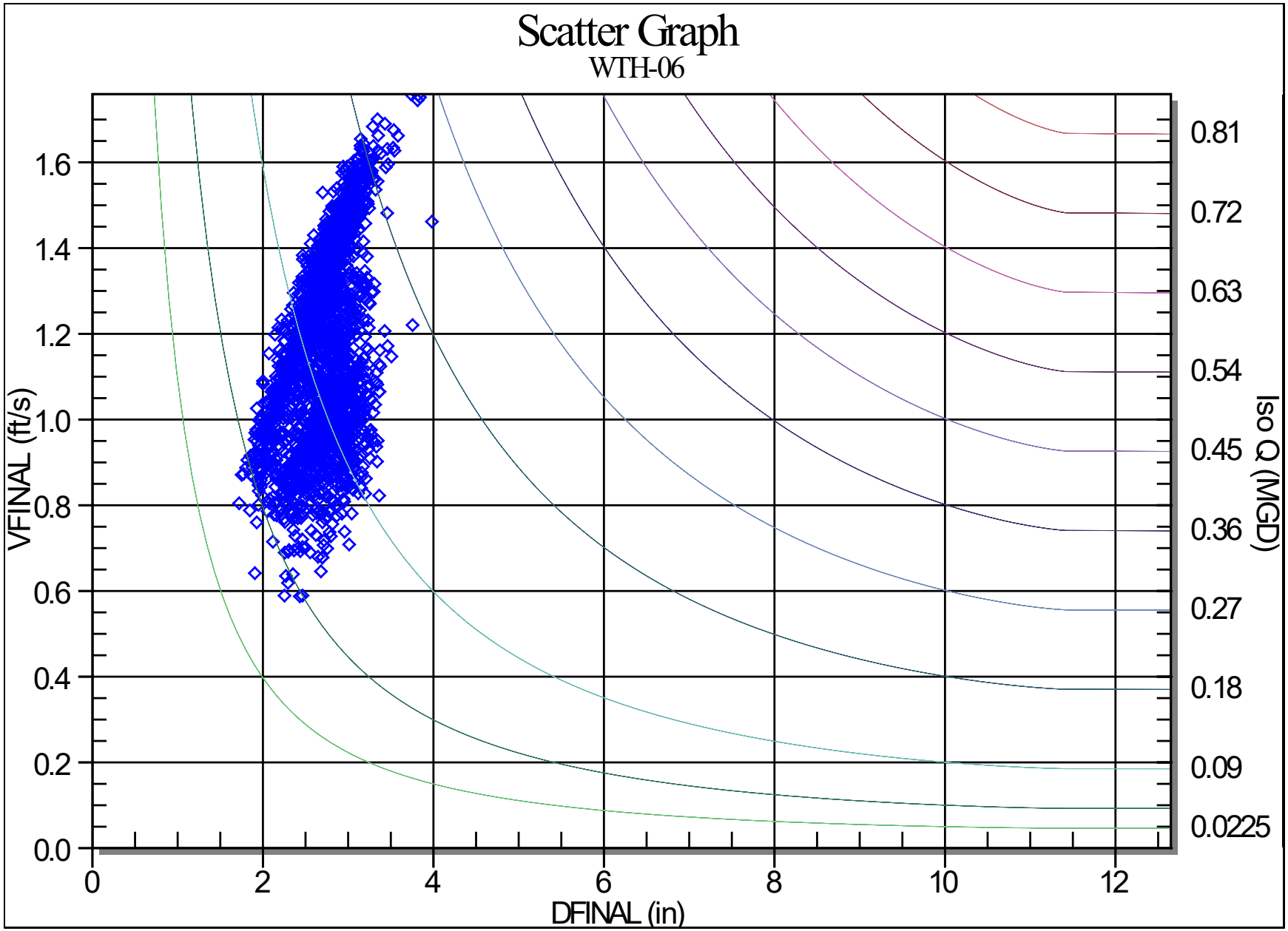

Q vs i - WTH-05
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)
(5/4/2024)
(4/28/2024)
(5/30/2024)
(6/11/2024)
(6/12/2024)
(5/27/2024)

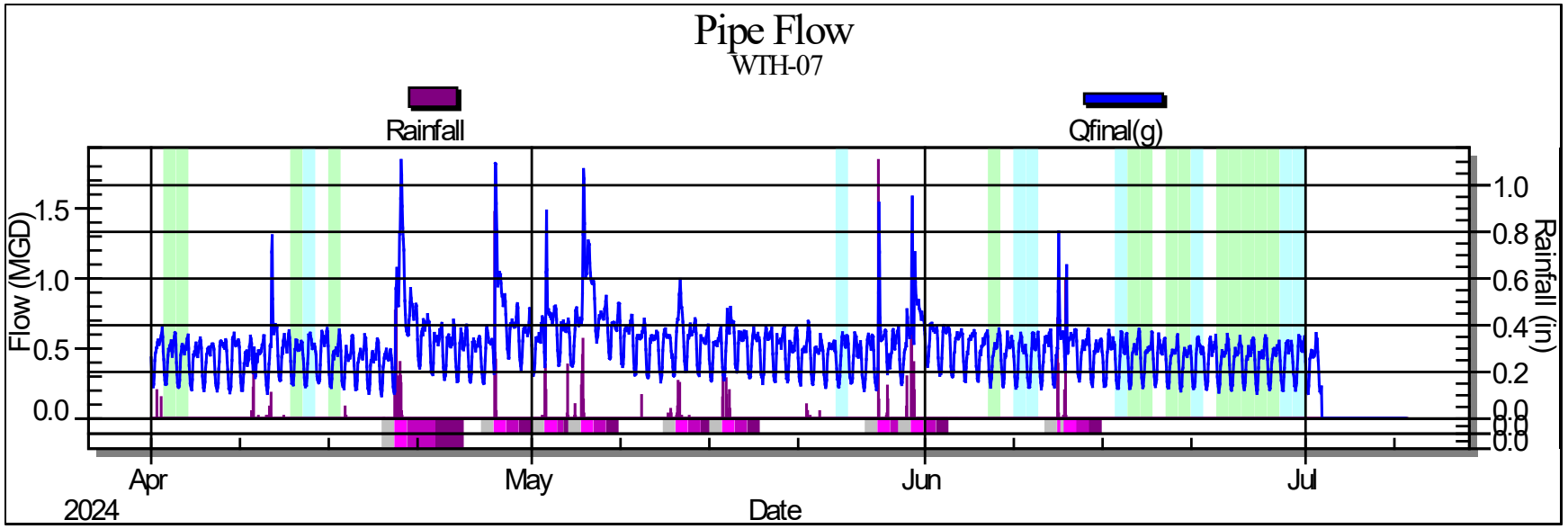

Scatter Graph
WTH-05
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0
1
2
3
4
5
6
7
0
5
10
15
20
25
0.5
2
4
6
8
10
12
14

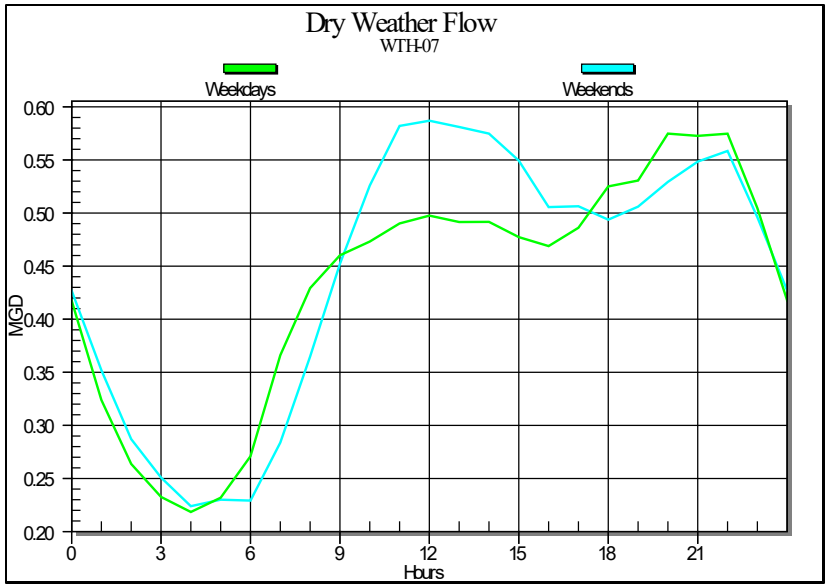

Pipe Flow
WTH-06
Rainfall
Qfinal(g)
Flow (MGD)
0.3
0.2
0.1
0.0
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall (in)
Apr
2024
May
Jun
Jul
Date

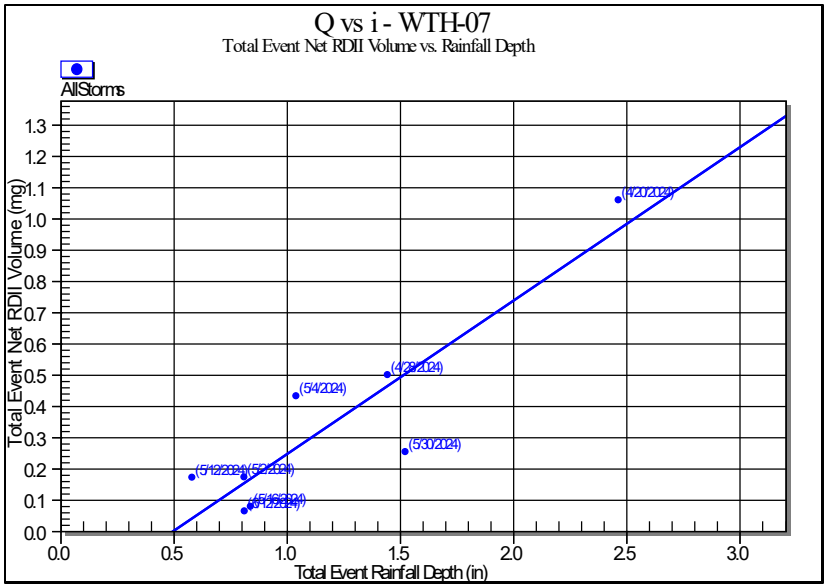

Dry Weather Flow
WTH-06
Weekdays
Weekends
MGD
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0
3
6
9
12
15
18
21
Hours

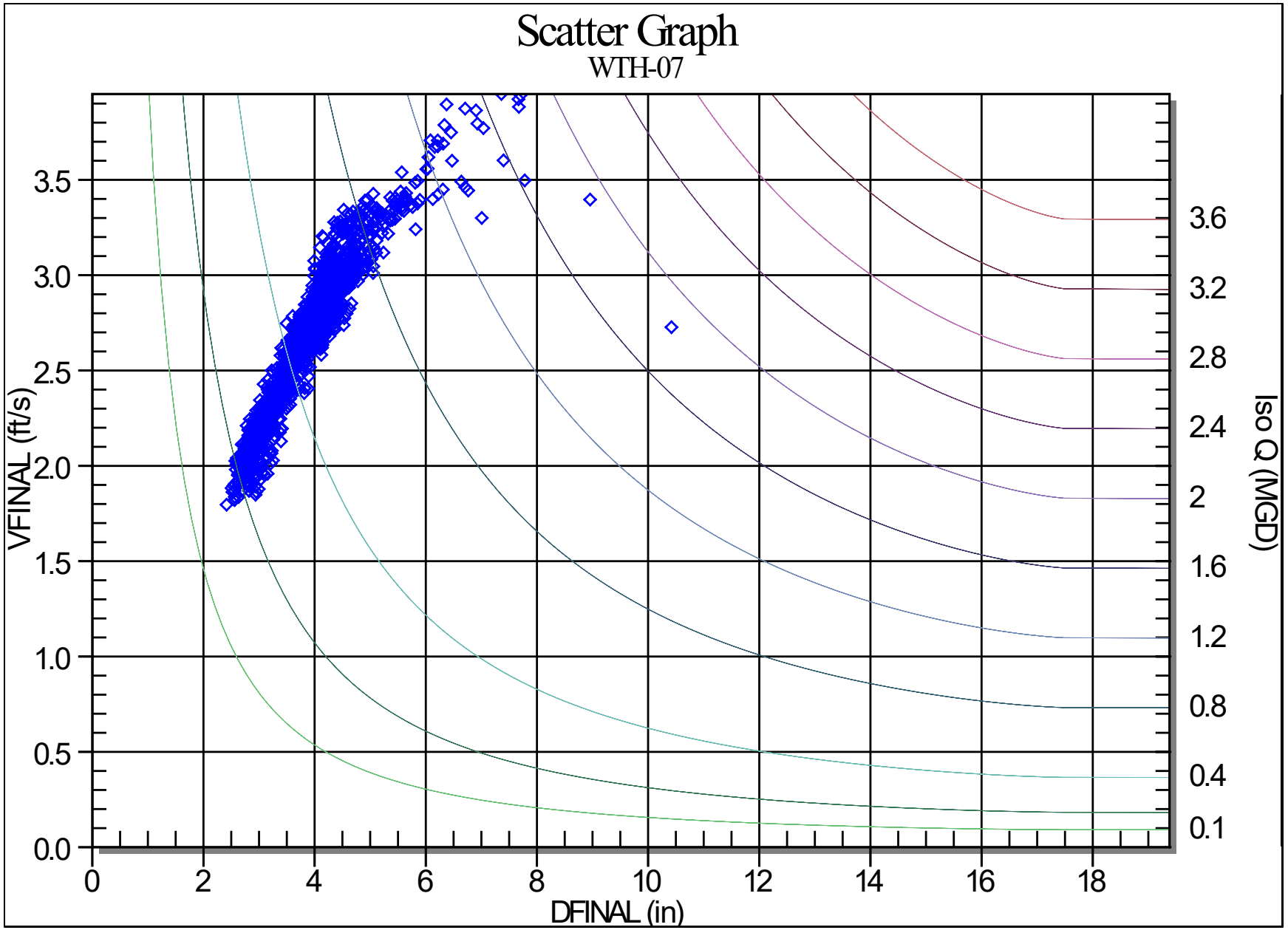

Q vs i - WTH-06
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)
(4/20/2024)
(5/4/2024)
(4/28/2024)
(5/12/2024)
(6/11/2024)
(6/12/2024)

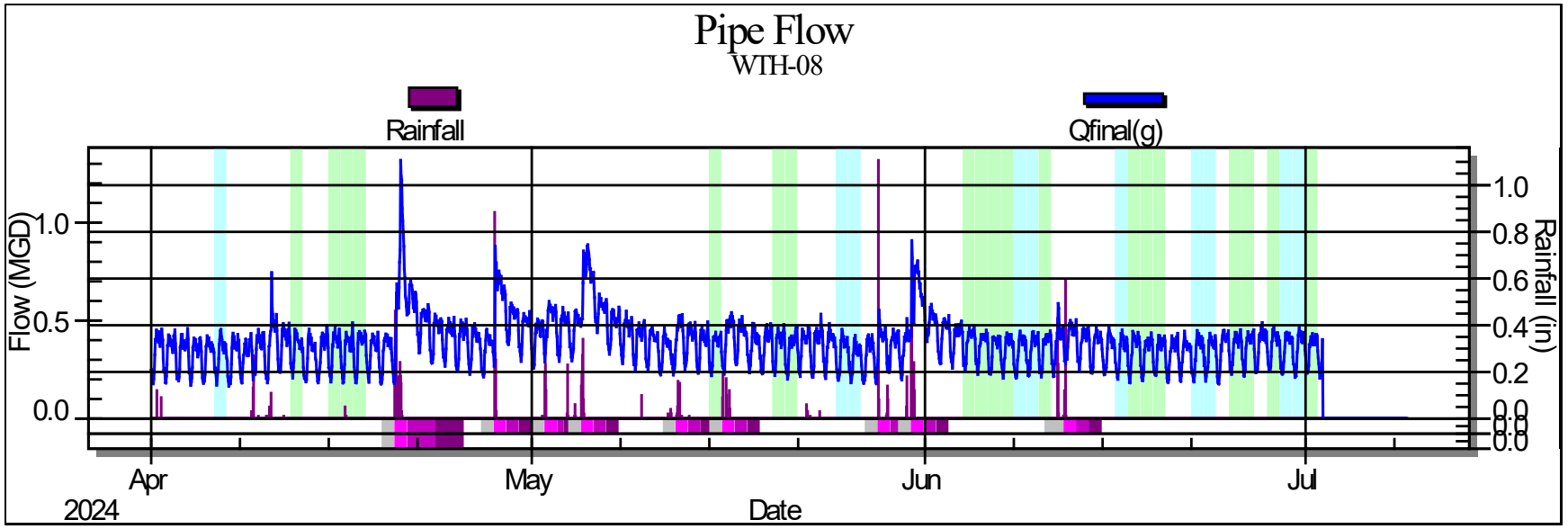

Scatter Graph
WTH-06
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0
2
4
6
8
10
12
0.81
0.72
0.63
0.54
0.45
0.36
0.27
0.18
0.09
0.0225

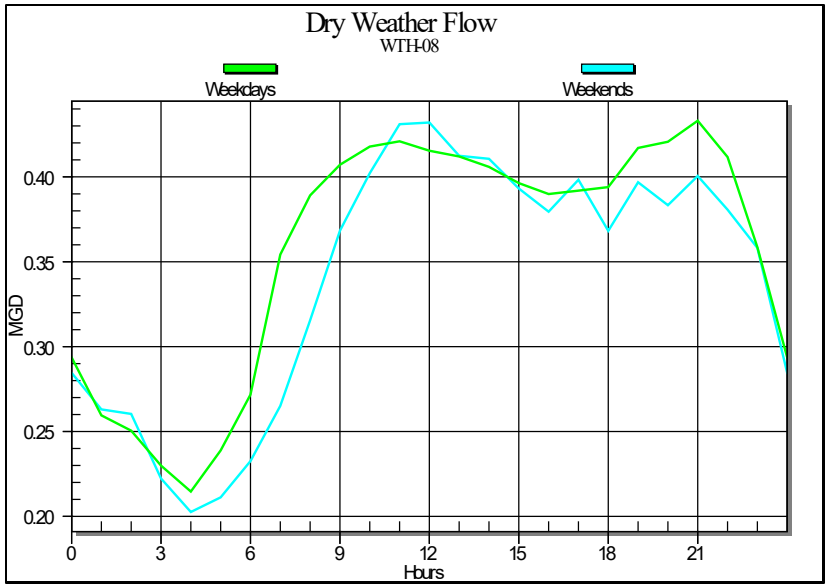

Pipe Flow
WTH-07
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
1.5
1.0
0.5
0.0
1.0
0.8
0.6
0.4
0.2
0.0
Apr
2024
May
Jun
Jul
Date

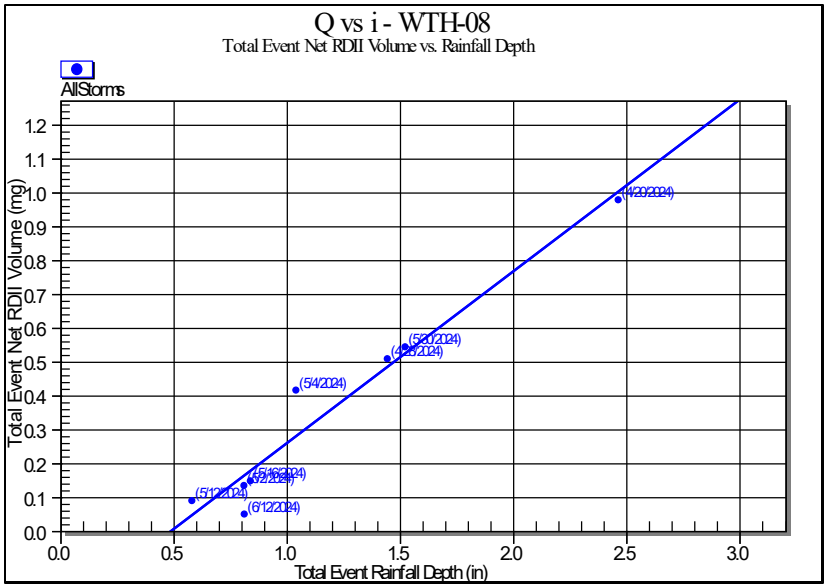

Dry Weather Flow
WTH-07
Weekdays
Weekends
MGD
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0
3
6
9
12
15
18
21
Hours

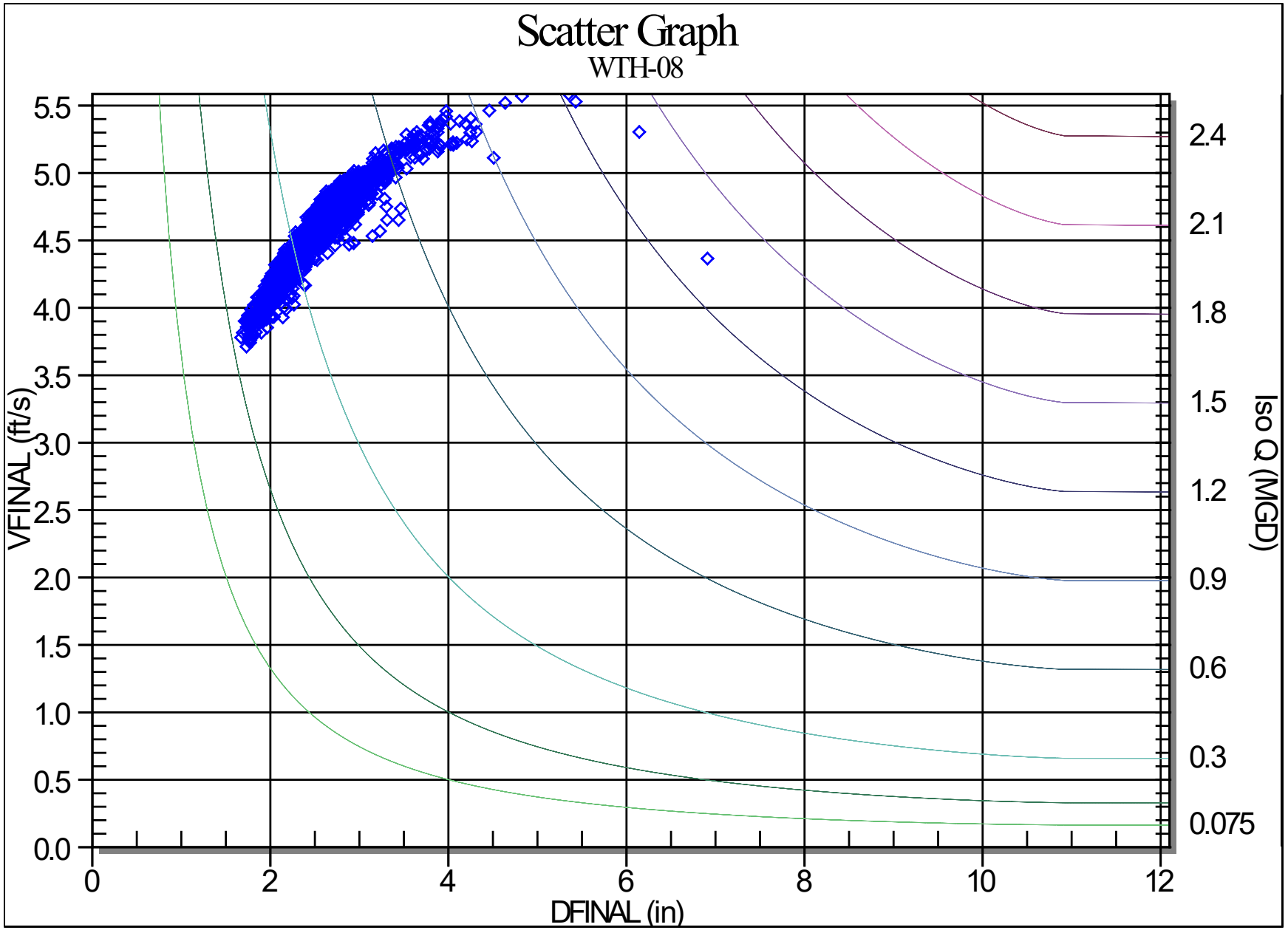

Q vs i - WTH-07
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)
(5/4/2024)
(5/30/2024)

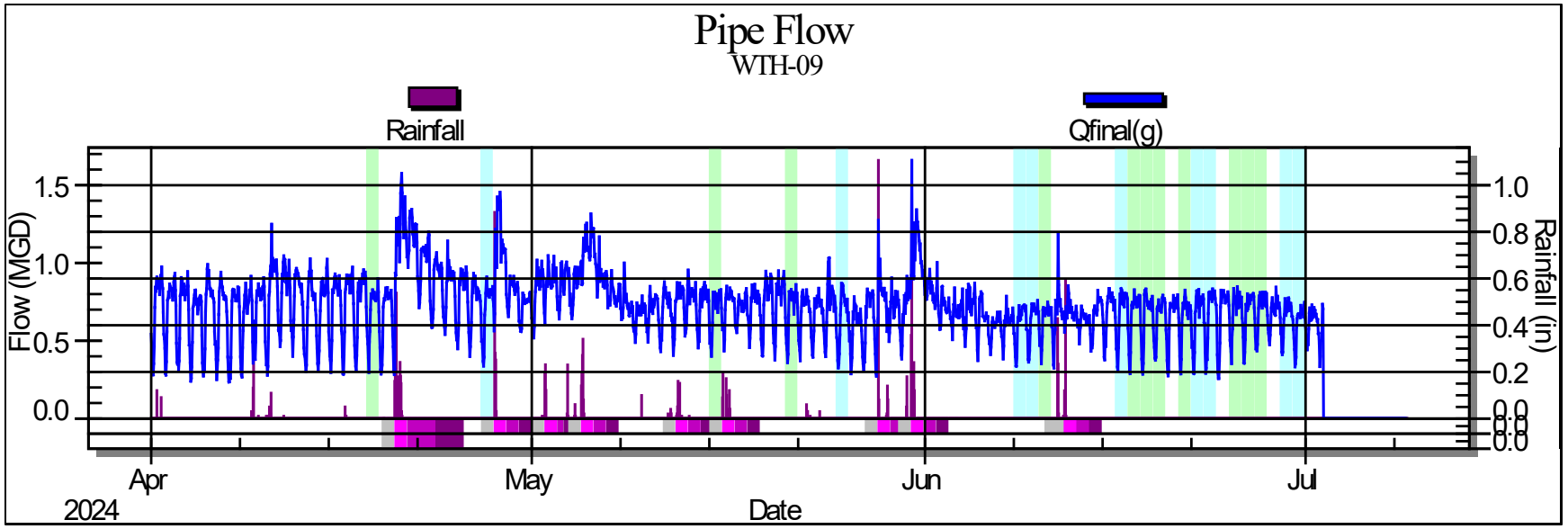

Scatter Graph
WTH-07
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
2
4
6
8
10
12
14
16
18
0.1
0.4
0.8
1.2
1.6
2
2.4
2.8
3.2
3.6

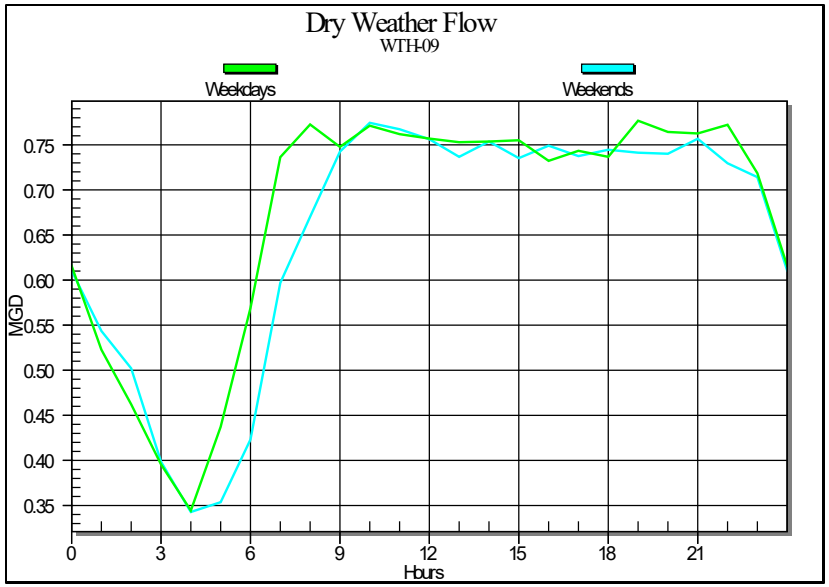

Pipe Flow
WTH-08
Rainfall
Qfinal(g)
Flow (MGD)
1.0
0.5
0.0
Rainfall (in)
1.0
0.8
0.6
0.4
0.2
0.0
Apr
2024
May
Jun
Jul
Date

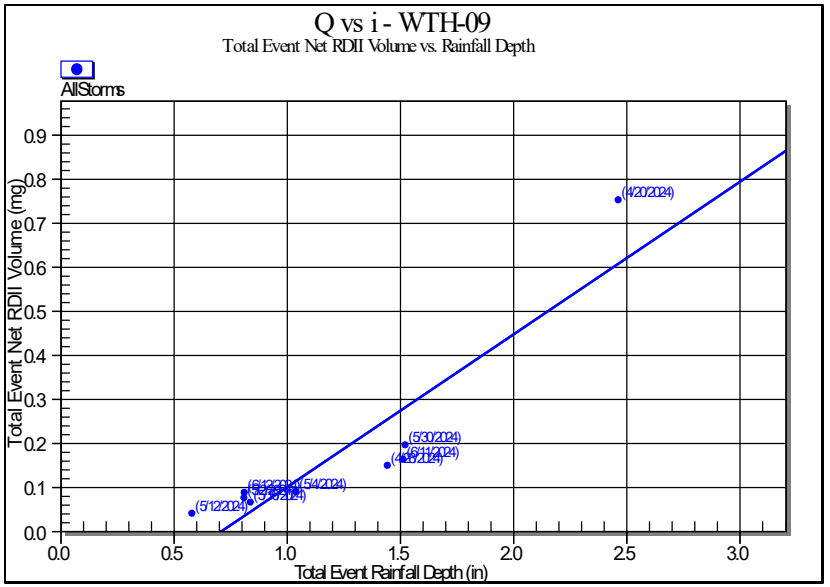

Dry Weather Flow
WTH-08
Weekdays
Weekends
MGD
0.40
0.35
0.30
0.25
0.20
0
3
6
9
12
15
18
21
Hours

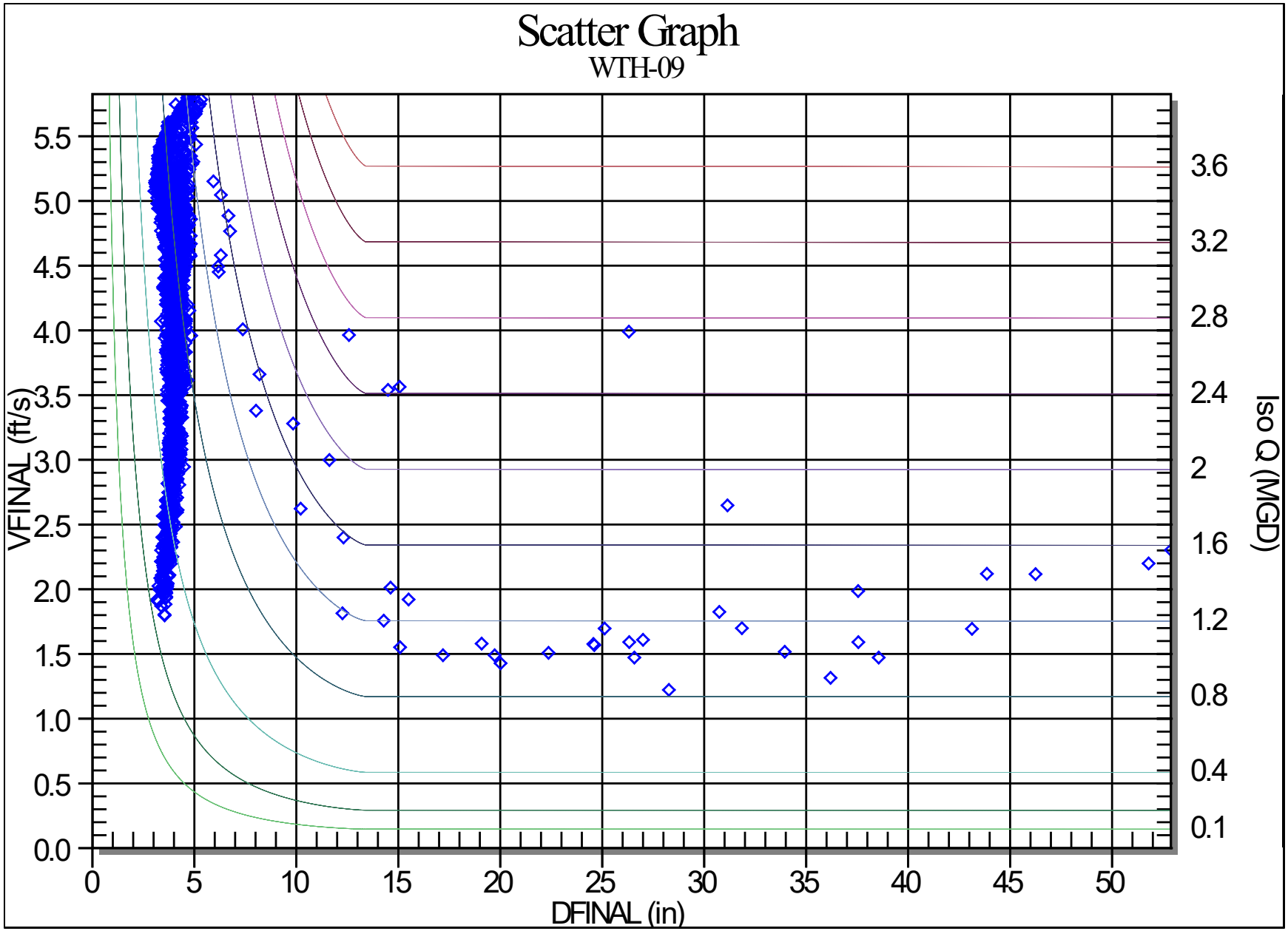

Q vs i - WTH-08
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)

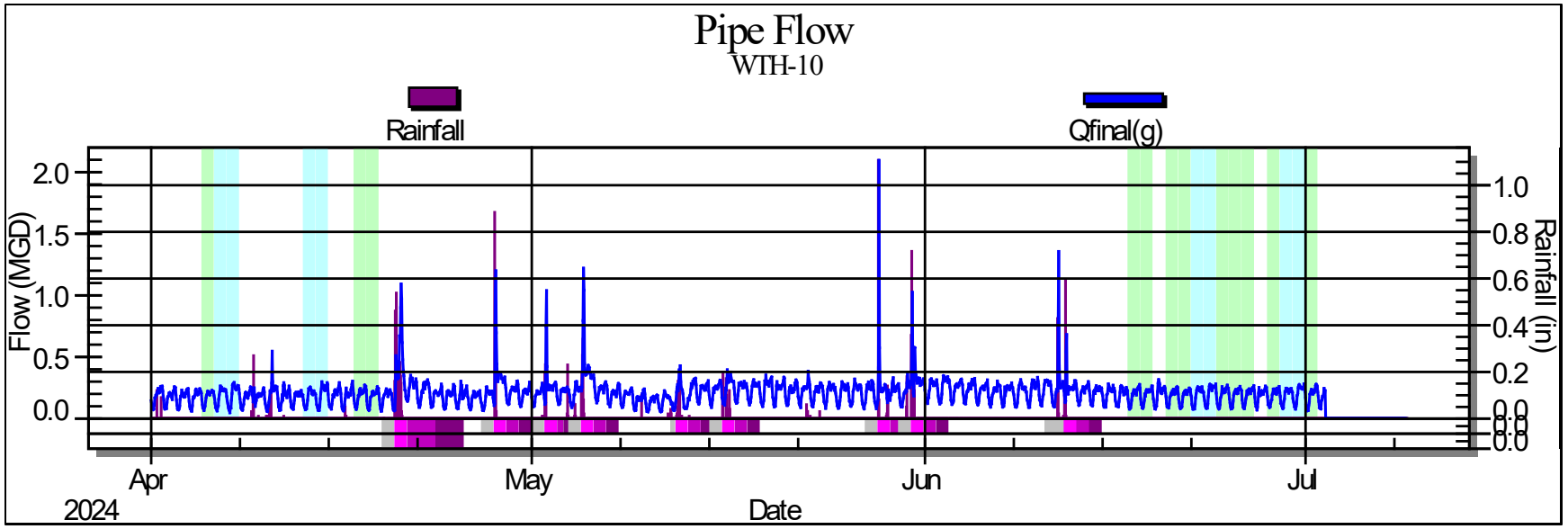

Scatter Graph
WTH-08
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
12
2.4
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0.075

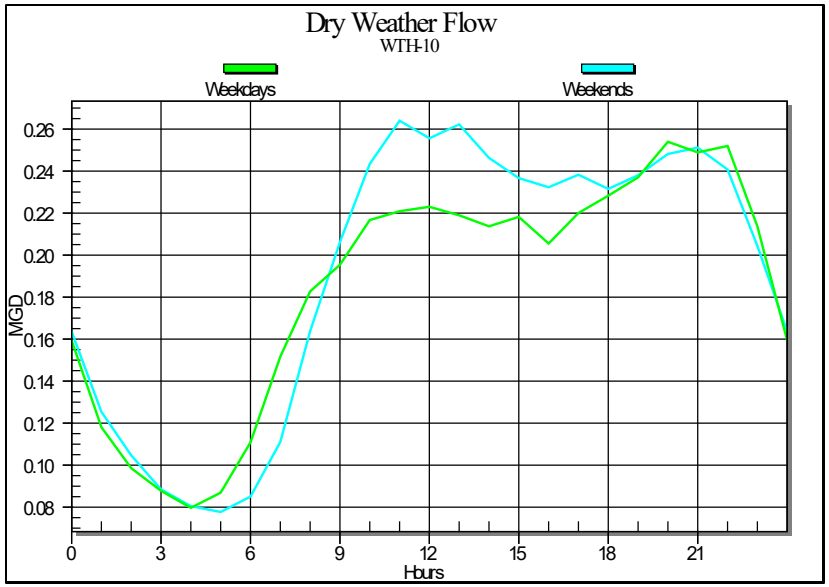

Pipe Flow
WTH-09
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
1.5
1.0
0.5
0.0
1.0
0.8
0.6
0.4
0.2
0.0
Apr
2024
May
Jun
Jul
Date

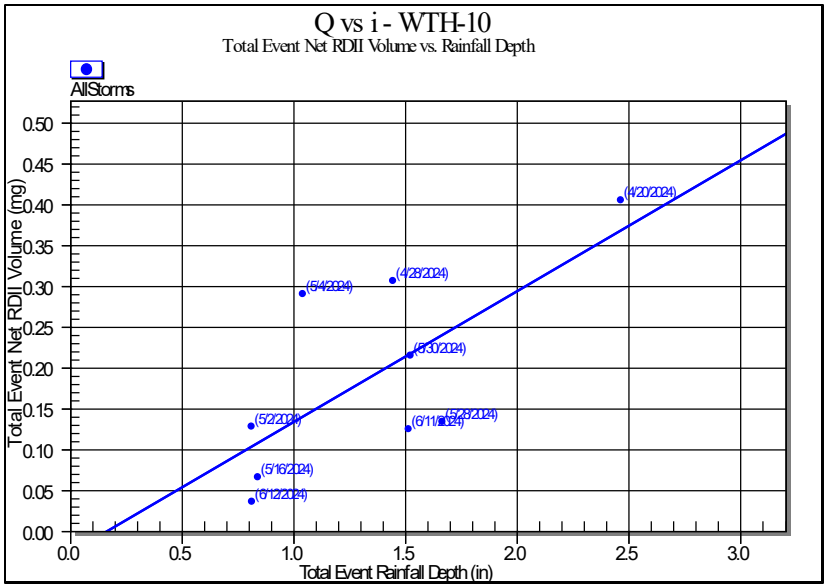

Dry Weather Flow
WTH-09
Weekdays
Weekends
MGD
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0
3
6
9
12
15
18
21
Hours

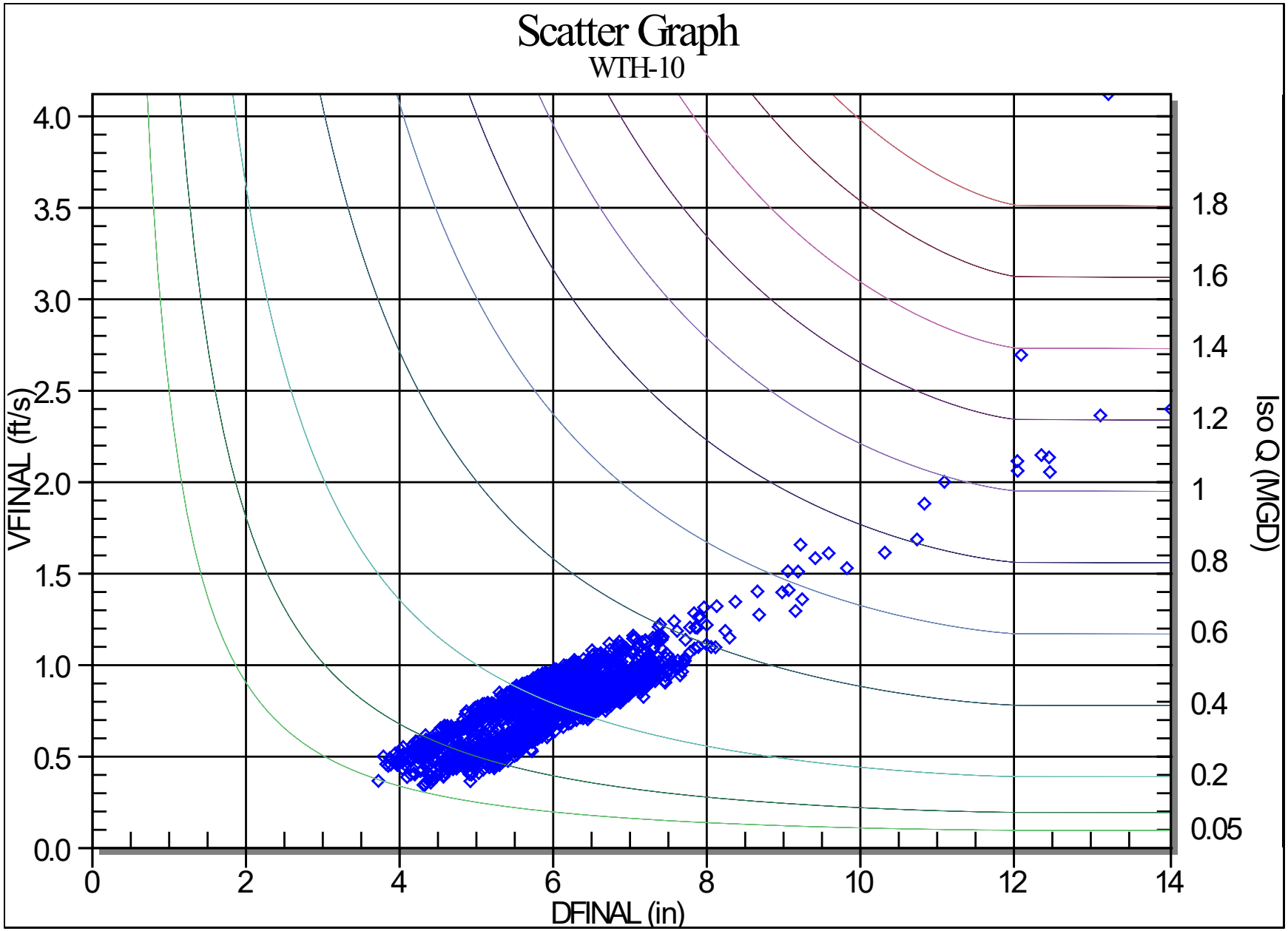

Q vs i - WTH-09
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)
(4/20/2024)
(5/30/2024)
(5/12/2024)

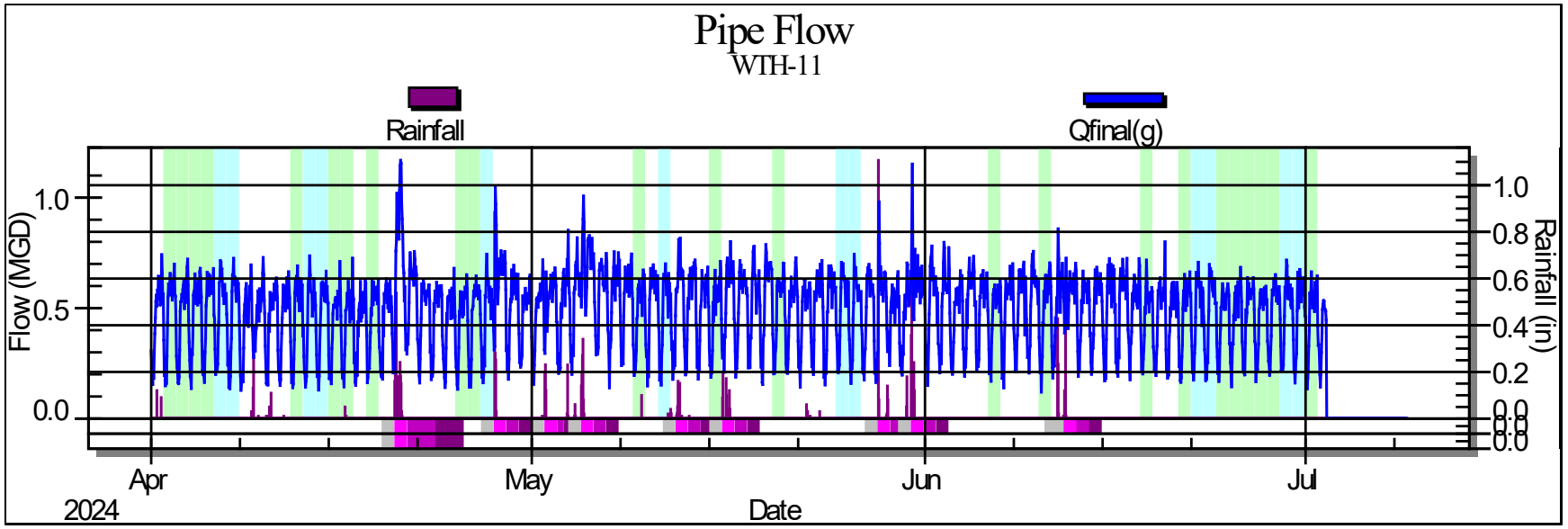

Scatter Graph
WTH-09
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
0
5
10
15
20
25
30
35
40
45
50
0.1
0.4
0.8
1.2
1.6
2
2.4
2.8
3.2
3.6

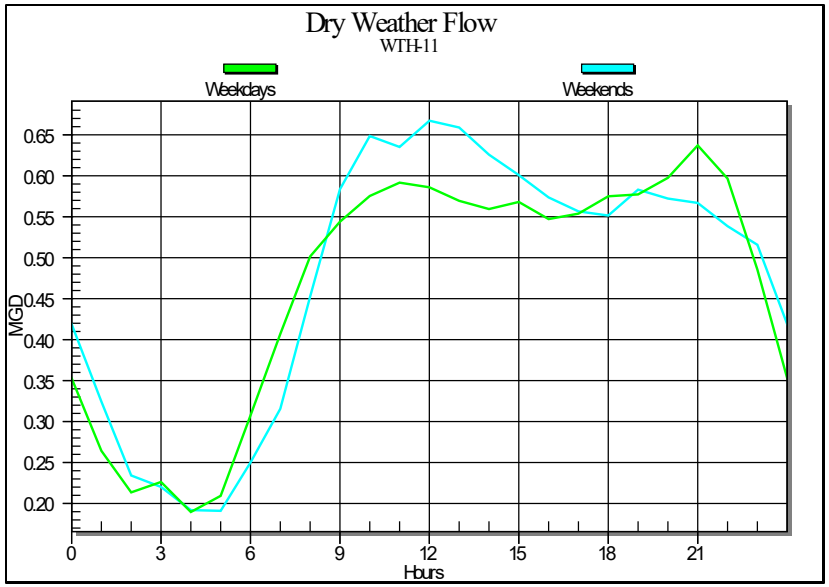

Pipe Flow
WTH-10
Rainfall
Qfinal(g)
Flow (MGD)
Rainfall (in)
2.0
1.5
1.0
0.5
0.0
1.0
0.8
0.6
0.4
0.2
0.0
Apr
2024
May
Jun
Jul
Date

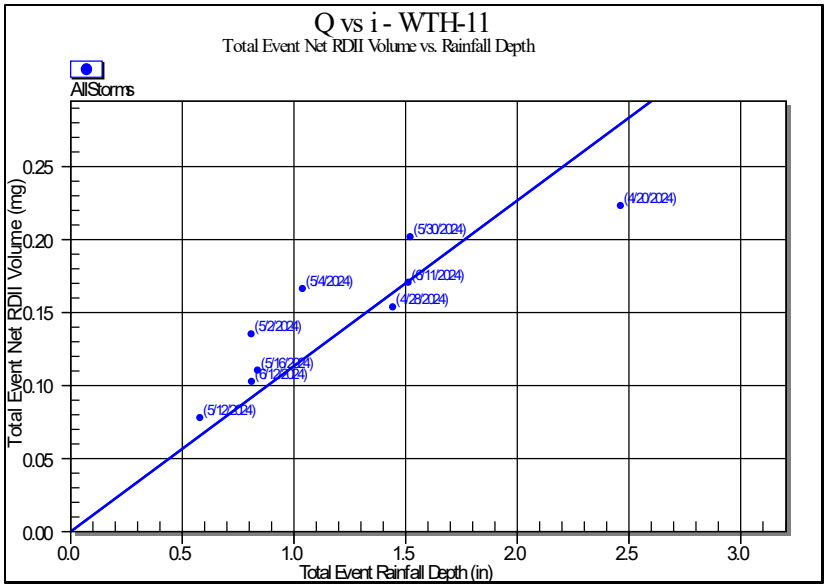

Dry Weather Flow
WTH-10
Weekdays
Weekends
MGD
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0
3
6
9
12
15
18
21
Hours

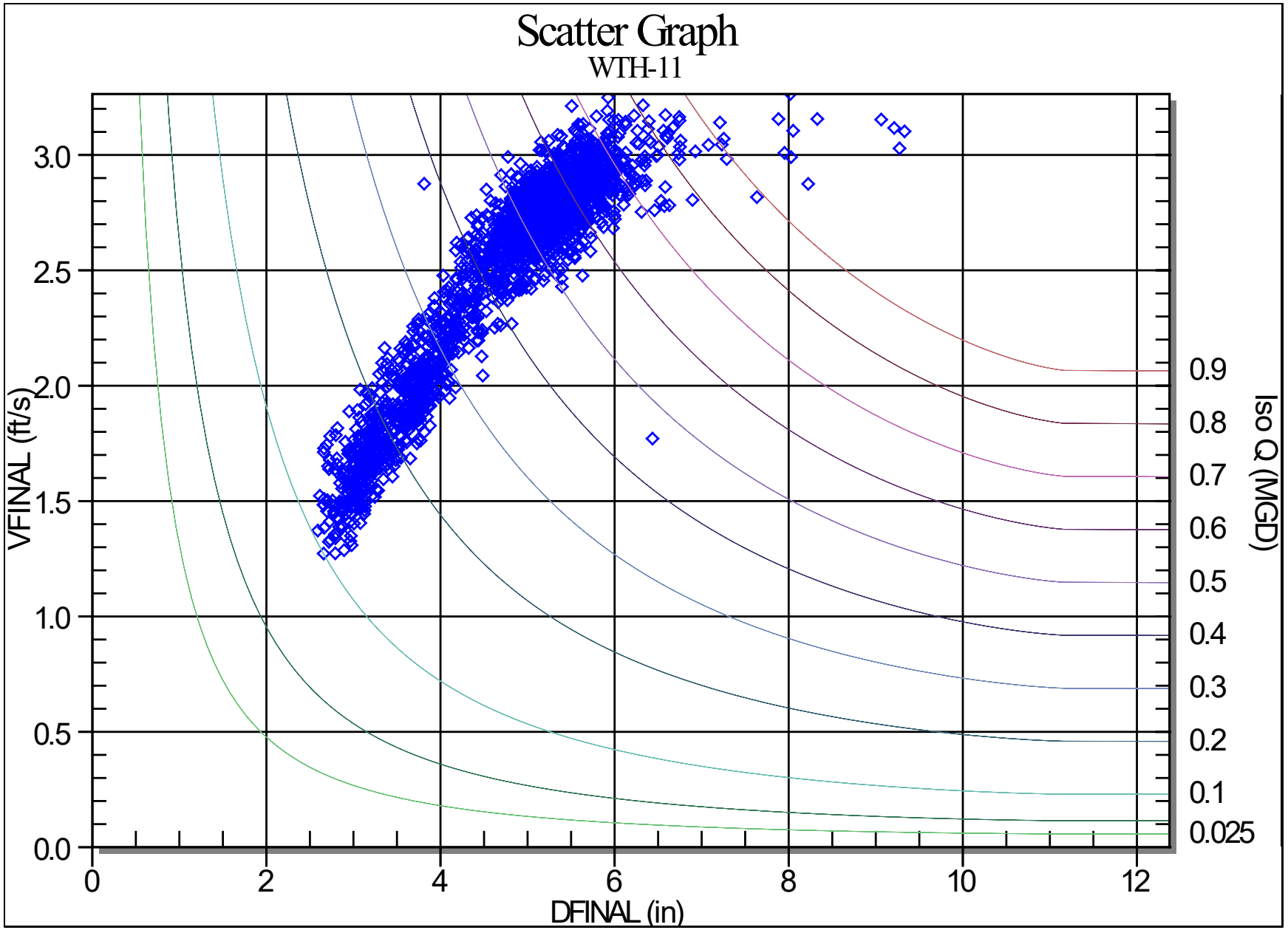

Q vs i - WTH-10
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)
(4/20/2024)
(4/28/2024)
(5/4/2024)
(5/30/2024)
(5/2/2024)
(5/16/2024)
(6/12/2024)

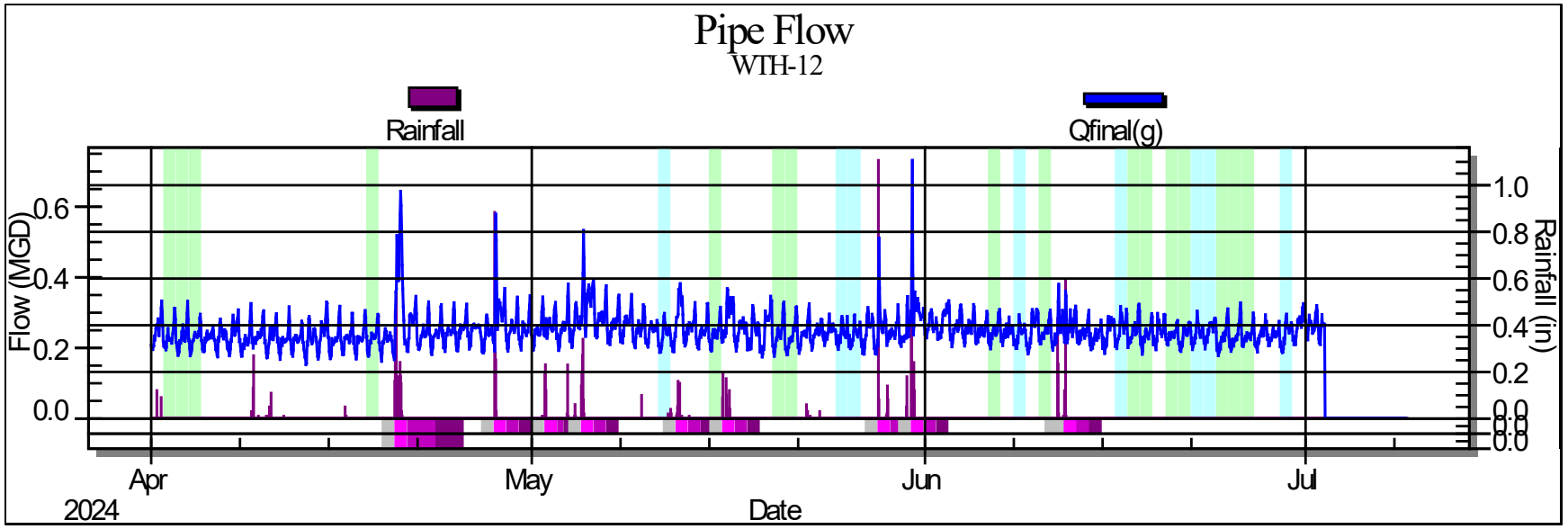

Scatter Graph
WTH-10
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
2
4
6
8
10
12
14
0.05
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8

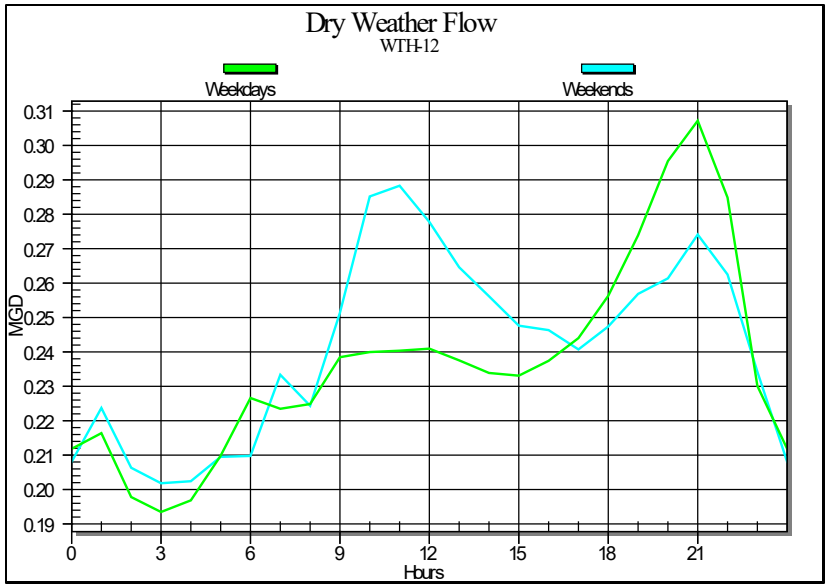

Pipe Flow
WTH-11
Rainfall
Qfinal(g)
Flow (MGD)
1.0
0.5
0.0
Rainfall (in)
1.0
0.8
0.6
0.4
0.2
0.0
Apr
2024
May
Jun
Jul
Date

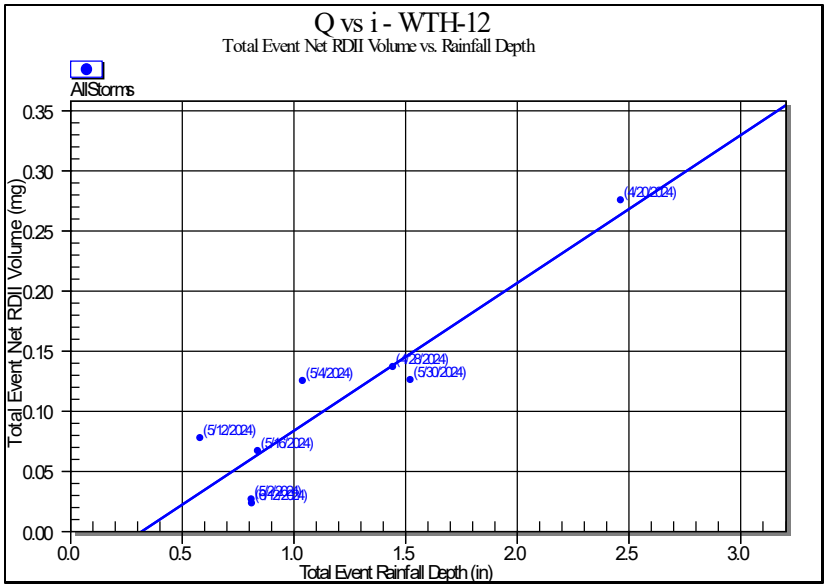

Dry Weather Flow
WTH-11
Weekdays
Weekends
MGD
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0
3
6
9
12
15
18
21
Hours

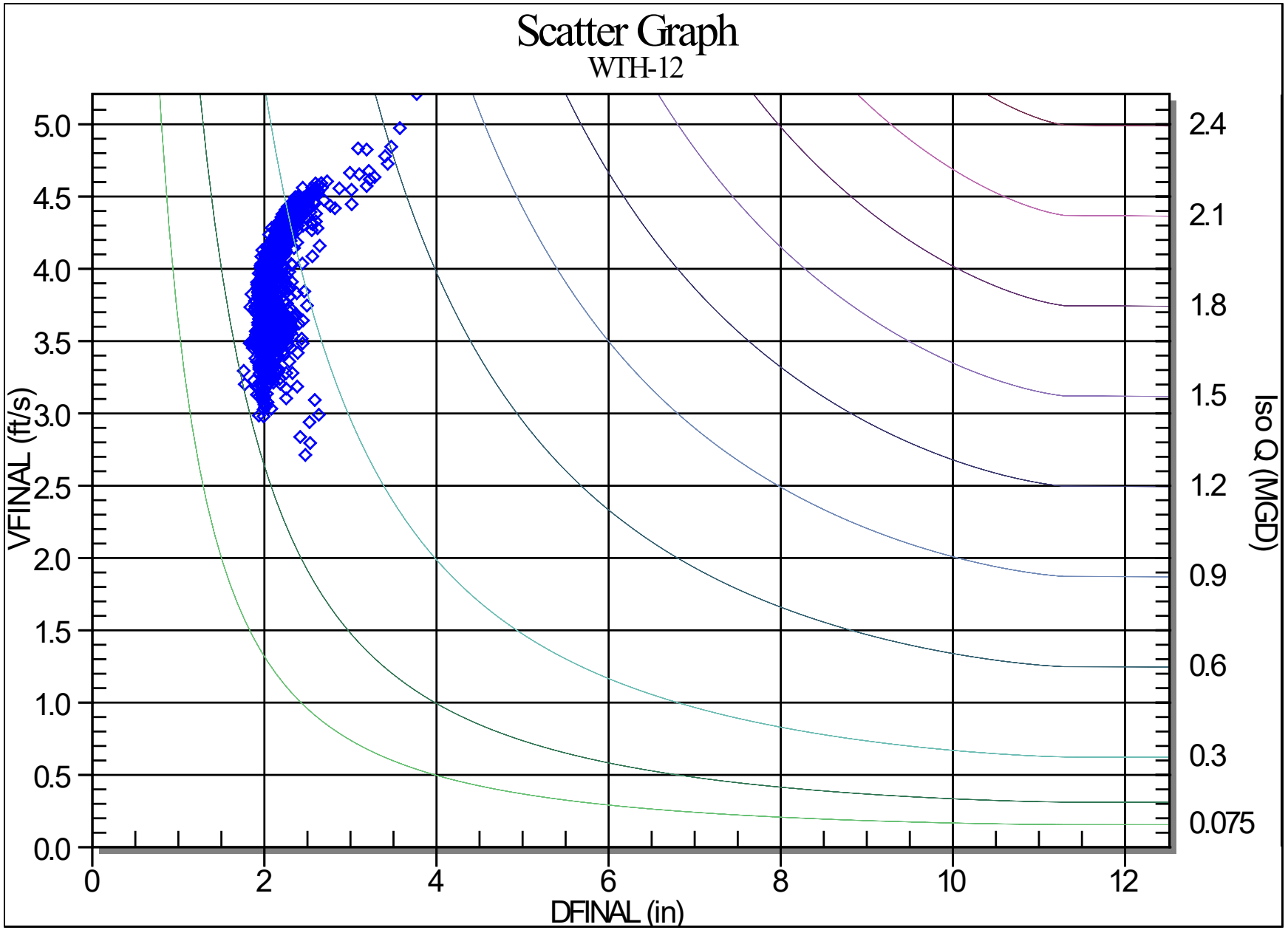

Q vs i - WTH-11
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)
(4/20/2024)
(5/30/2024)
(5/4/2024)
(5/11/2024)
(4/28/2024)
(5/2/2024)
(5/16/2024)
(5/12/2024)


Scatter Graph
WTH-11
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
2
4
6
8
10
12
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.025


Pipe Flow
WTH-12
Rainfall
Qfinal(g)
Flow (MGD)
0.6
0.4
0.2
0.0
1.0
0.8
0.6
0.4
0.2
0.0
Rainfall (in)
Apr
2024
May
Jun
Jul
Date


Dry Weather Flow
WTH-12
Weekdays
Weekends
MGD
0.31
0.30
0.29
0.28
0.27
0.26
0.25
0.24
0.23
0.22
0.21
0.20
0.19
0
3
6
9
12
15
18
21
Hours


Q vs i - WTH-12
Total Event Net RDII Volume vs. Rainfall Depth
AllStorms
Total Event Net RDII Volume (mg)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Total Event Rainfall Depth (in)
(4/20/2024)
(5/4/2024)
(5/30/2024)
(5/12/2024)


Scatter Graph
WTH-12
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
0
2
4
6
8
10
12
0.075
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4

Appendix B

WEATHERFORD

Flow Monitoring Site Report

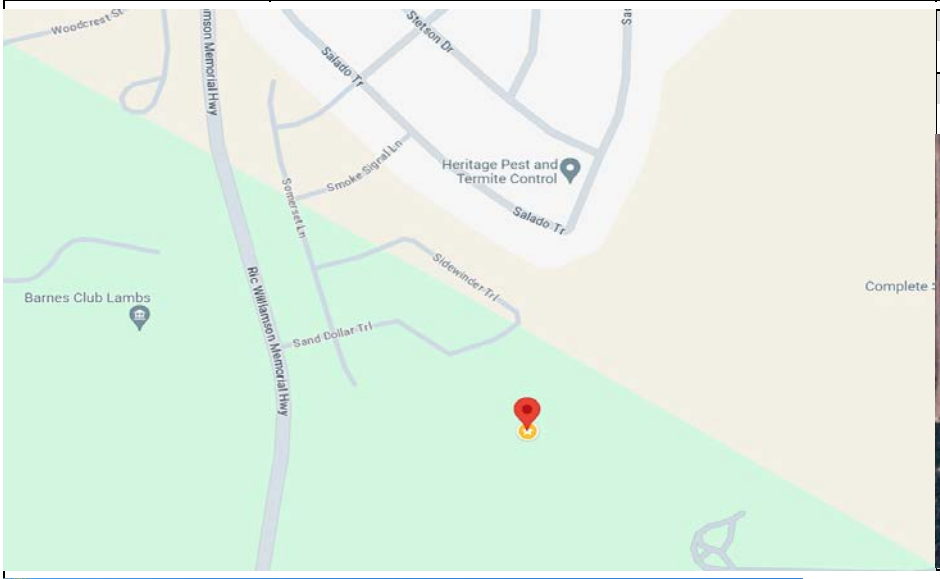
ADS ENVIRONMENTAL SERVICES®

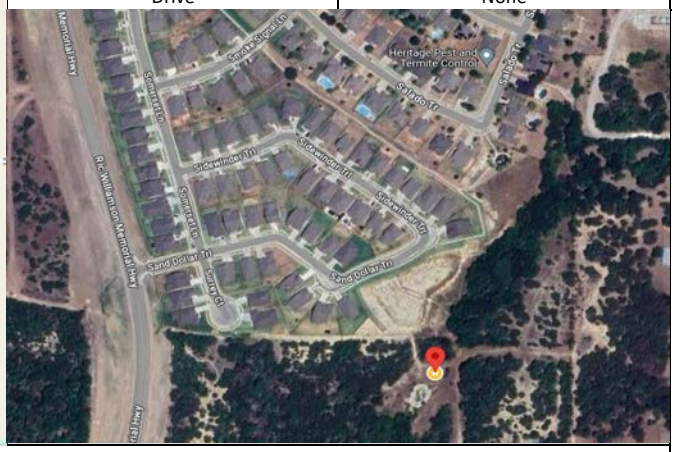
Site Name

WTH-01

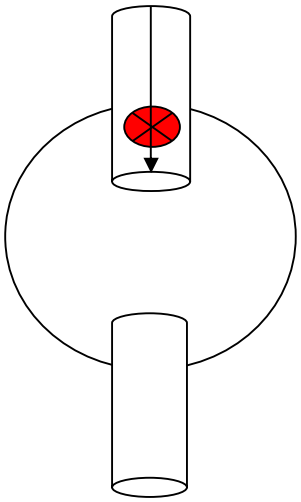
Site Address /Location:	Near 1524 Sand Dollar Trl, Weatherford, TX 76087		
Site Access Details:	Drive/Grass, Do not drive when wet	Latitude:	32.769494
		Longitude:	-97.7201945

Monitor Series	Location Type
TRITON+	Temporary
Pipe Size (H x W)	Pipe Shape
11.25 X 11.25	Elliptical
Manhole #	System Characteristics
N/A	Residential
Access	Traffic
Drive	None









Installation Information

Installation Date:	Installation Type:
Tuesday, March 26, 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
10:24:00 AM	11.25 X 11.25
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
2.75	
Downlooker Physical Offset (in)	Measurement Confidence (in)
1.5	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
9.5	0
Silt (in)	Silt Type
0	

Hydraulic Comments:

Good

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
8.3	Single
Manhole Material:	Manhole Condition:
Concrete	Fair
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
32	48"
Manhole Cover	Manhole Frame
Concealed	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Drilled Pavement / Concrete

Additional Site Info. / Comments:

SN: 50784 IP: 10.4.6.64

ADS Project Name:	Weatherford.FNI.TFM.TX24
ADS Project Number:	

Additional Photos

Upstream



Downstream



Overflow

Top Down



Location



Location



Location

Weatherford TFM 2024

Flow Monitoring
Site Installation Report

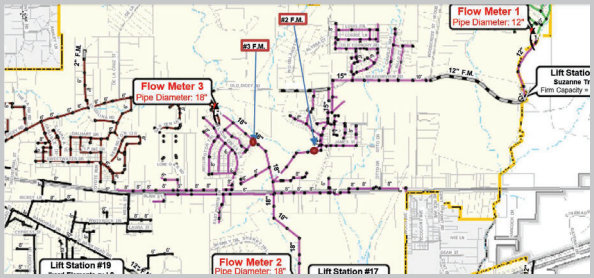
ADS ENVIRONMENTAL SERVICES®

Site I.D.

WTH-02

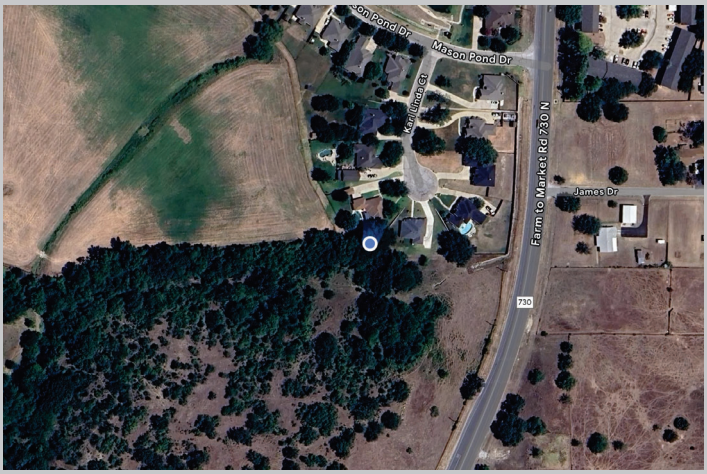
Site Address / Location:	**117 Kari Linda Ct, Weatherford, TX**
Site Access:	**SW corner of property over the fence**

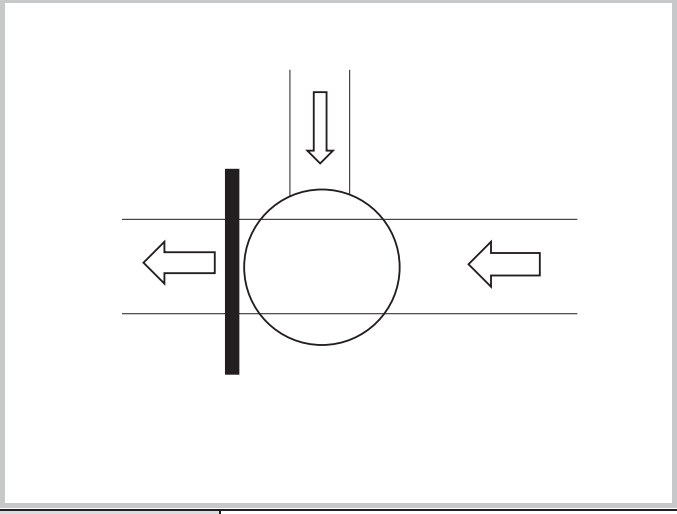
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
(32.7602844, -97.7420076)	**Circular**



Manhole #	System Characteristics
	Commercial
Access	**Traffic**
Drive	None







ADS Crew Leader:	**Bryan Crews**
ADS Field Manager:	Kyle Wulf

Installation Information

Installation Date:	Installation Type:
Wednesday March 27 2024	**Doppler Standard Ring and Crank**
Monitoring Location (Sensors):	Monitor Location:
Downstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
6:20 pm	**17.63 x 17.50**
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
2.00	
Downlooker Physical Offset (in)	Measurement Confidence (in)
1.38	**0.25"**
Peak Velocity (fps)	Velocity Sensor Offset (in)
8.51	
Silt (in)	Silt Type
0	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
6.5	**Single**
Manhole Material:	Manhole Condition:
Concrete	**Good**
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
27	
Manhole Cover	Manhole Frame
Concealed	**Normal**
Active Drop Connections	Air Quality:
No	**20.8,0,0,0**
Pipe Material	Pipe Condition:
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Manhole Pick / Vent Hole**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		
		

Weatherford TFM 2024

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

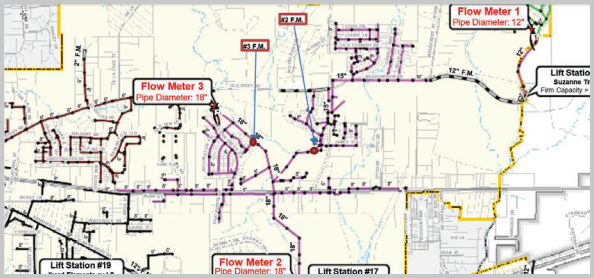
Site I.D.

WTH-03

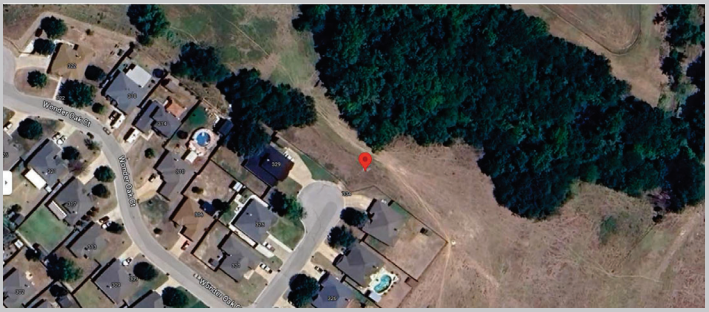
Site Address / Location:	32.761138, -97.748218
Site Access:	acrosss the fence

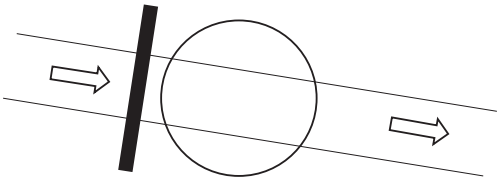
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	Pipe Shape
32.761138, -97.748218	**Circular**

Manhole #	System Characteristics
	Commercial
Access	Traffic
Drive	None









ADS Crew Leader:	**Bryan Crews**
ADS Field Manager:	Kyle Wulf

Installation Information

Installation Date:	Installation Type:
Thursday February 29 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
10:31 am	17.25x17.75
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
2.88	
Downlooker Physical Offset (in)	Measurement Confidence (in)
	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.97	
Silt (in)	Silt Type
0	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
15	Single
Manhole Material:	Manhole Condition:
Concrete	**Good**
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
26	
Manhole Cover	Manhole Frame
Bolted	**Normal**
Active Drop Connections	Air Quality:
No	**20.8,0,0,0**
Pipe Material	Pipe Condition:
Concrete	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	In manhole

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		
		

WEATHERFORD

Flow Monitoring Site Report

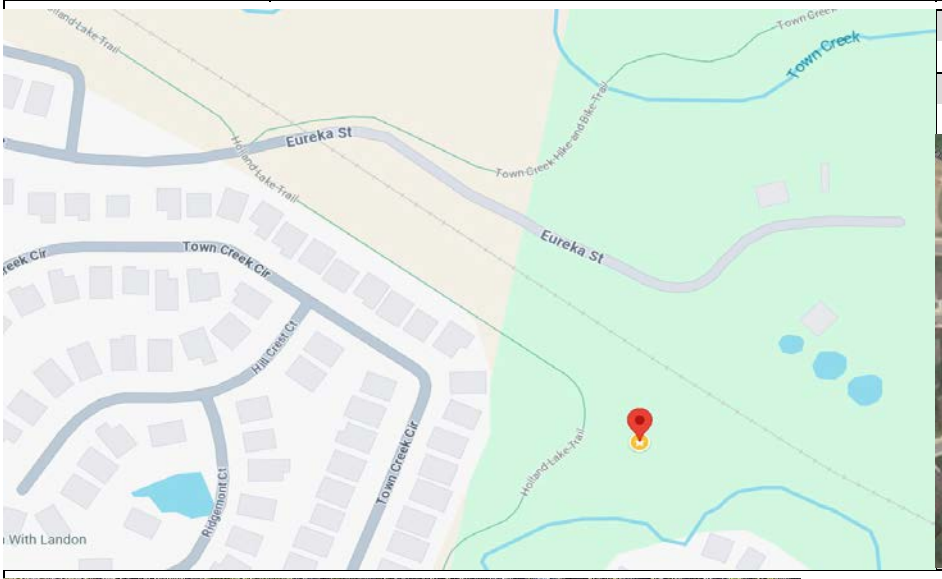
ADS ENVIRONMENTAL SERVICES®

Site Name

WTH-04

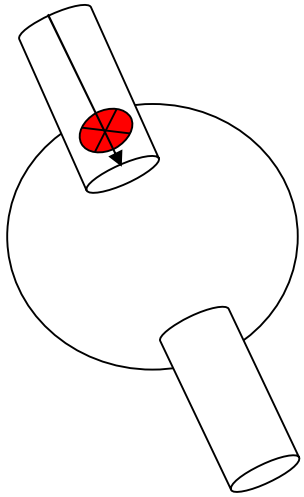
Site Address /Location:	NEAR 1327 Eureka St, Weatherford, TX 76086		
Site Access Details:	WWTP Gate/GRASS	Latitude:	32.7465646
		Longitude:	-97.7709959

Monitor Series	Location Type
TRITON+	Temporary
Pipe Size (H x W)	Pipe Shape
17.50 X 16.50	Elliptical
Manhole #	System Characteristics
N/A	Residential
Access	Traffic
Drive	None









Installation Information	
Installation Date:	Installation Type:
Tuesday, March 26, 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi
Installation Confirmation:	
Confirmation Time:	Pipe Size (HxW)
4:17:00 PM	17.50 X 16.50
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
12.38	
Downlooker Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
0.7	8
Silt (in)	Silt Type
8	Soft / Loose
Hydraulic Comments:	
Good	
Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
9.75	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	48"
Manhole Cover	Manhole Frame
Concealed	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
Concrete	Poor
Communication Information:	
Communication Type	Antenna Location
Wireless	Grass (buried)
Additional Site Info. / Comments:	
SN: 50634 IP: 10.4.6.101	

ADS Project Name:	Weatherford.FNI.TFM.TX24
ADS Project Number:	

Additional Photos

Upstream	Downstream	Overflow
		
Top Down	Location	Location
		
Location		

Weatherford TFM 2024

Flow Monitoring
Site Installation Report

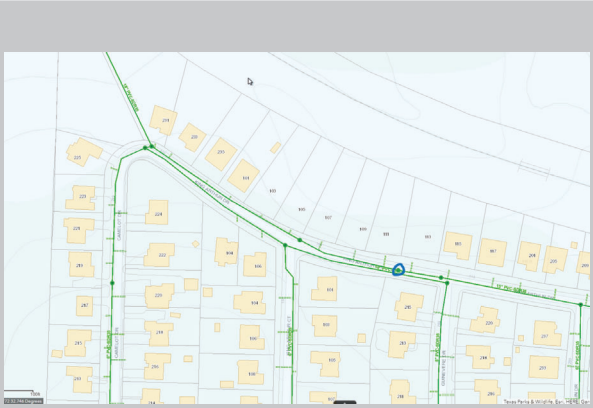
ADS ENVIRONMENTAL SERVICES®

Site I.D.

WTH-04

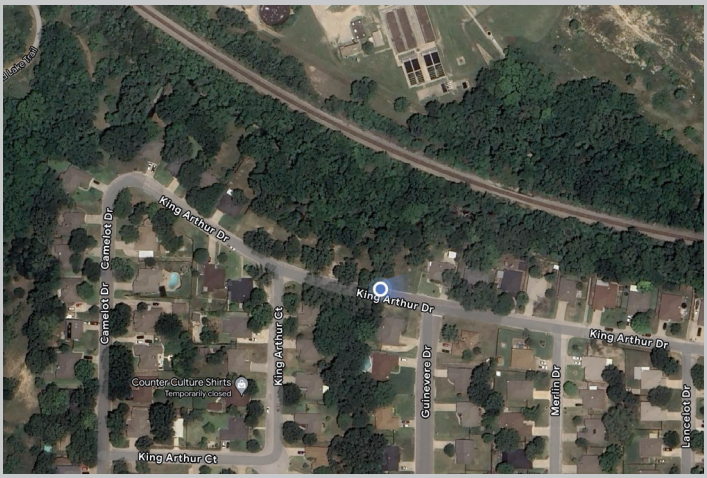
Site Address / Location:	**107 King Arthur Dr, Weatherford, TX 76086**
Site Access:	**In middle of street**

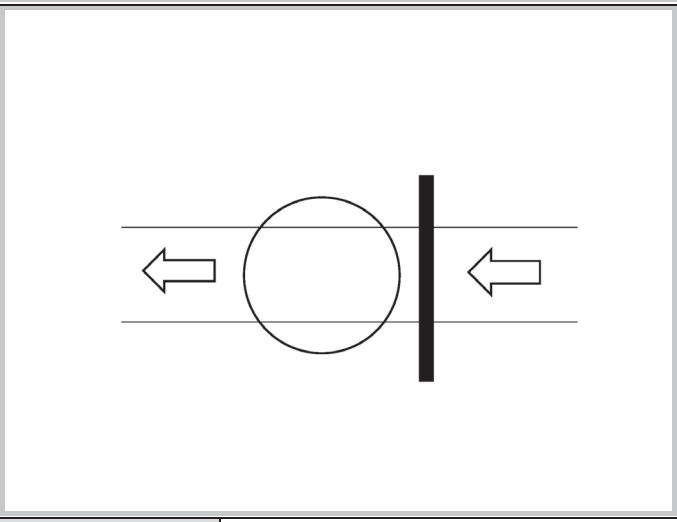
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
(32.7451072, -97.7689286)	**Elliptical**



Manhole #	System Characteristics
	Commercial
Access	**Traffic**
Drive	**Light**







ADS Crew Leader:	**Bryan Crews**
ADS Field Manager:	Kyle Wulf

Installation Information

Installation Date:	Installation Type:
Tuesday May 14 2024	**Doppler Standard Ring and Crank**
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Surface Combo (CS5-V	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
11:24 am	**14.63 x 14.50**
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
2.00	**-**
Downlooker Physical Offset (in)	Measurement Confidence (in)
1.38	**0.25"**
Peak Velocity (fps)	Velocity Sensor Offset (in)
3.25	**-**
Silt (in)	Silt Type
0	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
8.5	**Single**
Manhole Material:	Manhole Condition:
Concrete	**Good**
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	**-**
Manhole Cover	Manhole Frame
Bolted	**Normal**
Active Drop Connections	Air Quality:
No	**20.8,0,0,0**
Pipe Material	Pipe Condition:
Concrete	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Drilled Pavement / Concrete**

Additional Site Info. / Comments:

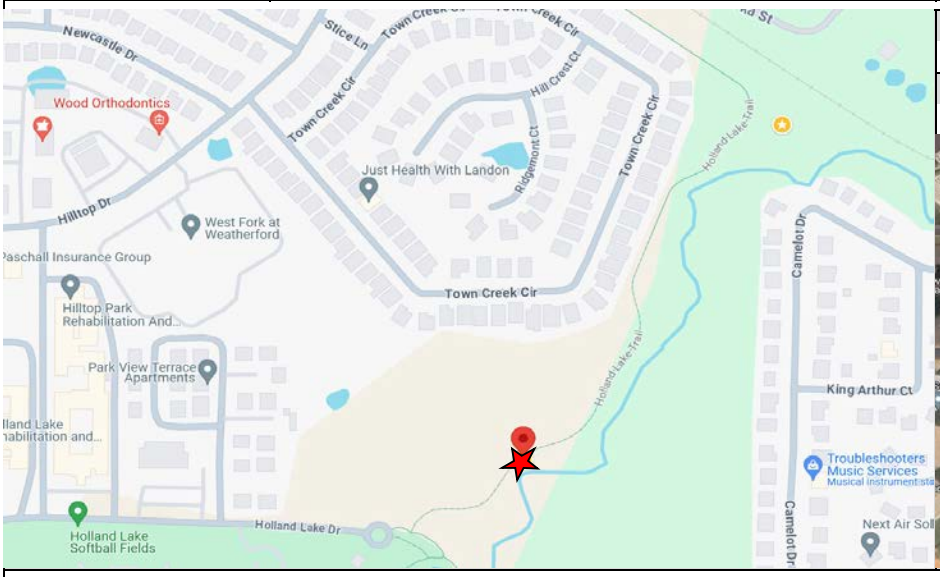
Additional Photos

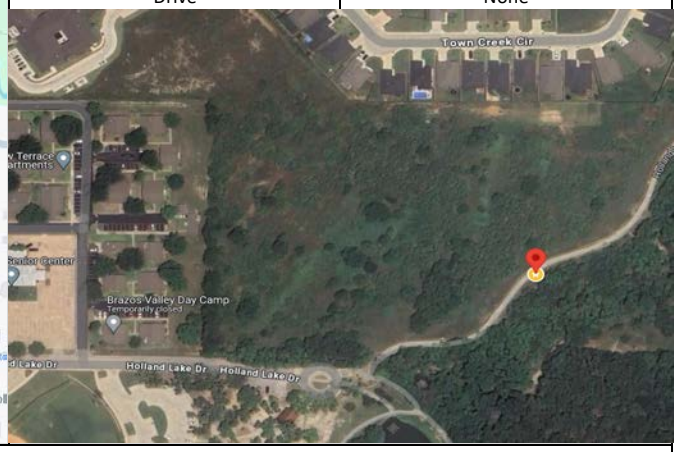
Incoming	Outgoing	Down
		

Flow Monitoring Site Report		Site Name WTH-05

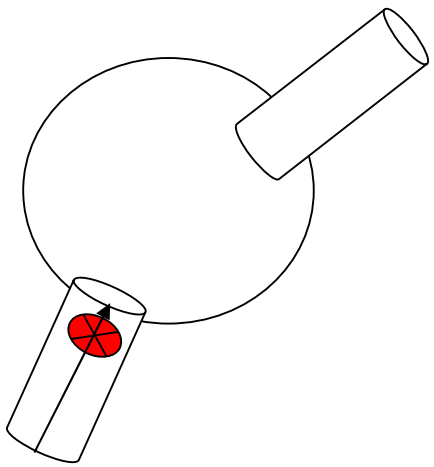
Site Address /Location:	Near 1419 Holland Lake Dr, Weatherford, TX 76086			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	WWTP Gate/Grass	Latitude:	32.73525	Pipe Size (H x W)	Pipe Shape
		Longitude:	-97.776194	23 x 24	Elliptical

Manhole #	System Characteristics
N/A	Residential
Access	Traffic
Drive	None









Installation Information	
Installation Date:	Installation Type:
Tuesday, March 26, 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi
Installation Confirmation:	
Confirmation Time:	Pipe Size (HxW)
6:34:00 PM	23 x 24
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
2.75	
Downlooker Physical Offset (in)	Measurement Confidence (in)
0	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
6.2	0
Silt (in)	Silt Type
0	
Hydraulic Comments:	
Good	
Manhole / Pipe Information:	
Manhole Depth (Approx. FT):	Manhole Configuration
11.41	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
32	48"
Manhole Cover	Manhole Frame
Concealed	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
PVC	Good
Communication Information:	
Communication Type	Antenna Location
Wireless	Grass (buried)
Additional Site Info. / Comments:	
SN: 50659 IP: 10.4.6.107	

ADS Project Name:	Weatherford.FNI.TFM.TX24
ADS Project Number:	

Additional Photos

Upstream	Downstream	Overflow
		
Top Down	Location	Location
		
Location		

Weatherford.FNI.TFM.TX24

Flow Monitoring Site Report

Site Name

WTH-06

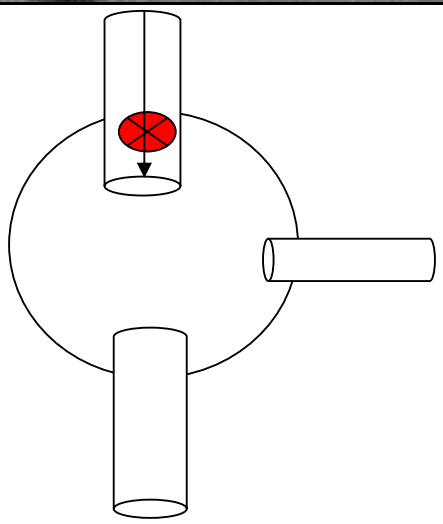
Site Address /Location:	612 Fort Worth Hwy, Weatherford, TX 76086			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	DRIVE	Latitude:	32.7577406	Pipe Size (H x W)	Pipe Shape
		Longitude:	-97.7870559	11.5 x 12	Elliptical

Manhole #	System Characteristics
N/A	Residential
Access	Traffic
Drive	None









Installation Information

Installation Date:	Installation Type:
Wednesday, March 27, 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
10:18:00 AM	11.5 x 12
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
4.00	
Downlooker Physical Offset (in)	Measurement Confidence (in)
0	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2.1	0
Silt (in)	Silt Type
0	

Hydraulic Comments:

Good

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
6.41	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
32	48"
Manhole Cover	Manhole Frame
Concealed	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Drilled Pavement / Concrete

Additional Site Info. / Comments:

SN: 50609 IP: 10.4.6.126

ADS Project Name:	Weatherford.FNI.TFM.TX24
ADS Project Number:	26121.11.235

Additional Photos

Upstream	Downstream	East Side Pipe
		
Top Down	Location	Location
		
Location		

Weatherford.FNI.TFM.TX24

Flow Monitoring Site Report

ADS ENVIRONMENTAL SERVICES

Site Name

WTH-07

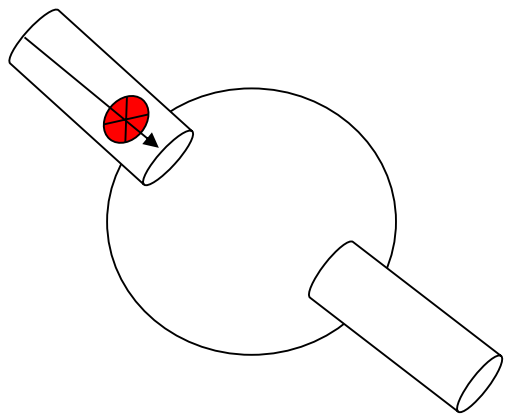
Site Address /Location:	Near 501 E Oak St, Weatherford, TX 76086			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	DRIVE	Latitude:	32.7572782	Pipe Size (H x W)	Pipe Shape
		Longitude:	-97.7886539	17.62 x 17.62	Circular



Manhole #	System Characteristics
N/A	Residential
Access	Traffic
Drive	None







Installation Information

Installation Date:	Installation Type:
Wednesday, March 27, 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
12:34:00 PM	17.62 x 17.62
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
4.25	
Downlooker Physical Offset (in)	Measurement Confidence (in)
0	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
3.1	0
Silt (in)	Silt Type
0	

Hydraulic Comments:

Good

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
8	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
32	48"
Manhole Cover	Manhole Frame
Concealed	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Drilled Pavement / Concrete

Additional Site Info. / Comments:

SN: 50763 IP: 10.4.6.146

ADS Project Name:	Weatherford.FNI.TFM.TX24
ADS Project Number:	26121.11.235

Additional Photos

Upstream	Downstream	Overflow
		
Top Down	Location	Location
		
Location		

Flow Monitoring Site Report

Site Name

WTH-08

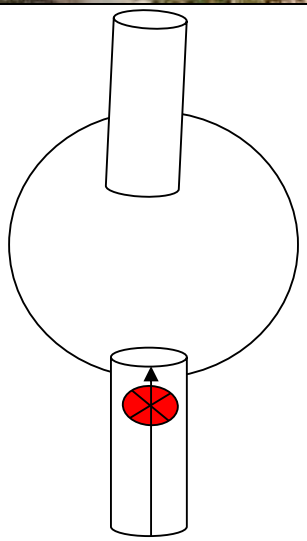
Site Address /Location:	544 Santa Fe Dr, Weatherford, TX 76086			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	DRIVE/GRASS	Latitude:	32.7531646	Pipe Size (H x W)	Pipe Shape
		Longitude:	-97.7887038	11 X 11.78	Elliptical

Manhole #	System Characteristics
N/A	Commercial
Access	Traffic
Drive	None









Installation Information

Installation Date:	Installation Type:
Wednesday, March 27, 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
2:59:00 PM	11 X 11.78
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
3.00	
Downlooker Physical Offset (in)	Measurement Confidence (in)
0	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
5.6	0
Silt (in)	Silt Type
0	

Hydraulic Comments:

Good

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9.08	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
32	48"
Manhole Cover	Manhole Frame
Concealed	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Grass (buried)

Additional Site Info. / Comments:

SN: 50759 IP: 10.4.6.104

ADS Project Name:	Weatherford.FNI.TFM.TX24
ADS Project Number:	26121.11.235

Additional Photos

Upstream	Downstream	Overflow
		
Top Down	Location	Location
		
Location		
		

WEATHERFORD

Flow Monitoring Site Report

ADS ENVIRONMENTAL SERVICES

Site Name

WTH-09

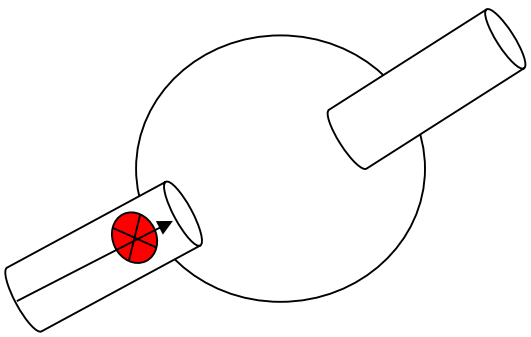
Site Address /Location:	317 Santa Fe Dr, Weatherford, TX 76086			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	DRIVE	Latitude:	32.7554097	Pipe Size (H x W)	Pipe Shape
		Longitude:	-97.7877909	13.5 X 14.38	Elliptical

Manhole #	System Characteristics
N/A	Other
Access	Traffic
Drive	None









ADS Project Name:	Weatherford.FNI.TFM.TX24
ADS Project Number:	26121.11.235

Installation Information

Installation Date:	Installation Type:
Wednesday, March 27, 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW)
5:24:00 PM	13.5 X 14.38
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
4,25	
Downlooker Physical Offset (in)	Measurement Confidence (in)
0	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
5.2	0
Silt (in)	Silt Type
0	

Hydraulic Comments:

Good

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9.75	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
32	48"
Manhole Cover	Manhole Frame
Concealed	Normal
Active Drop Connections	Air Quality:
No	Good
Pipe Material	Pipe Condition:
PVC	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Grass (buried)

Additional Site Info. / Comments:

SN: 50672 IP: 10.4.6.98

Additional Photos

Upstream	Downstream	Overflow
		
Top Down	Location	Location
		
Location		

Weatherford TFM 2024

Flow Monitoring
Site Installation Report

Site I.D.

WTH-10

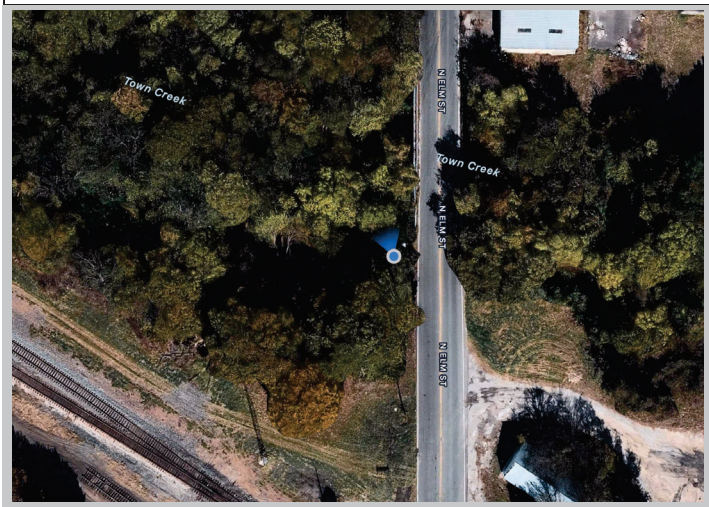
Site Address / Location:	
Site Access:	**Side of road**

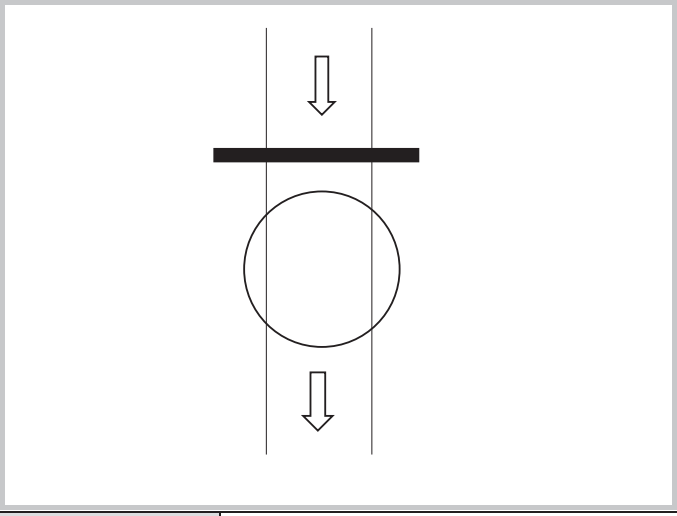
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	Pipe Shape
32.762724, -97.795500	**Circular**



Manhole #	System Characteristics
	Commercial
Access	Traffic
Drive	None







ADS Crew Leader:	**Bryan Crews**
ADS Field Manager:	Kyle Wulf

Installation Information

Installation Date:	Installation Type:
Thursday February 29 2024	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Surface Combo (CS5-V	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
11:39 am	12.13x12.00
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
6.24	
Downlooker Physical Offset (in)	Measurement Confidence (in)
	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.0	
Silt (in)	Silt Type
0	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
7	Single
Manhole Material:	Manhole Condition:
Concrete	**Good**
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
28	
Manhole Cover	Manhole Frame
Bolted	**Normal**
Active Drop Connections	Air Quality:
No	**20.8,0,0,0**
Pipe Material	Pipe Condition:
Concrete	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	In manhole

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

Weatherford TFM 2024

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

Site I.D.

WTH-11

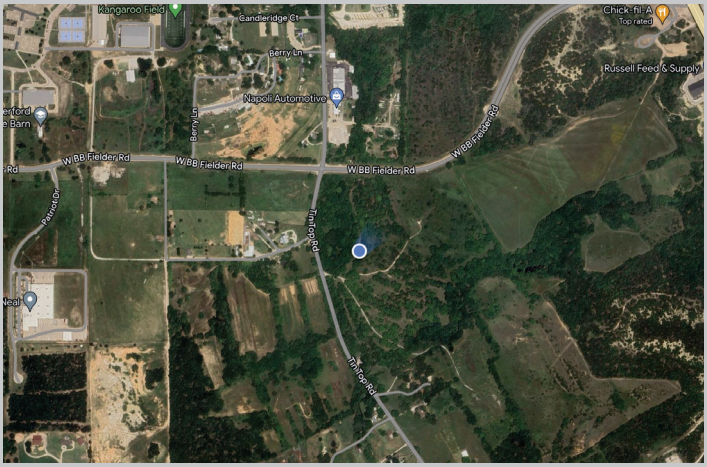
Site Address / Location:	**South of BB Fielder Rd and Tin Top Rd**
Site Access:	**First access road south of intersection**

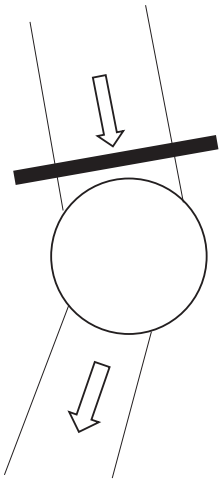
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.718928, -97.796738	**Circular**

Manhole #	System Characteristics
	Commercial
Access	**Traffic**
Drive	None









ADS Crew Leader:	**Bryan Crews**
ADS Field Manager:	Kyle Wulf

Installation Information

Installation Date:	Installation Type:
Wednesday March 27 2024	**Doppler Standard Ring and Crank**
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
2:23 pm	**11.25 x 11.00**
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
3.50	
Downlooker Physical Offset (in)	Measurement Confidence (in)
	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.56	
Silt (in)	Silt Type
0	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
19	**Single**
Manhole Material:	Manhole Condition:
Concrete	**Good**
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
30	
Manhole Cover	Manhole Frame
Concealed	**Normal**
Active Drop Connections	Air Quality:
No	**20.8,0,0,0**
Pipe Material	Pipe Condition:
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Drilled Pavement / Concrete**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		

Weatherford TFM 2024

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

Site I.D.

WTH-12

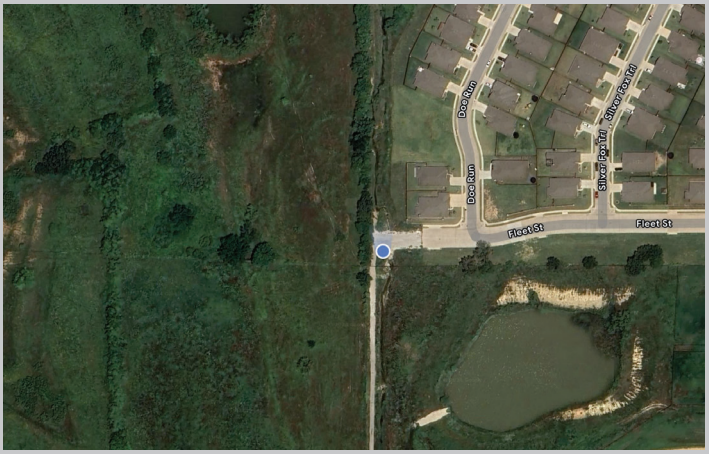
Site Address / Location:	**2568 Doe Run, Weatherford, TX 76087**
Site Access:	**SW behind address**

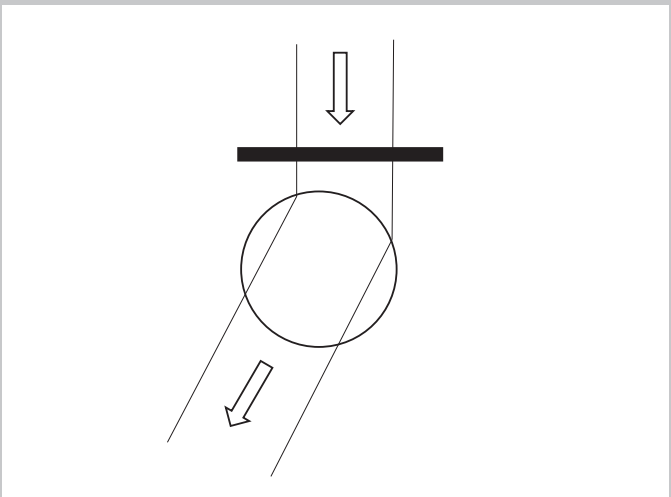
Monitor Series	Location Type
Triton+	Temporary
GPS Coordinates	**Pipe Shape**
32.718082, -97.822566	**Circular**



Manhole #	System Characteristics
	Commercial
Access	**Traffic**
Drive	None







ADS Crew Leader:	**Bryan Crews**
ADS Field Manager:	Kyle Wulf

Installation Information

Installation Date:	Installation Type:
Wednesday March 27 2024	**Doppler Standard Ring and Crank**
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 15 psi

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
12:29 pm	**11.38 x 12.00**
Depth of Flow (Wet DOF) (in)	Range (Air DOF) (in)
2.00	
Downlooker Physical Offset (in)	Measurement Confidence (in)
	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
5.00	
Silt (in)	Silt Type
0	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
12	**Single**
Manhole Material:	Manhole Condition:
Concrete	**Good**
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
30	
Manhole Cover	Manhole Frame
Concealed	**Normal**
Active Drop Connections	Air Quality:
No	**20.8,0,0,0**
Pipe Material	Pipe Condition:
PVC	**Good**

Communication Information:

Communication Type	Antenna Location
Wireless	**Drilled Pavement / Concrete**

Additional Site Info. / Comments:

Additional Photos

Incoming	Outgoing	Down
		
		

Weatherford TFM 2023

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

Site I.D.

WTHRG1

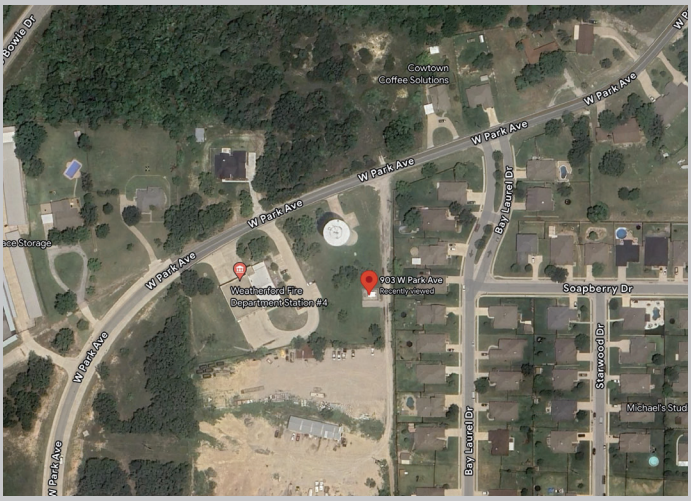
Site Address / Location:	**903 W. Park Ave, Weatherford, TX**
Site Access:	**On top of electric box**

Monitor Series	Location Type
Rain Alert III	Temporary
GPS Coordinates	**Pipe Shape**
32.7317498, -96.8156272	-



Manhole #	System Characteristics
	-
Access	**Traffic**
Drive	None





Installation Information

Installation Date:	Installation Type:
Monday April 01 2024	Rain Gauge
Monitoring Location (Sensors):	**Monitor Location:**
Other	**Building - Contact Client**
Sensors / Devices:	**Pressure Sensor Range (psi)**
Rain Gauge Tipping Bucket	N/A

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
	-
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
Silt (in)	**Silt Type**
	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
	-
Manhole Material:	**Manhole Condition:**
-	-
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
Manhole Cover	**Manhole Frame**
-	-
Active Drop Connections	**Air Quality:**
-	
Pipe Material	**Pipe Condition:**
-	-

Communication Information:

Communication Type	Antenna Location
Wireless	Cabinet

Additional Site Info. / Comments:

ADS Crew Leader:	Bryan Crews
ADS Field Manager:	Kyle Wulf

Weatherford TFM 2023

Flow Monitoring
Site Installation Report

ADS ENVIRONMENTAL SERVICES®

Site I.D.

WTHRG2

Site Address / Location:	
Site Access:	**On electric box**

Monitor Series	Location Type
Rain Alert III	Temporary
GPS Coordinates	**Pipe Shape**
32.775824, -97.7387349	-



Manhole #	System Characteristics
	-
Access	**Traffic**
Drive	None





Installation Information

Installation Date:	Installation Type:
Monday April 01 2024	Rain Gauge
Monitoring Location (Sensors):	**Monitor Location:**
Other	**Building - Contact Client**
Sensors / Devices:	**Pressure Sensor Range (psi)**
Rain Gauge Tipping Bucket	N/A

Installation Confirmation:

Confirmation Time:	Pipe Size (HxW) (in)
Depth of Flow (Wet DOF) (in)	**Range (Air DOF) (in)**
Downlooker Physical Offset (in)	**Measurement Confidence (in)**
	-
Peak Velocity (fps)	**Velocity Sensor Offset (in)**
Silt (in)	**Silt Type**
	-

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
	-
Manhole Material:	**Manhole Condition:**
-	-
Manhole Opening Diameter (in)	**Manhole Diameter (Approx.):**
Manhole Cover	**Manhole Frame**
-	-
Active Drop Connections	**Air Quality:**
-	
Pipe Material	**Pipe Condition:**
-	-

Communication Information:

Communication Type	Antenna Location
Wireless	Cabinet

Additional Site Info. / Comments:

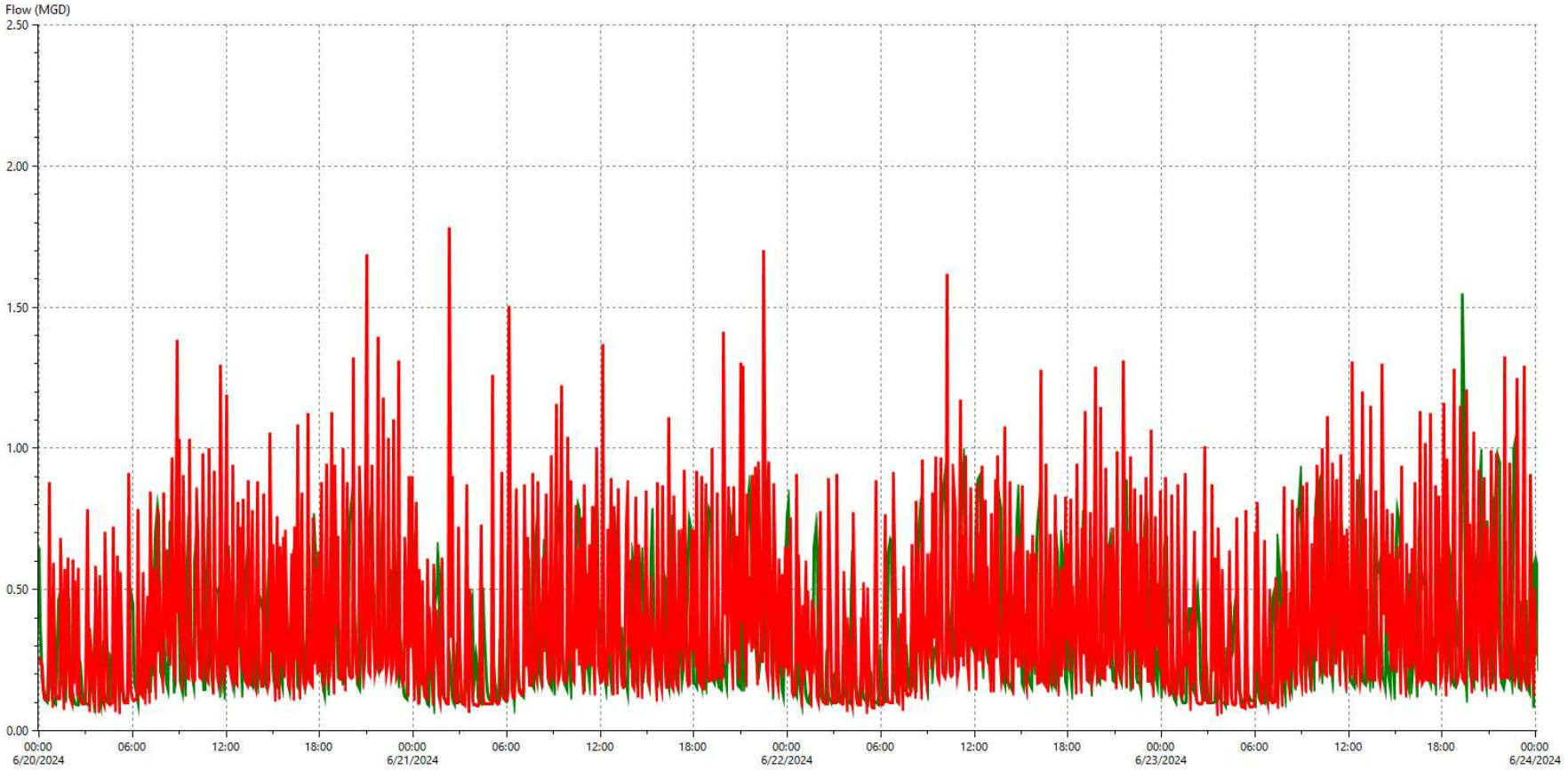
ADS Crew Leader:	Bryan Crews
ADS Field Manager:	Kyle Wulf

Appendix I
Wastewater Model Calibration Results

City of Weatherford

Dry Weather Wastewater Calibration

WTH-01



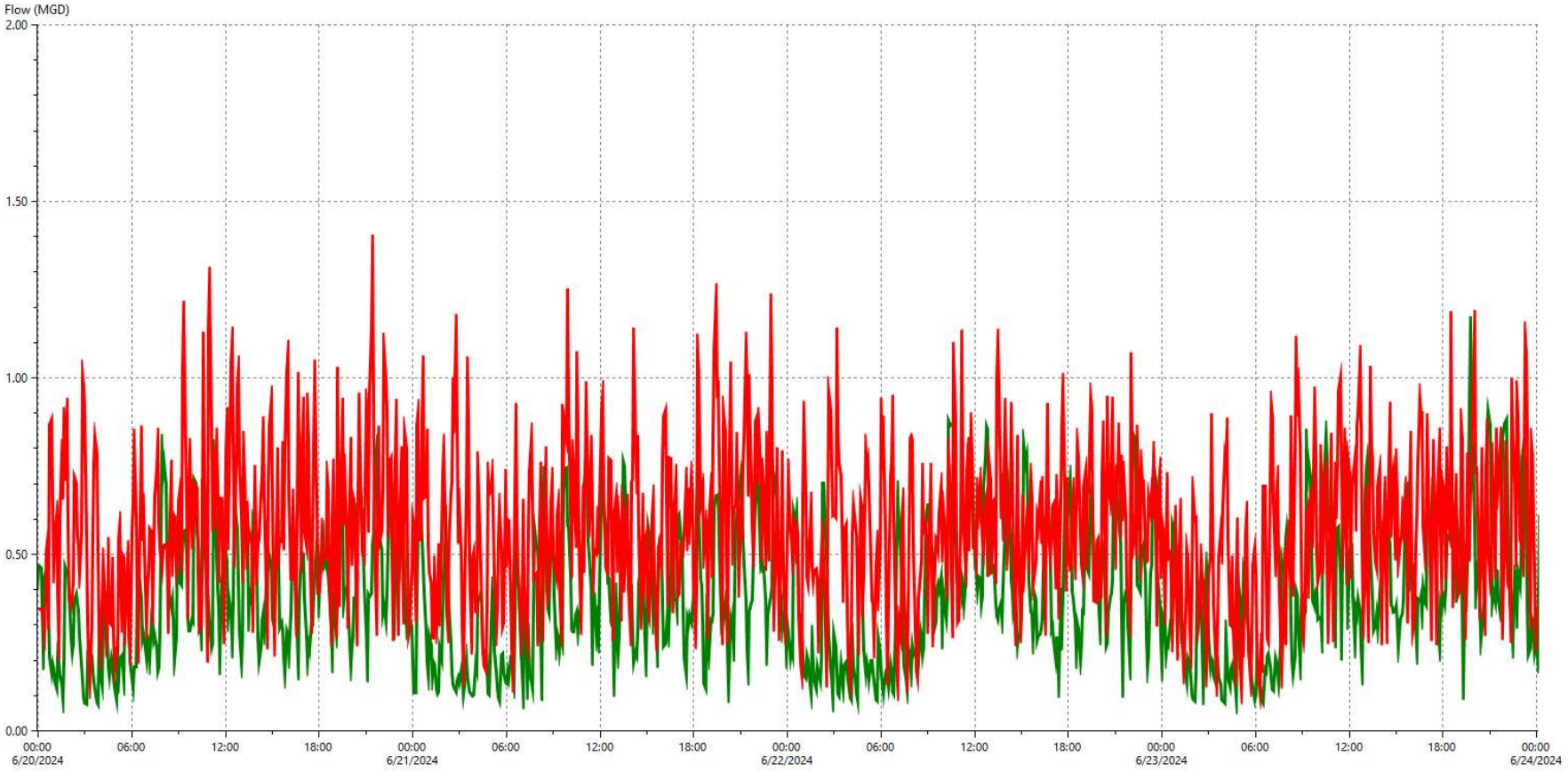
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.090	1.496	1.377
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.080	1.728	1.541

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-02



	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.076	1.133	1.523
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.106	1.362	2.327

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-03



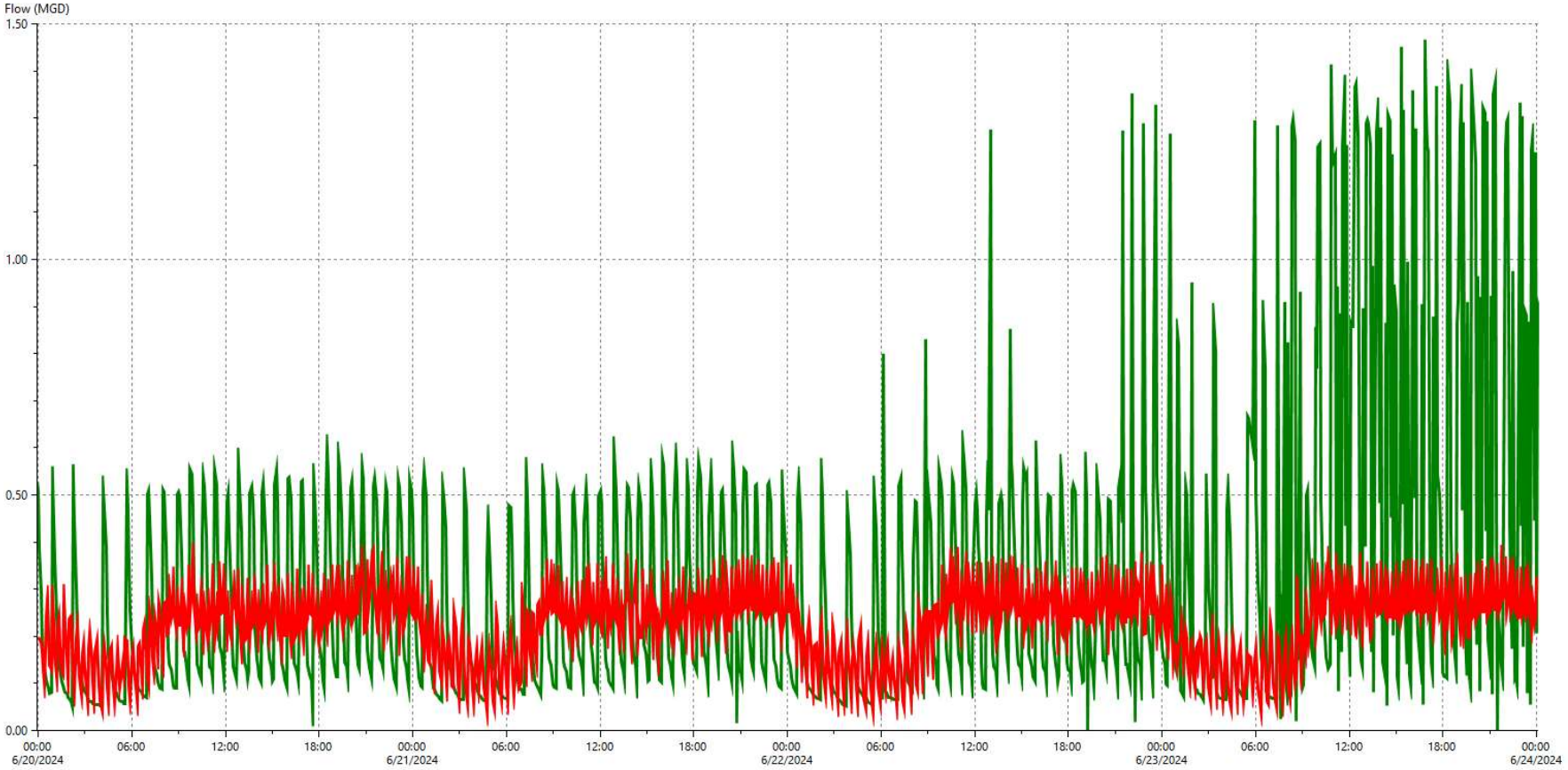
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.042	0.203	0.460
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.070	0.201	0.534

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-04M



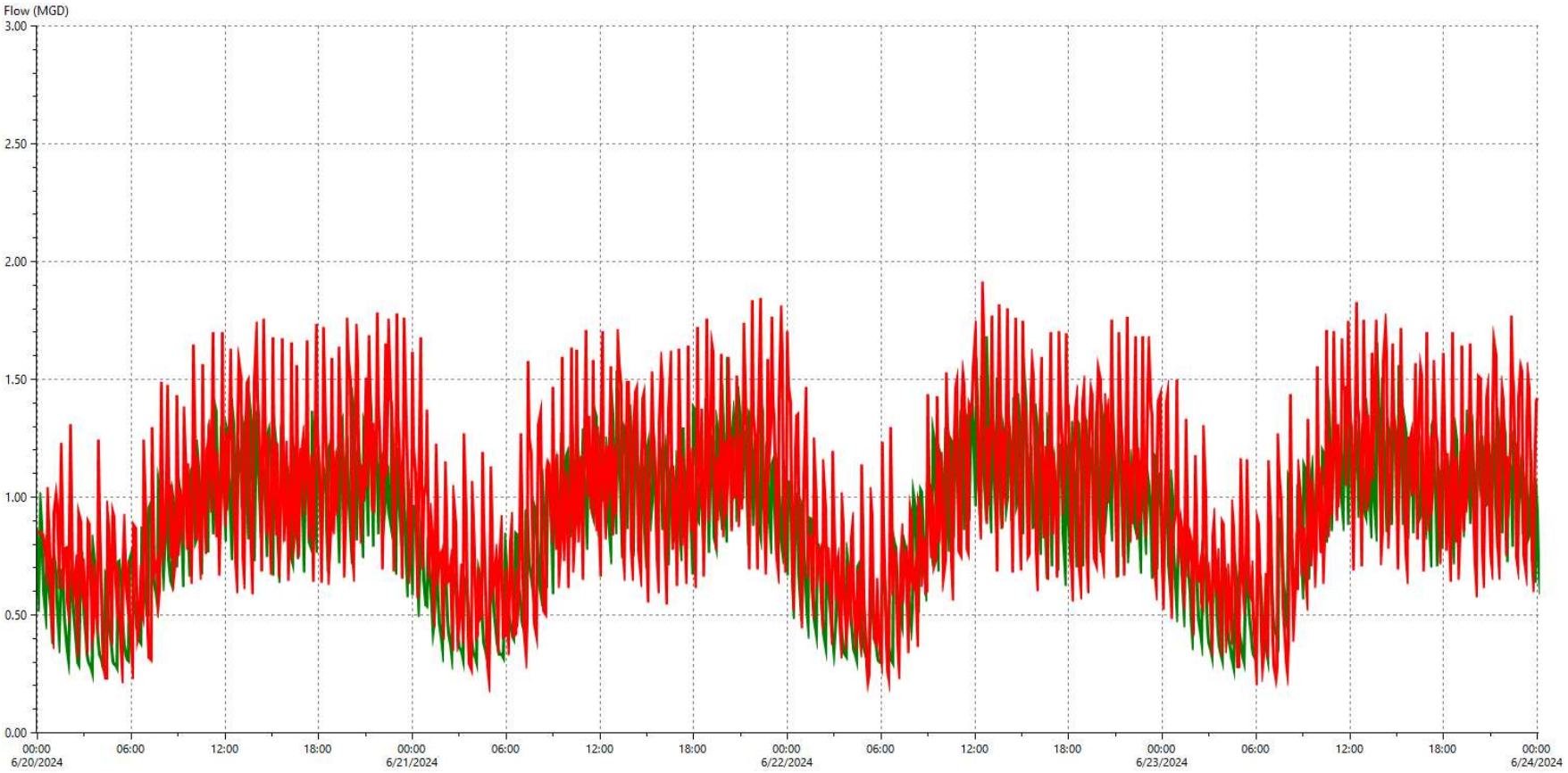
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.028	1.435	1.303
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.041	0.366	0.895

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-05



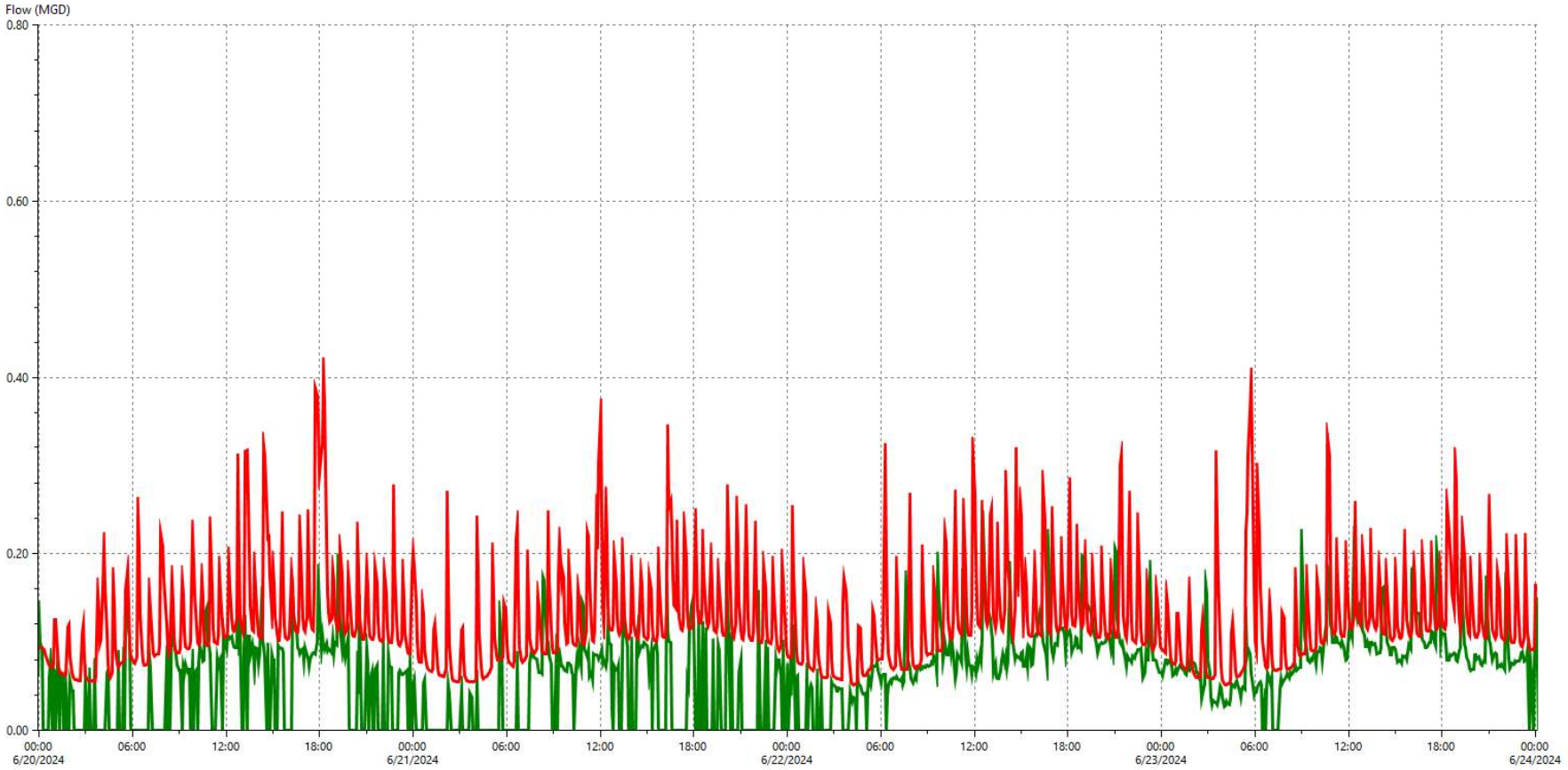
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.259	1.620	3.596
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.221	1.852	3.957

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-06



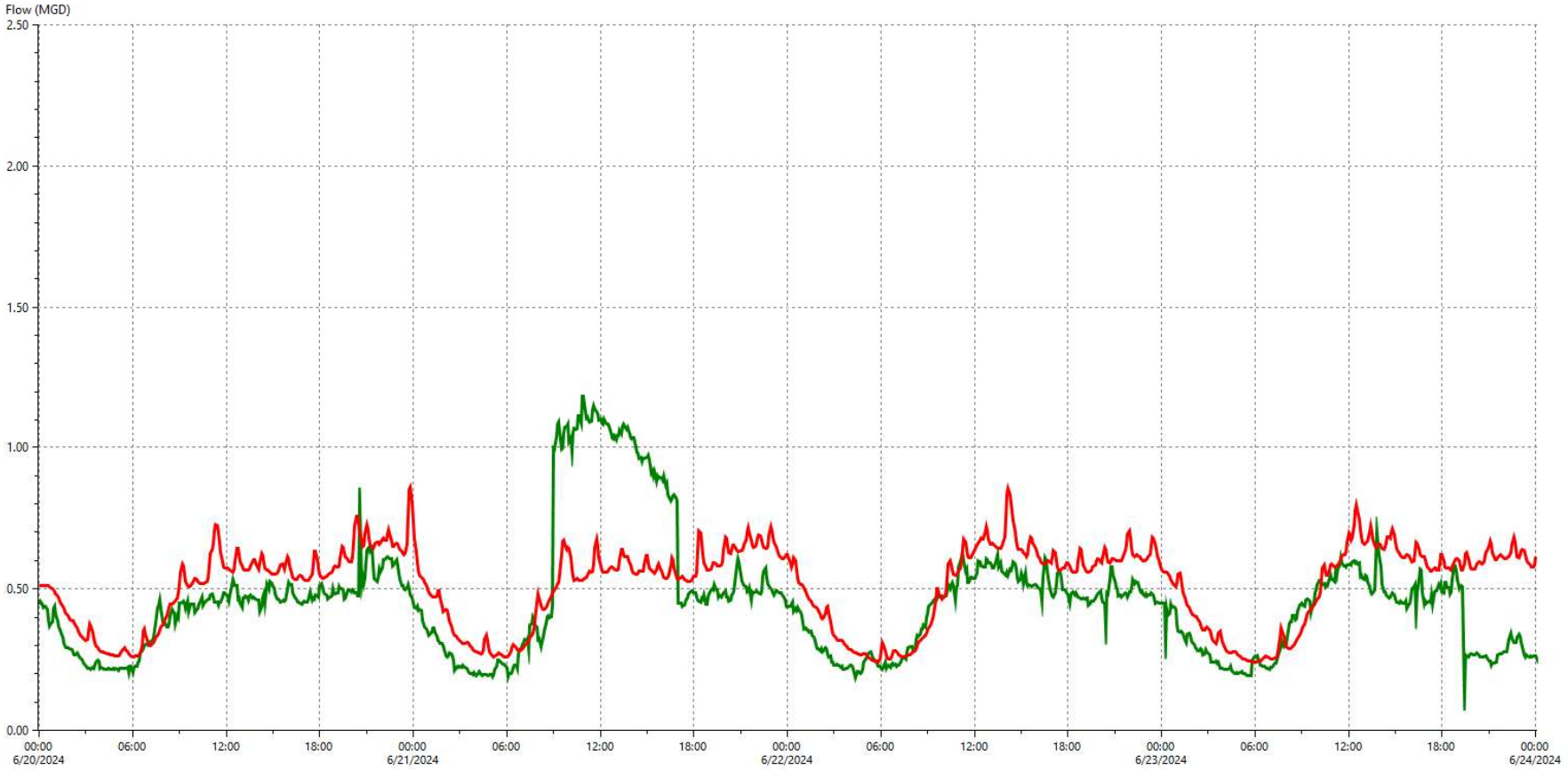
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.000	0.232	0.254
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.052	0.406	0.507

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-07



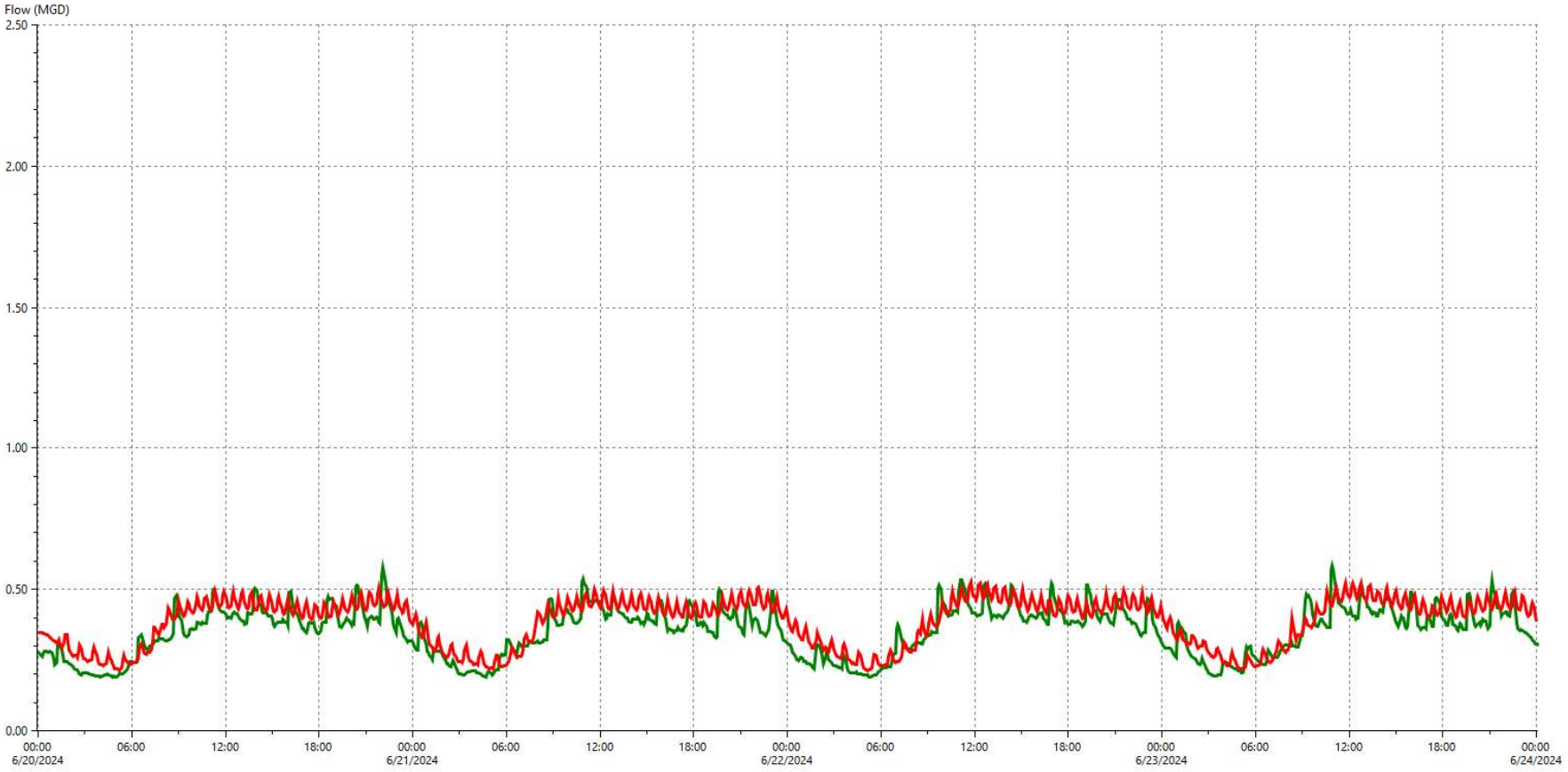
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.125	1.186	1.822
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.242	0.858	2.043

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-08



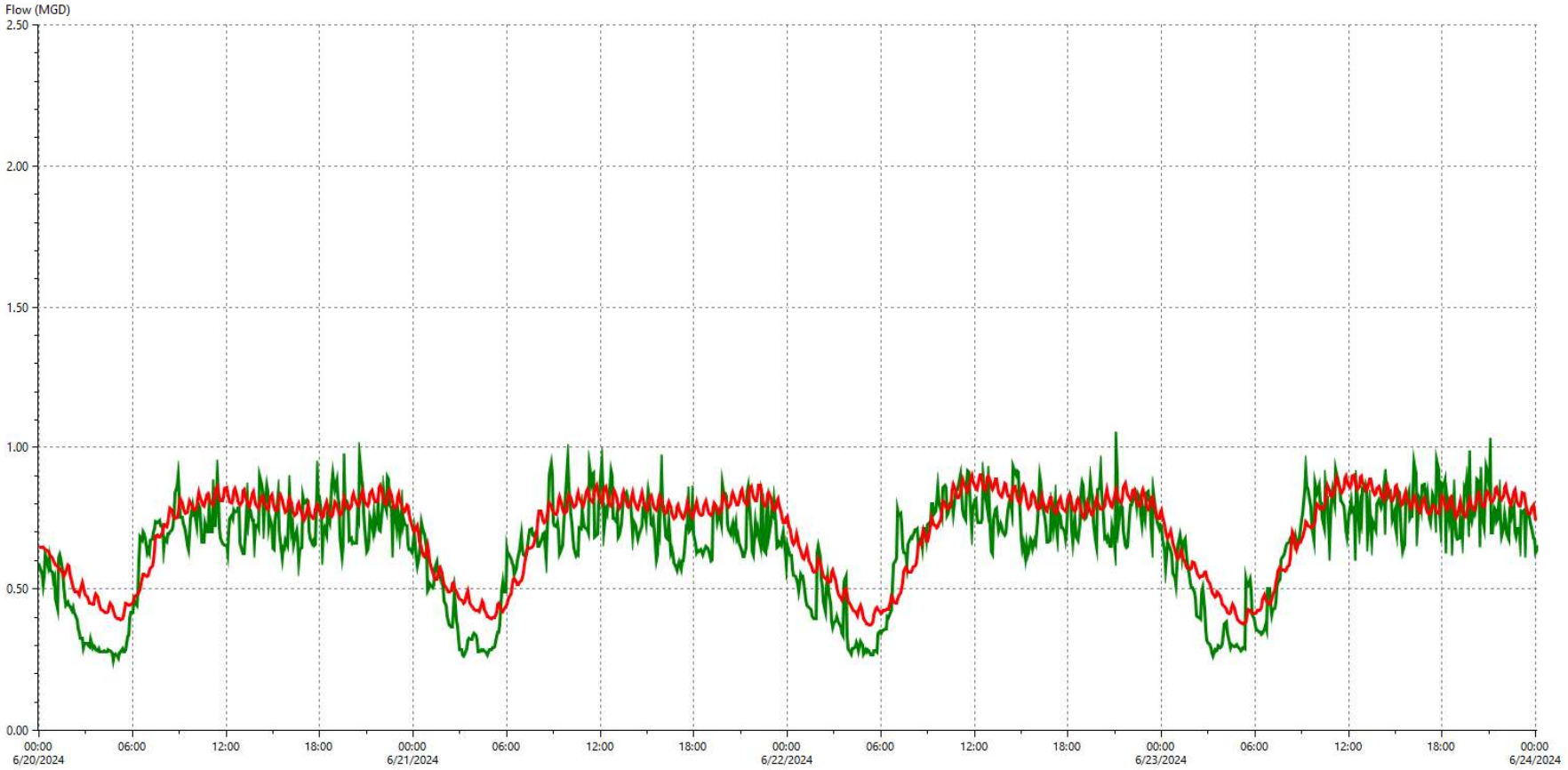
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.189	0.585	1.418
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.213	0.526	1.556

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-09



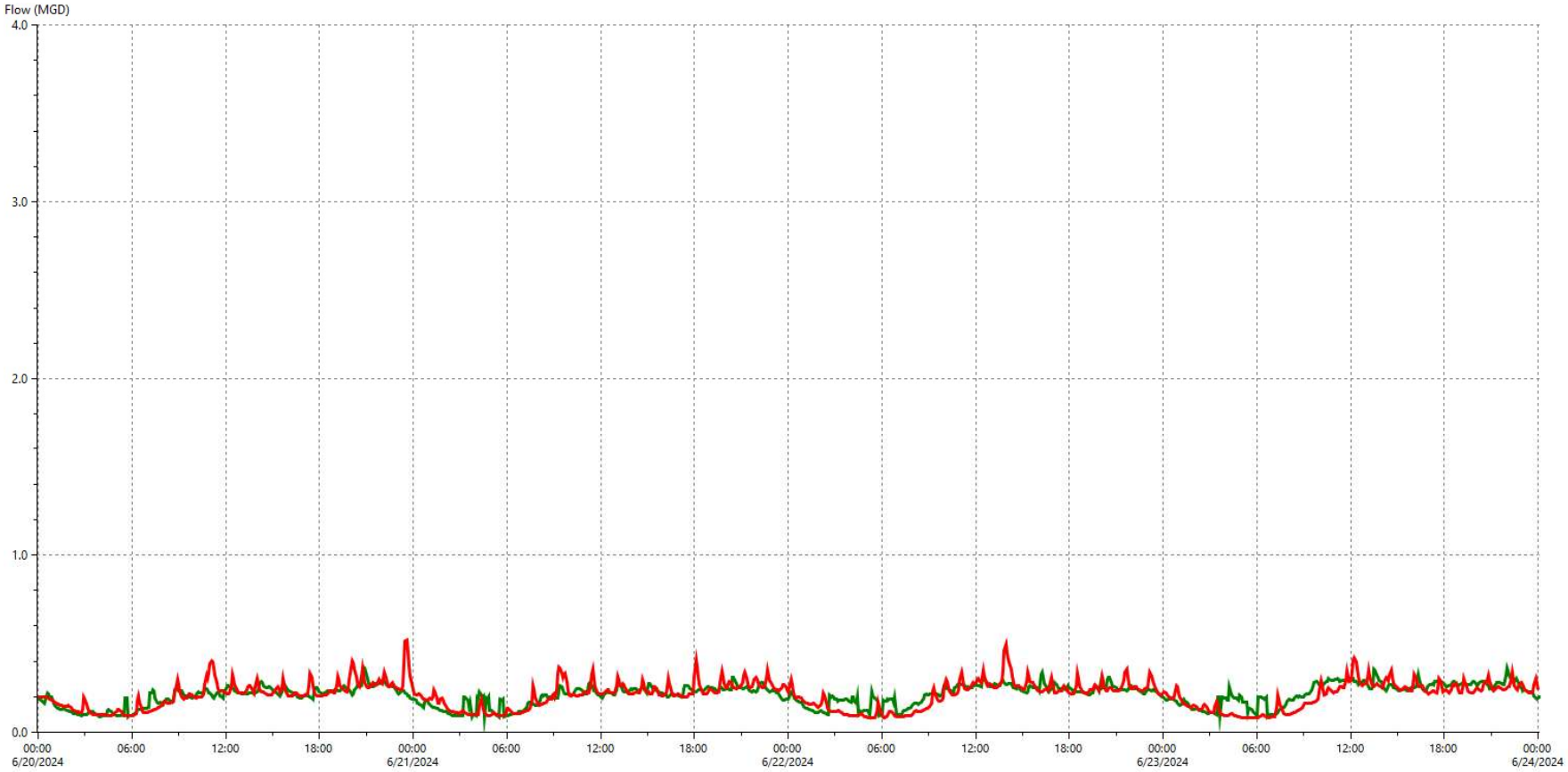
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.247	1.004	2.617
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.372	0.903	2.828

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-10



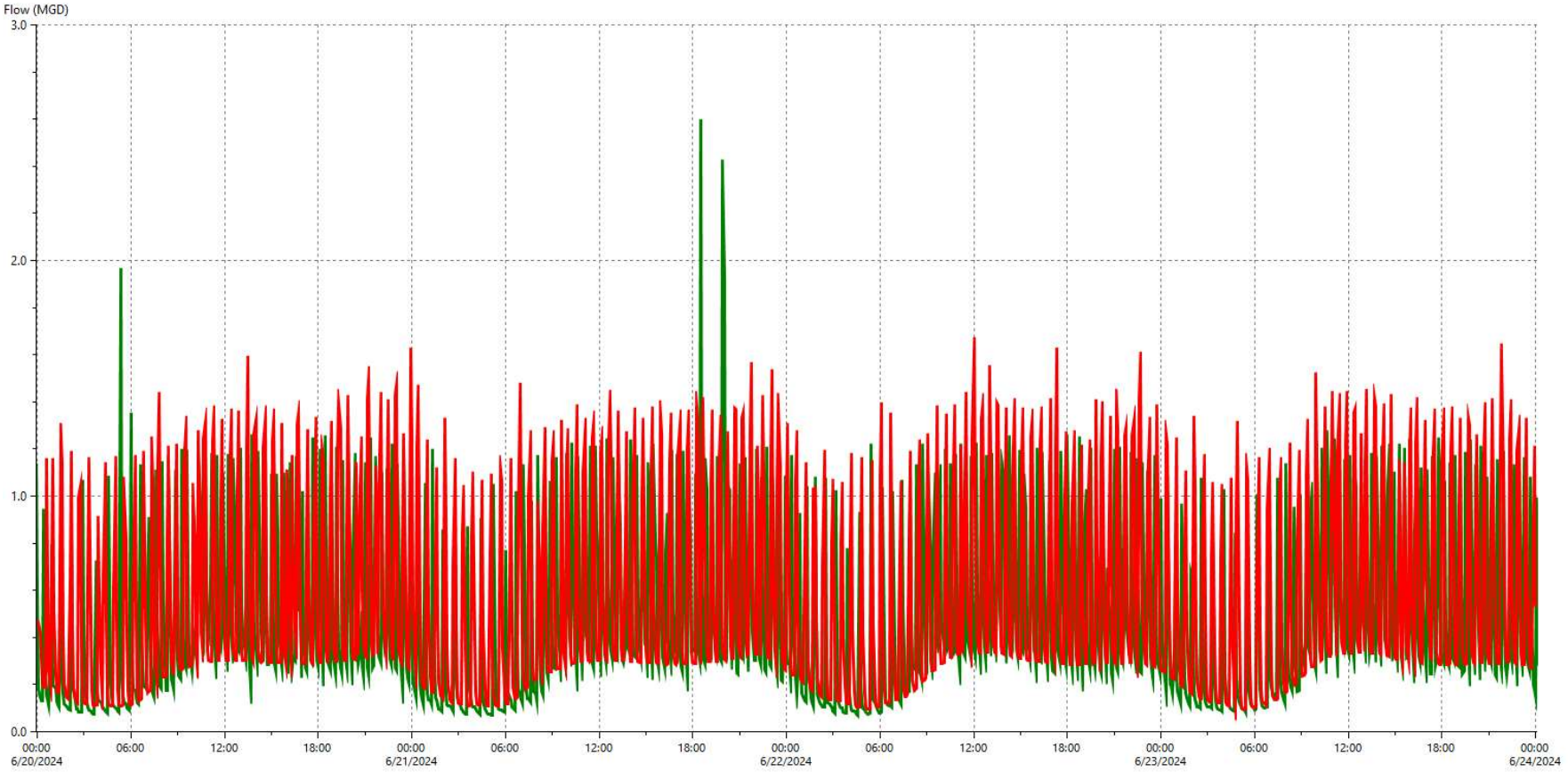
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.086	0.368	0.844
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.079	0.520	0.840

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-11



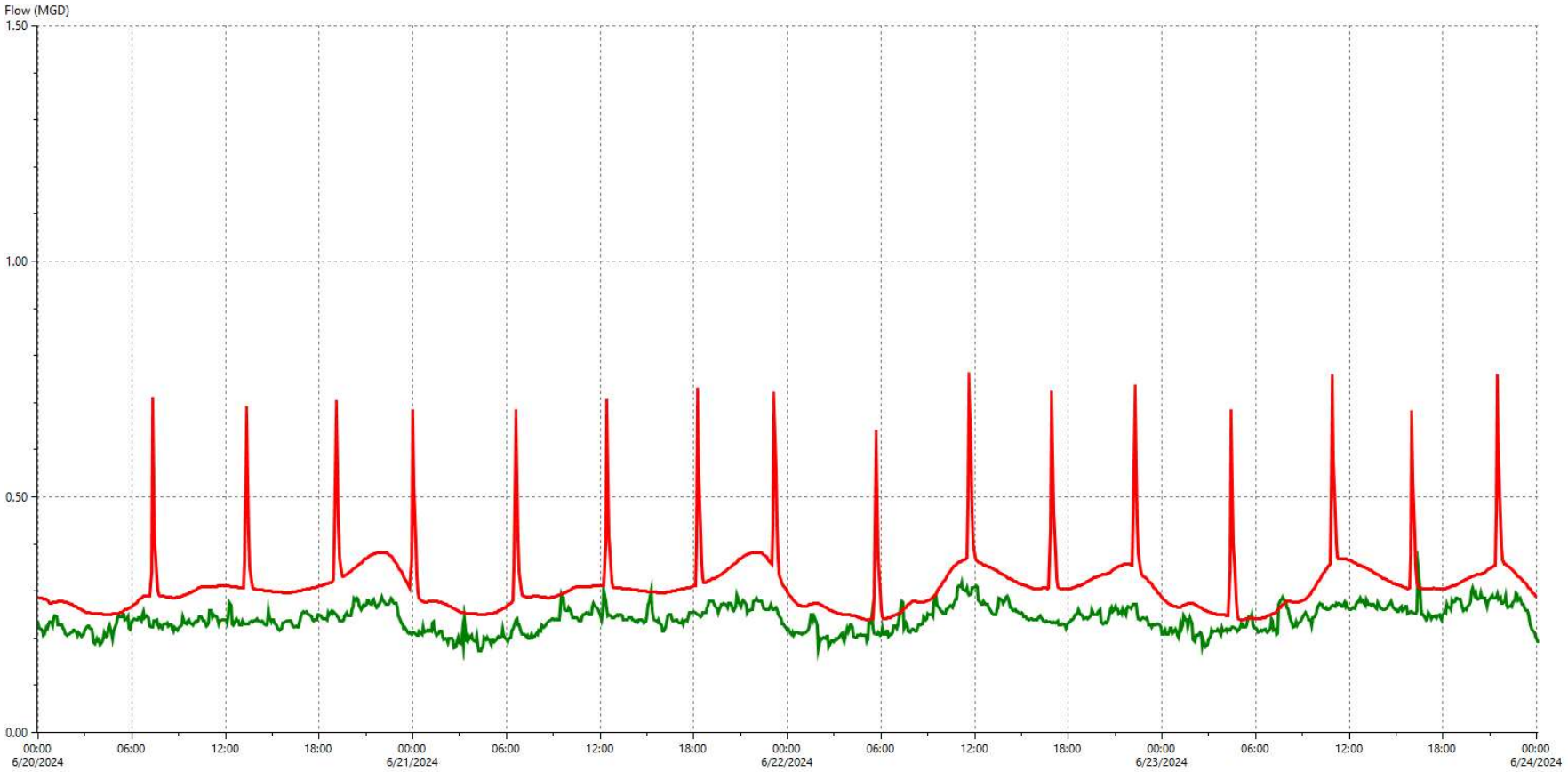
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.069	2.533	1.901
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.096	1.611	2.319

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City of Weatherford

Dry Weather Wastewater Calibration

WTH-12



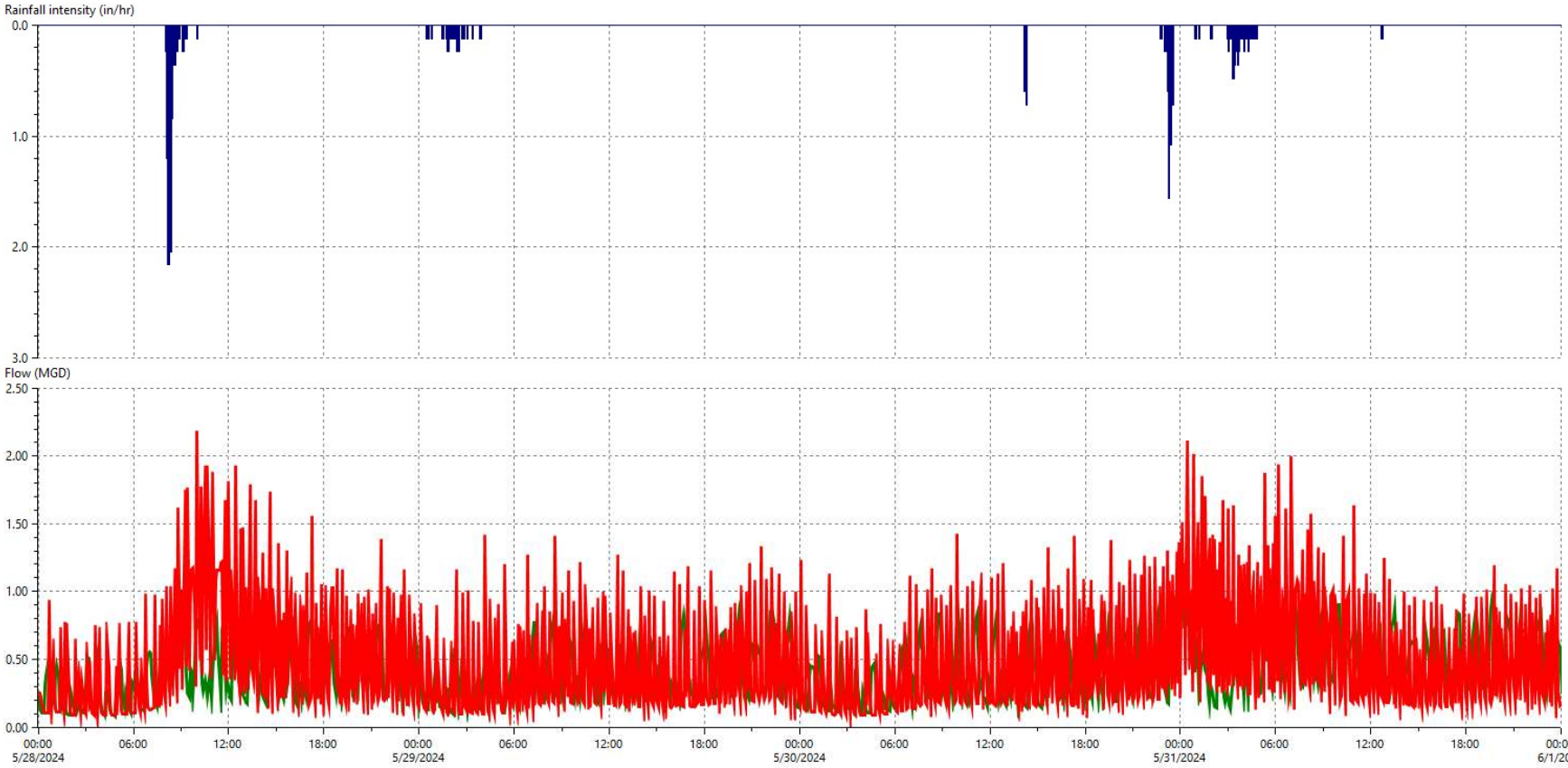
	Flow		
	Min (MGD)	Max (MGD)	Volume (US Mgal)
Observed	0.173	0.352	0.967
... - 5/28/2024 Rain Event>Existing System Rainfall event	inf	-inf	0.000
Dry Calibration>Existing System DWF	0.239	0.732	1.258

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-01



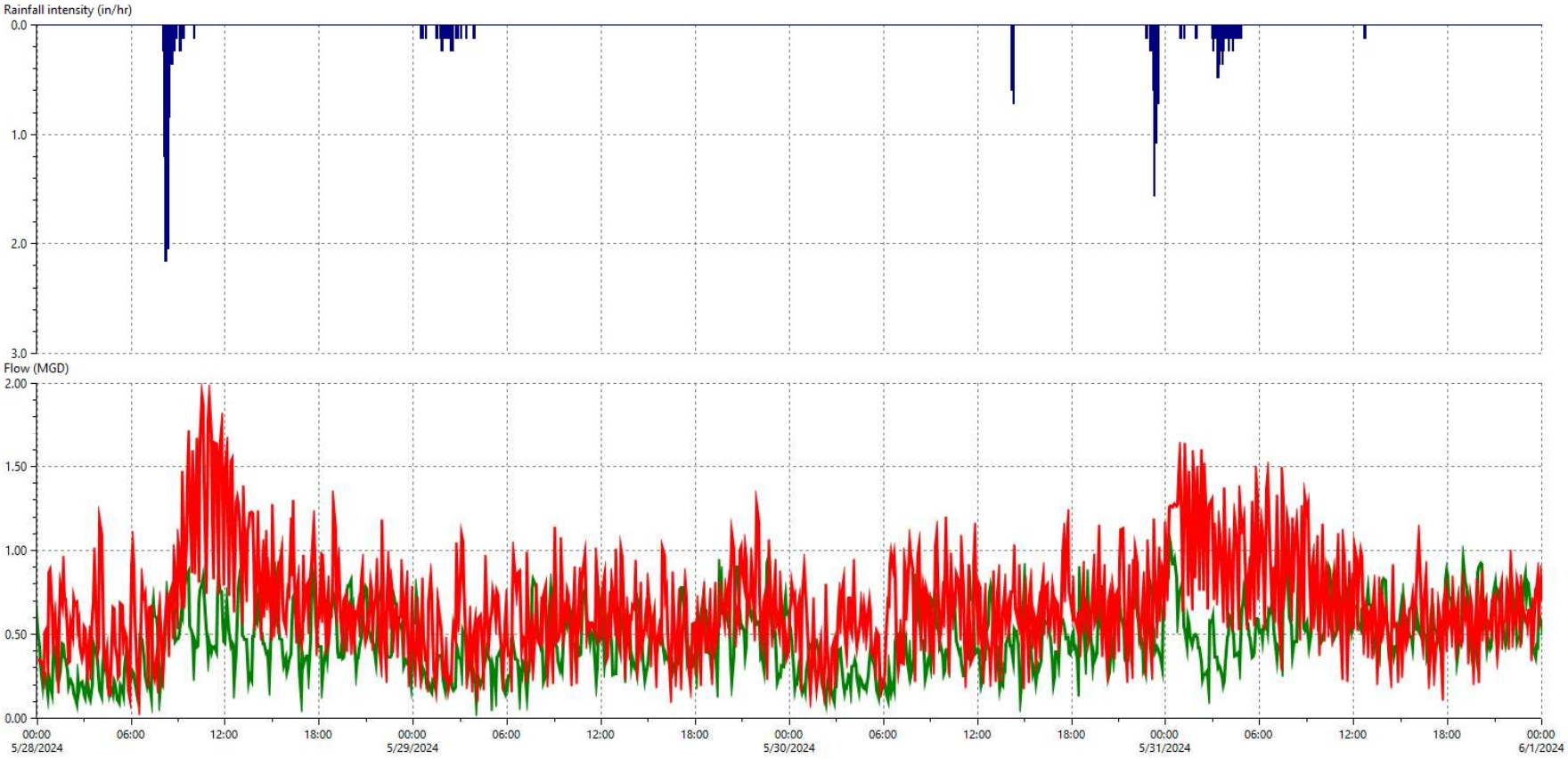
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	1.970	2.160	0.021			
Observed				0.088	1.020	1.674
...nt> Existing System Rainfall event				0.089	2.073	1.970
...Calibration> Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-02



	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	1.970	2.160	0.021			
Observed				0.089	1.071	1.884
...nt>Existing System Rainfall event				0.114	1.922	2.749
...Calibration>Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-03



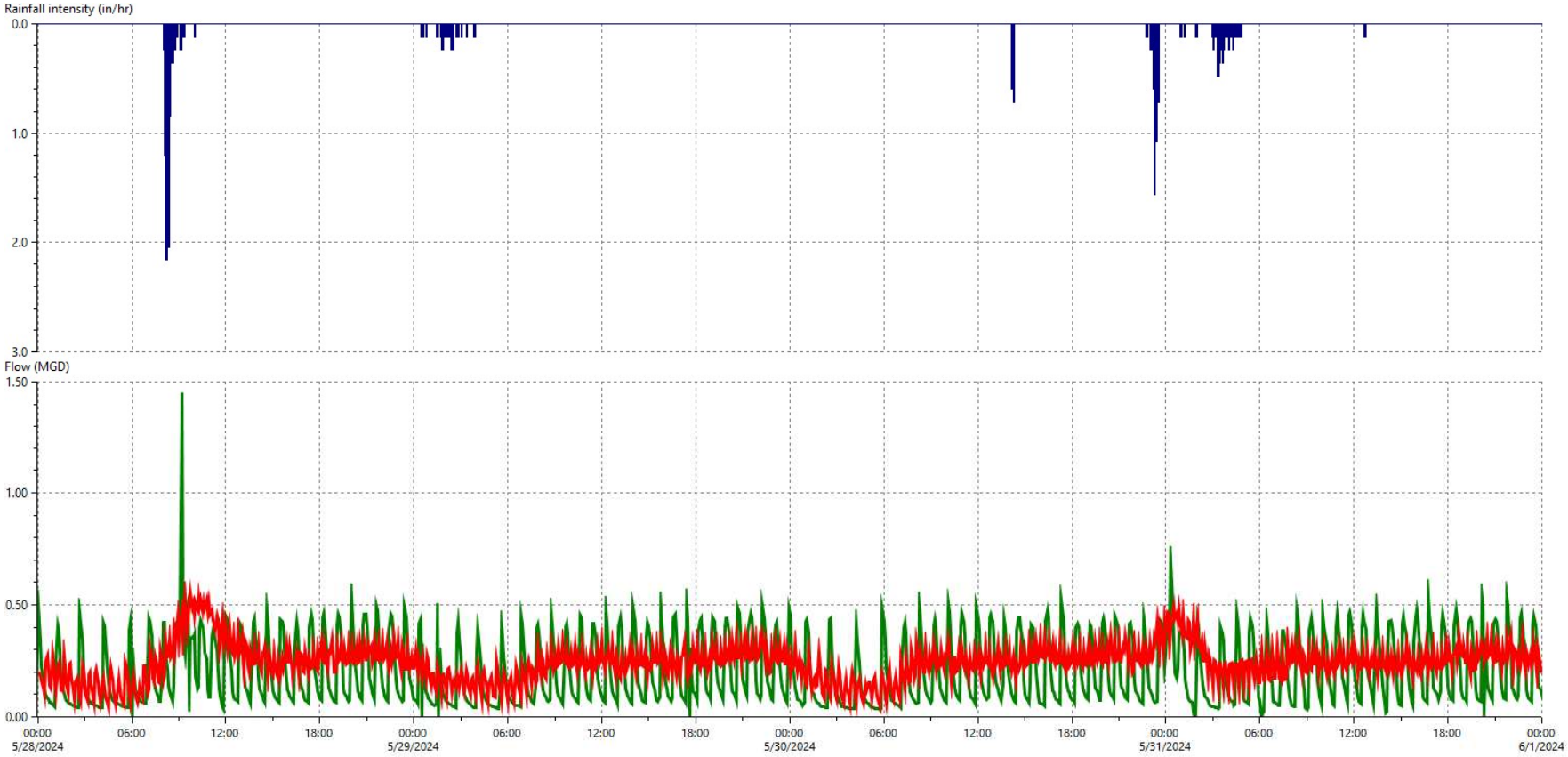
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	1.970	2.160	0.021			
Observed				0.000	0.229	0.467
...nt>Existing System Rainfall event				0.070	0.249	0.556
...Calibration>Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-04M



	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	1.970	2.160	0.021			
Observed				0.000	1.385	0.819
...nt> Existing System Rainfall event				0.041	0.556	0.970
...Calibration> Existing System DWF				inf	-inf	0.000

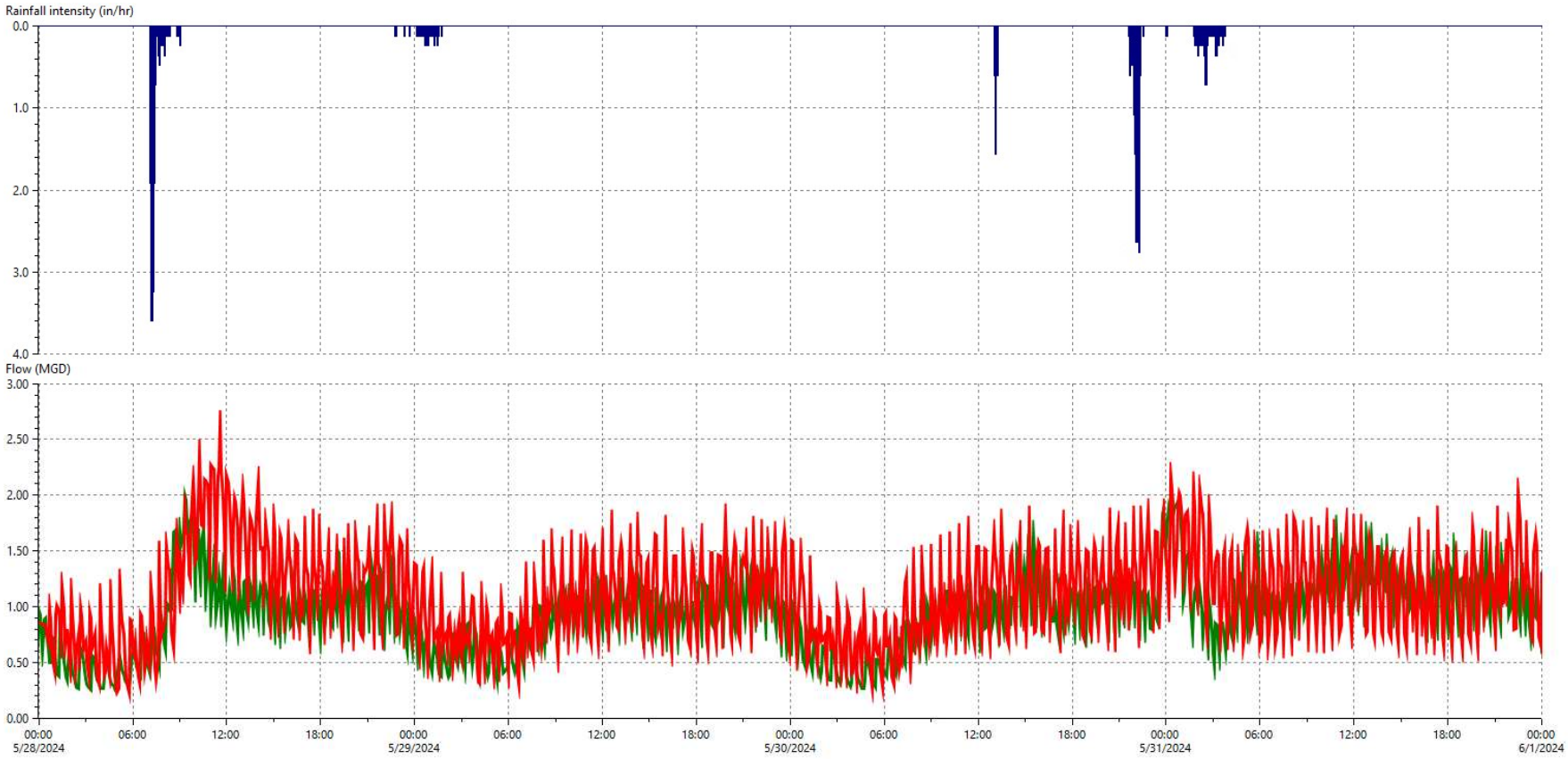
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City of Weatherford

Wet Weather Wastewater Calibration

WTH-05



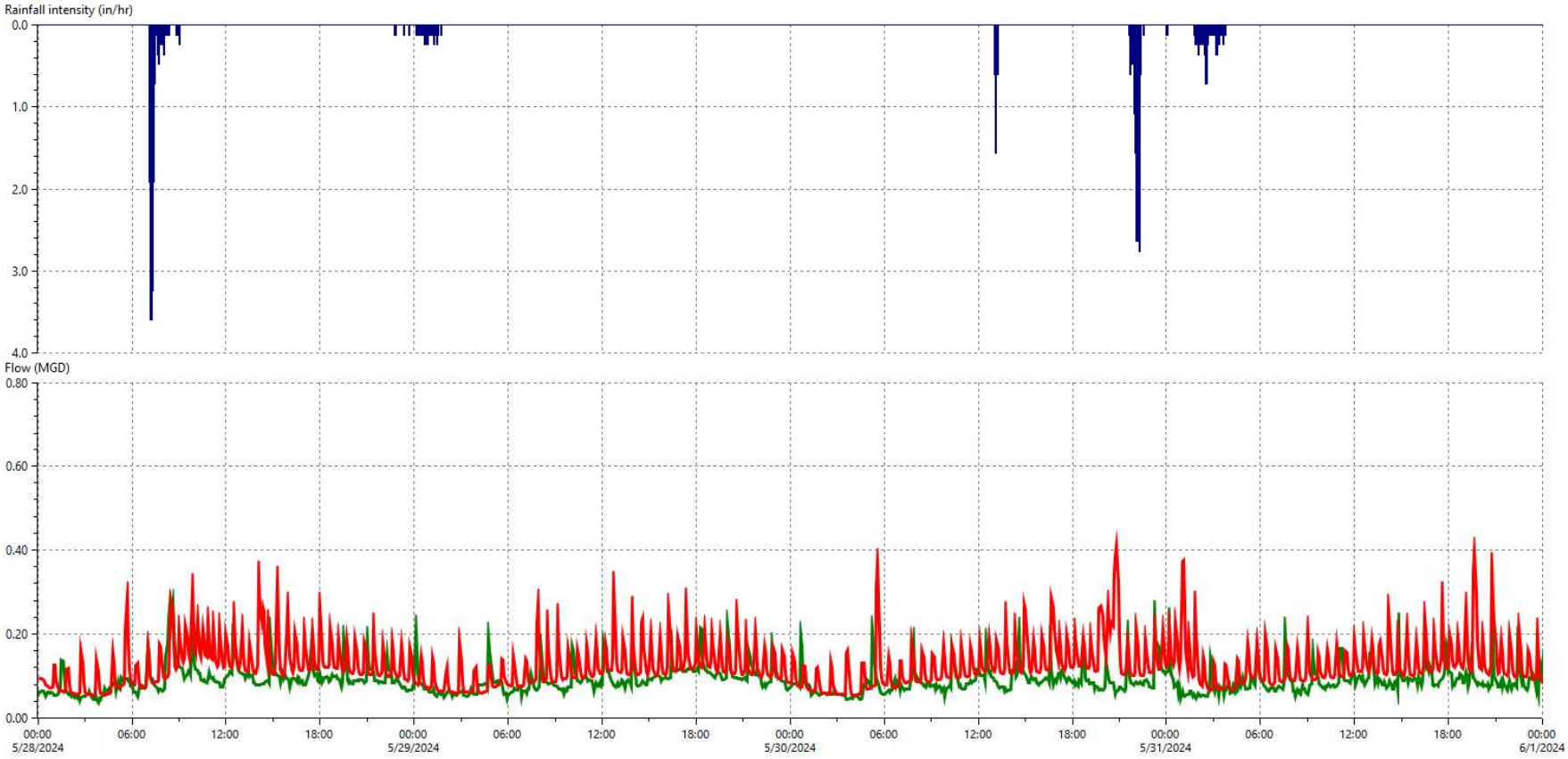
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	3.200	3.600	0.033			
Observed				0.257	1.992	3.825
...nt> Existing System Rainfall event				0.228	2.634	4.435
...Calibration> Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-06



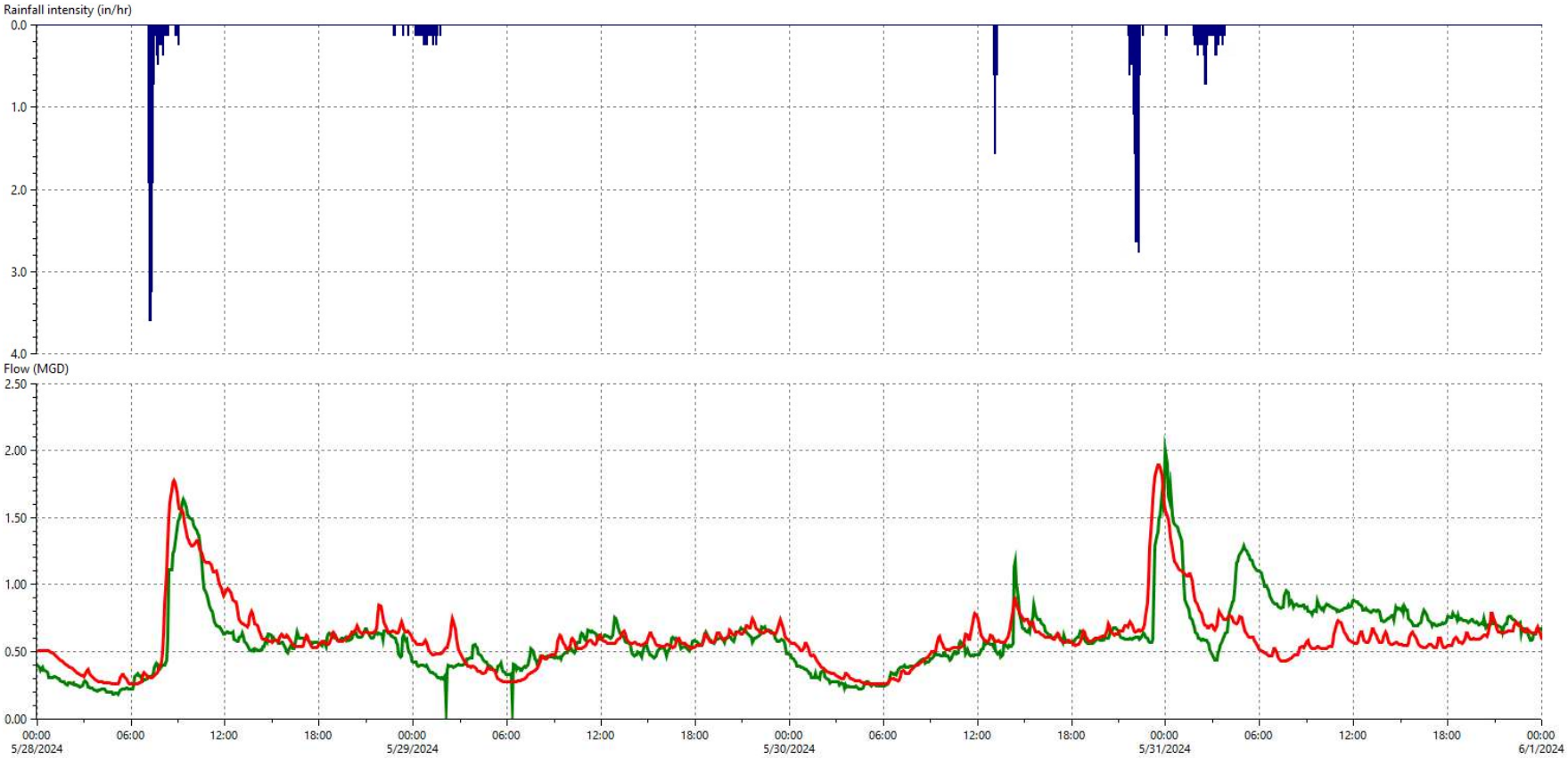
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	3.200	3.600	0.033			
Observed				0.037	0.272	0.359
...nt>Existing System Rainfall event				0.055	0.409	0.507
...Calibration>Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-07



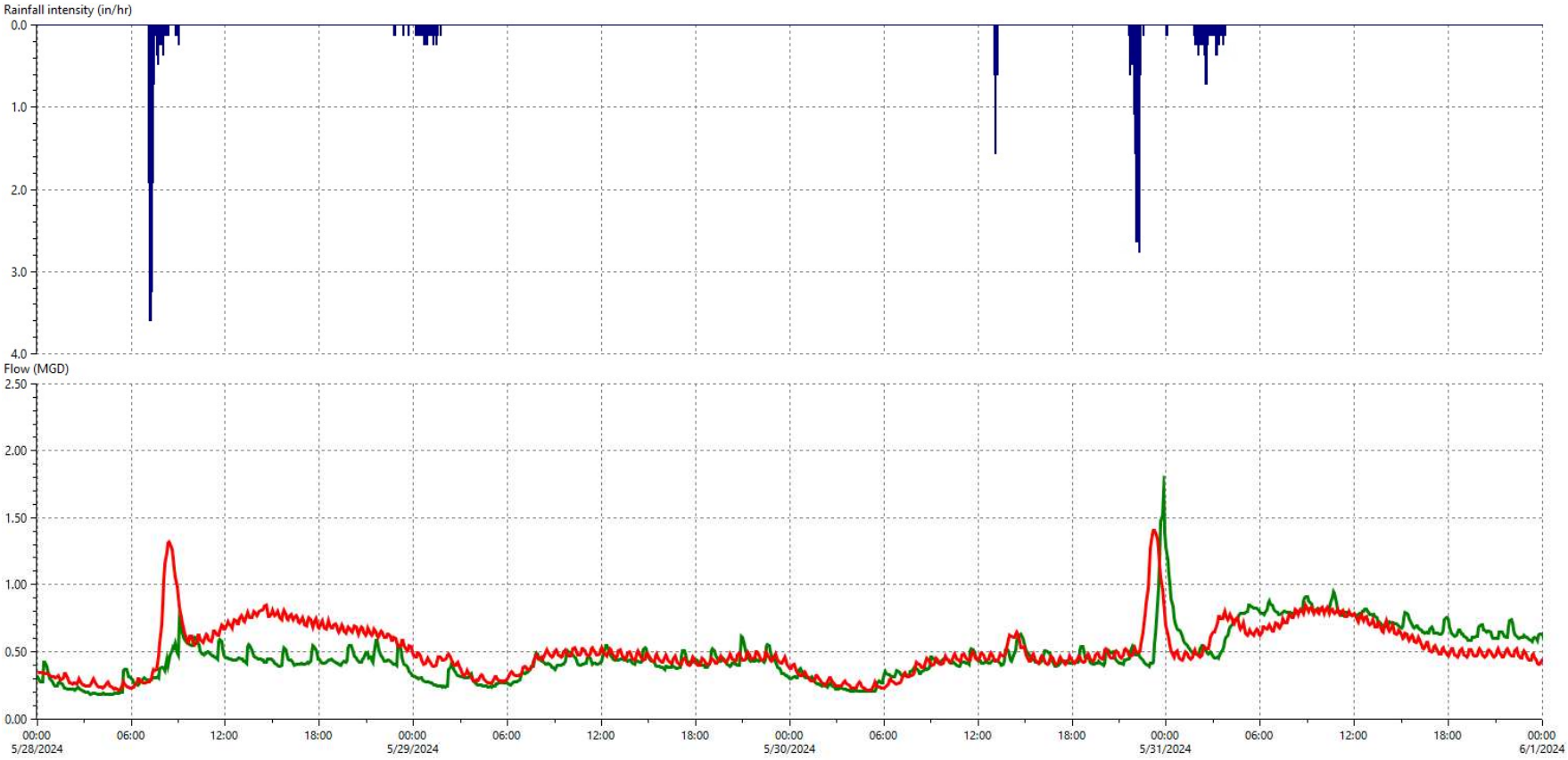
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	3.200	3.600	0.033			
Observed				0.108	1.999	2.425
...nt> Existing System Rainfall event				0.258	1.894	2.416
...Calibration> Existing System DWF				inf	-inf	0.000

Powered by

City of Weatherford

Wet Weather Wastewater Calibration

WTH-08



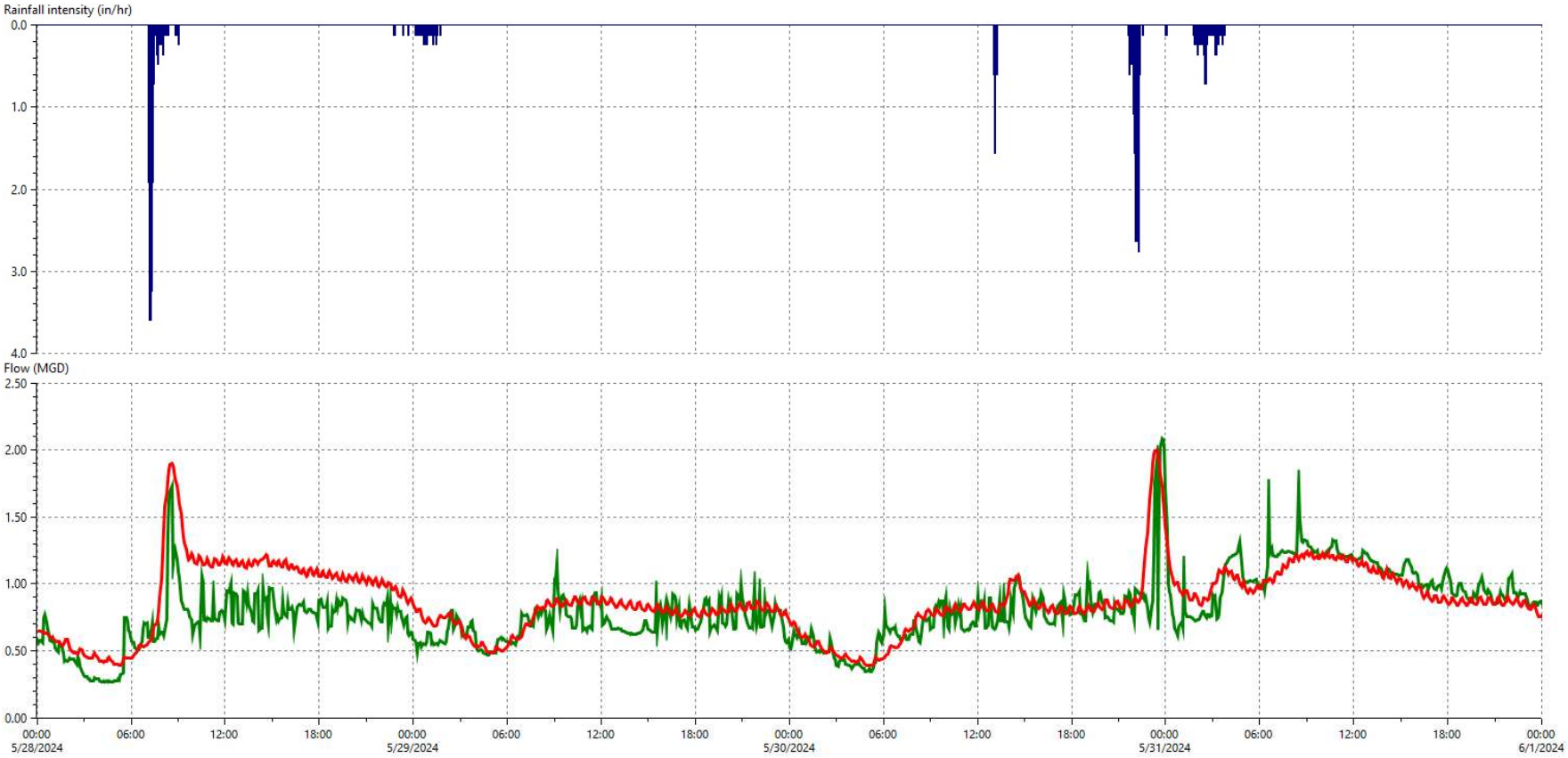
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	3.200	3.600	0.033			
Observed				0.186	1.699	1.906
...nt> Existing System Rainfall event				0.216	1.404	2.070
...Calibration> Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-09



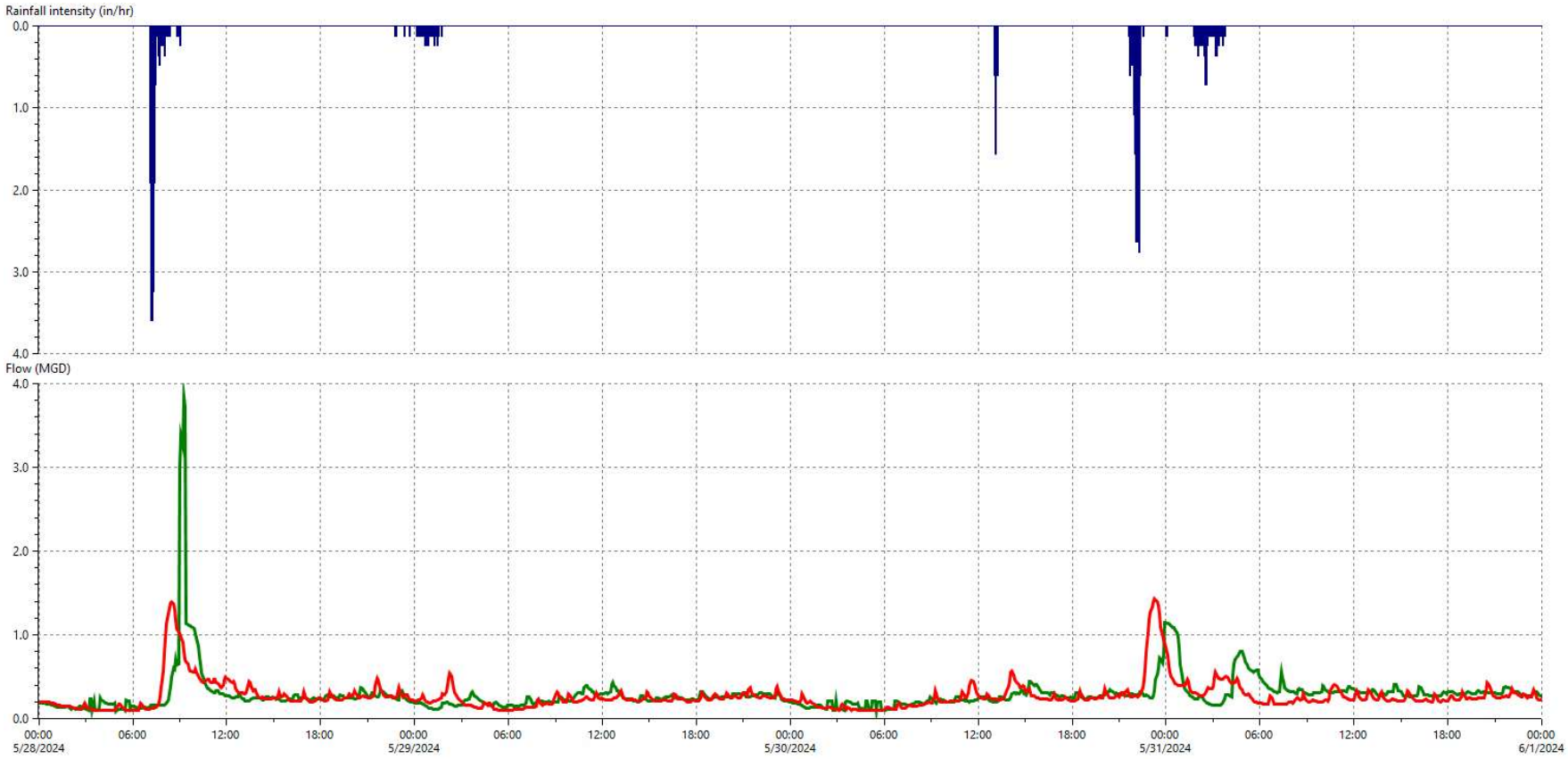
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	3.200	3.600	0.033			
Observed				0.267	2.084	3.194
...nt> Existing System Rainfall event				0.392	1.998	3.494
...Calibration> Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-10



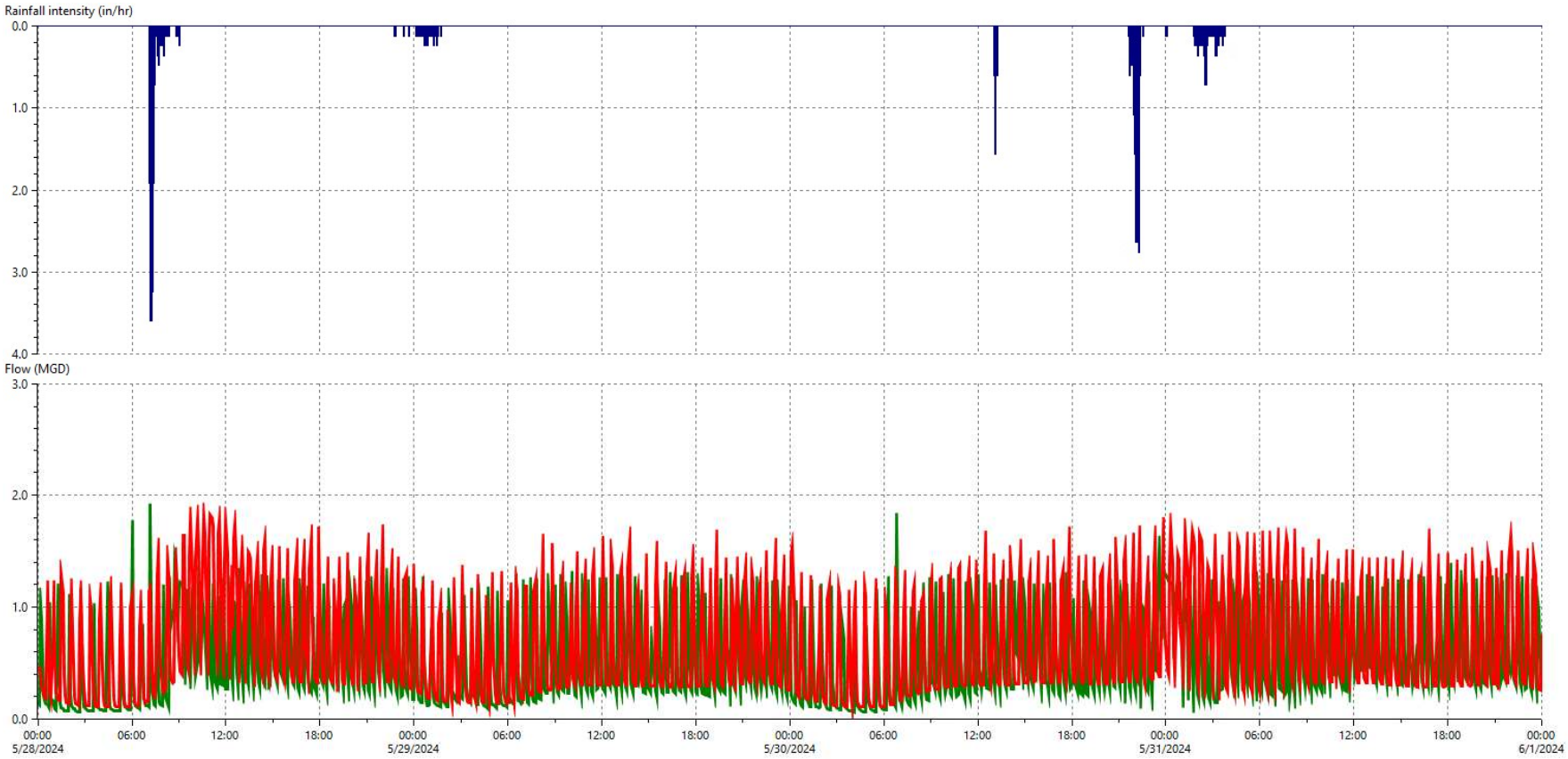
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	3.200	3.600	0.033			
Observed				0.091	3.841	1.157
...nt>Existing System Rainfall event				0.094	1.431	1.085
...Calibration>Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-11



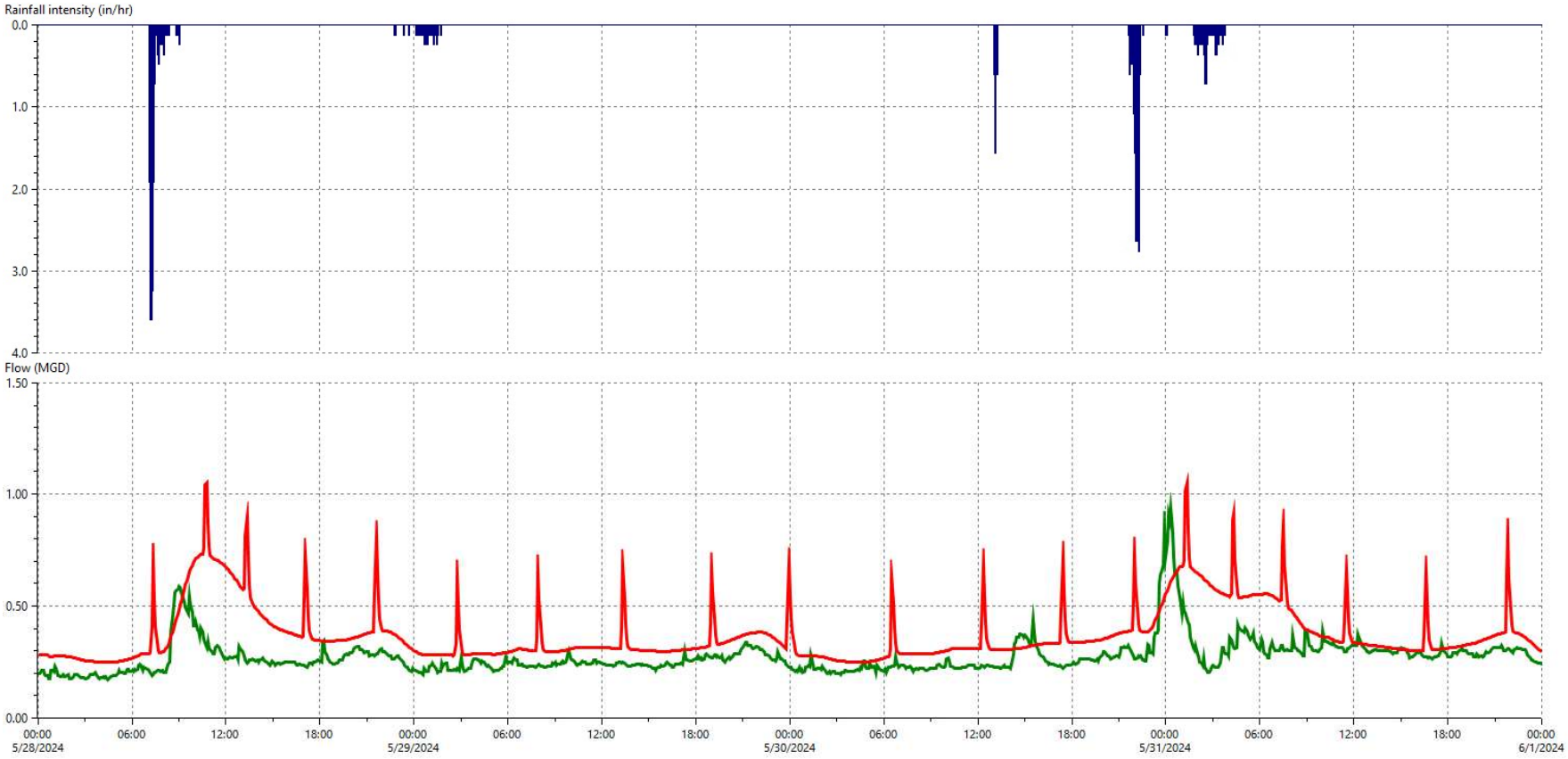
	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	3.200	3.600	0.033			
Observed				0.062	1.790	2.130
...nt> Existing System Rainfall event				0.110	1.827	2.690
...Calibration> Existing System DWF				inf	-inf	0.000

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City of Weatherford

Wet Weather Wastewater Calibration

WTH-12



	Rainfall			Flow		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min (MGD)	Max (MGD)	Volume (US Mgal)
Rain	3.200	3.600	0.033			
Observed				0.173	0.941	1.092
...nt> Existing System Rainfall event				0.251	1.049	1.502
...Calibration> Existing System DWF				inf	-inf	0.000

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Appendix J
Wastewater Collection System Risk-Based Assessment Mapping

Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Hudson Oaks #3 LS

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

0 1,900 3,800
SCALE IN FEET

WATERSHEDS
- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

AGE SCORE
- 1
- 2
- 4
- 6
- 8
- 10

FIGURE J-1

CITY OF WEATHERFORD

EXISTING WASTEWATER SYSTEM RISK-BASED ASSESSMENT PIPELINE AGE SCORE

LEGEND
- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Lift Station #24
Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Hudson Oaks #3 LS

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

WATERSHEDS
- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

MATERIAL SCORE
- 1
- 6
- 10

0 1,900 3,800
SCALE IN FEET

FIGURE J-2
CITY OF WEATHERFORD
EXISTING WASTEWATER SYSTEM RISK-BASED ASSESSMENT PIPELINE MATERIAL SCORE

LEGEND
- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Hudson Oaks #3 LS

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

WATERSHEDS
- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

0 1,900 3,800
SCALE IN FEET

WORK ORDER SCORE
- 1
- 5
- 10

FIGURE J-3

CITY OF WEATHERFORD

EXISTING WASTEWATER SYSTEM RISK-BASED ASSESSMENT PIPELINE WORK ORDER HISTORY SCORE

LEGEND

- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Hudson Oaks #3 LS

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

WATERSHEDS
- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

FIGURE J-4

CITY OF WEATHERFORD

EXISTING WASTEWATER SYSTEM
RISK-BASED ASSESSMENT
PIPELINE DIAMETER SCORE

LEGEND

- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

DIAMETER SCORE
- 1
- 2
- 6
- 10

0 1,900 3,800
SCALE IN FEET

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Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Hudson Oaks #3 LS

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

WATERSHEDS
- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

ACCESS/TRAFFIC IMPACT SCORE
- 1
- 2
- 4
- 6
- 10

0 1,900 3,800
SCALE IN FEET

FIGURE J-5
CITY OF WEATHERFORD
EXISTING WASTEWATER SYSTEM
RISK-BASED ASSESSMENT
PIPELINE ACCESS/TRAFFIC IMPACT SCORE

LEGEND
- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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User Name: DB5T

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Dove Hill North LS
Firm Capacity = 0.14 MGD

Lift Station #23
Dove Hill South LS
Firm Capacity = 0.14 MGD

Lift Station #5
Seguin Elementary LS
Firm Capacity = 0.14 MGD

Lift Station #1
North Bowie Drive LS
Firm Capacity = 0.40 MGD

Lift Station #3
Third Street LS
Firm Capacity = 0.72 MGD

Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43

Lift Station #10
Westwood LS
Firm Capacity = 0.18 MGD

Lift Station #19
Ikard Elementary LS
Firm Capacity: 0.14 MGD

Wastewater Treatment Plant
Permitted Avg Day Capacity: 4.5 MGD

Lift Station #17
Sherry Trail LS
Firm Capacity: 4.00 MGD

Lift Station #9
Clear Lake Road LS
Firm Capacity: 0.62 MGD

Lift Station #16
Country Brook LS
Firm Capacity: 0.5 MGD

Lift Station #25
Firm Capacity = 0.68 MGD

Lift Station #4
Lockwood Estates LS
Firm Capacity = 0.43 MGD

Lift Station #6
Bethel Road LS
Firm Capacity = 1.01 MGD

Lift Station #8
Tin Top Road LS
Firm Capacity = 1.22 MGD

Lift Station #11
East Lake LS
Firm Capacity = 0.20 MGD

Lift Station #14
Brazos Electric Plant LS
Firm Capacity = 1.73 MGD

Lift Station #13
Lake Hills LS
Firm Capacity = 0.41 MGD

Hudson Oaks #3 LS

Lift Station #15
Suzanne Trail LS
Firm Capacity = 1.01 MGD

Lift Station #12
WPP LS
Firm Capacity = 0.65 MGD

Lift Station #18
Crown Valley West LS
Firm Capacity = 0.56 MGD

Lift Station #21
Crown Valley East LS
Firm Capacity = 0.26 MGD

Hudson Oaks #2 LS

Hudson Oaks #1 LS

Lift Station #20
Centerpoint LS
Firm Capacity: 0.72 MGD

Lake Weatherford

Willow Park

Hudson Oaks

Annetta North

WATERSHEDS

- Lake
- Sanchez Creek
- Town Creek
- Willow Creek

ENVIRONMENTAL PROXIMITY SCORE

- 1
- 6
- 8
- 10

0 1,900 3,800
SCALE IN FEET

FIGURE J-6
CITY OF WEATHERFORD
EXISTING WASTEWATER SYSTEM
RISK-BASED ASSESSMENT
PIPELINE ENVIRONMENTAL PROXIMITY SCORE

LEGEND

- Manhole
- Lift Station
- Wastewater Treatment Plant
- 10" and Smaller Wastewater Line
- 12" and Larger Wastewater Line
- Force Main
- Road
- Railroad
- Stream
- Lake
- Parcel
- City Limit
- ETJ Boundary
- Other City Limit

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Updated: Wednesday, July 23, 2025 8:44 AM
User Name: 08817

Appendix K
Lift Station Condition Assessment Site Sheets

Lift Station #1: Mastershield

Inspection Date:

Inspector:

Facility Information	
Address:	1200 North Bowie Drive
Year in Service:	1974
Type of Facility:	
Number of Pumps:	2
Design Point:	275 gpm @ 25' TDH
Horsepower:	5.0 RPM: 1,750
Electrical Service:	208Y V, 3 PH, 4W-Wire
Utility Transformer:	45 KVA; Pad / (Pole Mounted)
Monitoring:	None / (SCADA) / Antenna / (Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent Diesel / Natural Gas 230 KW, 120/208 240 460 V, 3 PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	1	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	1	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	1	20%	
Piping and Valves	1	15%	
Mechanical - Ventilation, Odor Control	3	5%	No odor Control
Site - Drainage, Access Drive, Security, Fencing	1	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #2: Nursing Home

Inspection Date: **Inspector:**

Facility Information	
Address:	525 Peaster Highway (Highway 920)
Year in Service:	1971
Type of Facility:	
Number of Pumps:	2
Design Point:	100 gpm @ 25' TDH
Horsepower:	3.0 RPM: 1,150
Electrical Service:	_____ V, _____ PH, _____-Wire
Utility Transformer:	_____KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors		15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables		20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications		15%	
Structure - Hatches, Corrosion, Cracks, Leaking		20%	
Piping and Valves		15%	
Mechanical - Ventilation, Odor Control		5%	
Site - Drainage, Access Drive, Security, Fencing		10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #3: Third Street

Inspection Date: **Inspector:**

Facility Information	
Address:	900 Block East 2nd Street
Year in Service:	1995
Type of Facility:	
Number of Pumps:	2
Design Point:	500 gpm @ 56' TDH
Horsepower:	15.0 RPM:
Electrical Service:	208Y V, 3 PH, 4/0 -Wire
Utility Transformer:	75 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	1	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	1	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	1	20%	
Piping and Valves	1	15%	
Mechanical - Ventilation, Odor Control	2	5%	has charcoal filter
Site - Drainage, Access Drive, Security, Fencing	1	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #4: Lockwood Estates

Inspection Date:

Inspector:

Facility Information	
Address:	653 Ethan Street
Year in Service:	
Type of Facility:	
Number of Pumps:	2
Design Point:	300 gpm @ 27' TDH
Horsepower:	5.0 RPM: 3,450
Electrical Service:	120/240 V, 1 PH, _____-Wire
Utility Transformer:	75 KVA: Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	3	15%	Singk phase unretrable pumps
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	needs cleaning
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	Needs cleaning
Structure - Hatches, Corrosion, Cracks, Leaking	2	20%	
Piping and Valves	1	15%	
Mechanical - Ventilation, Odor Control	3	5%	Odor control not working
Site - Drainage, Access Drive, Security, Fencing	2	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #5: North Elementary

Inspection Date: **Inspector:**

Facility Information	
Address:	501 East 8th Street
Year in Service:	2001
Type of Facility:	
Number of Pumps:	2
Design Point:	100 gpm @ 70' TDH
Horsepower:	15.0 RPM: 3,450
Electrical Service:	240 V, 3 PH, _____-Wire
Utility Transformer:	87.5 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	3	15%	due to 1pump age
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	3	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	3	15%	diff style Panel
Structure - Hatches, Corrosion, Cracks, Leaking	2	20%	
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	3	5%	no odor Control
Site - Drainage, Access Drive, Security, Fencing	2	10%	fence to short
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #6: Bethel Road

Inspection Date: **Inspector:**

Facility Information	
Address:	2700 Bethel Road
Year in Service:	
Type of Facility:	
Number of Pumps:	2
Design Point:	700 gpm @ 140' TDH
Horsepower:	50.0 RPM: 1,750
Electrical Service:	480 V, 3 PH, _____-Wire
Utility Transformer:	225 KVA, (Pad) / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	1	20%	
Piping and Valves	1	15%	
Mechanical - Ventilation, Odor Control	3	5%	no odor control
Site - Drainage, Access Drive, Security, Fencing	4	10%	driveway is terrible
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #7: Westover Village

Inspection Date: **Inspector:**

Facility Information	
Address:	750 I-20 West / Bethel Road
Year in Service:	2007
Type of Facility:	
Number of Pumps:	2
Design Point:	400 gpm @ 143' TDH
Horsepower:	RPM: 1,750
Electrical Service:	_____ V, _____ PH, _____-Wire
Utility Transformer:	_____ KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Hardline / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvement recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors		15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables		20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications		15%	
Structure - Hatches, Corrosion, Cracks, Leaking		20%	
Piping and Valves		15%	
Mechanical - Ventilation, Odor Control		5%	
Site - Drainage, Access Drive, Security, Fencing		10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

-DECOMMISSIONED-DECOMMISSIONED-DECOMMISSIONED-DECOMMISSIONED-DECOMMISSIONED-DECOMMISSIONED-

Lift Station #8: Westover Village

Inspection Date: **Inspector:**

Facility Information	
Address:	2607 Tin Top Road
Year in Service:	2011
Type of Facility:	
Number of Pumps:	2
Design Point:	850 gpm @ 170' and 175' TDH
Horsepower:	60 and 75 RPM: 1,750
Electrical Service:	_____ V, 3 PH, _____-Wire
Utility Transformer:	150 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	2	20%	
Piping and Valves	3	15%	air cushion not working
Mechanical - Ventilation, Odor Control	1	5%	
Site - Drainage, Access Drive, Security, Fencing	2	10%	
Condition Rating	-	100%	

Debris Notes:

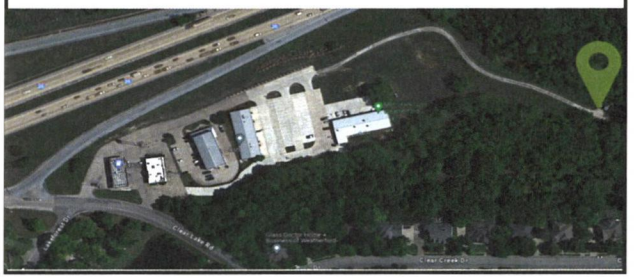
Additional Notes:

Lift Station #9: Clear Lake Road

Inspection Date: **Inspector:**

Facility Information	
Address:	East of 2113 Clear Lake Road
Year in Service:	1984
Type of Facility:	
Number of Pumps:	2
Design Point:	450 and 461 gpm @ 84' and 88' TDH
Horsepower:	20 and 25 RPM: 1,750
Electrical Service:	240 V, 3 PH, 4/0 -Wire
Utility Transformer:	~~86~~ 43 KVA; Pad / (Pole Mounted)
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / (Cellular))
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required



CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	4	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	3	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	4	20%	
Piping and Valves	4	15%	
Mechanical - Ventilation, Odor Control	3	5%	No odor control
Site - Drainage, Access Drive, Security, Fencing	2	10%	Fencing, drive
Condition Rating	-	100%	

Debris Notes:

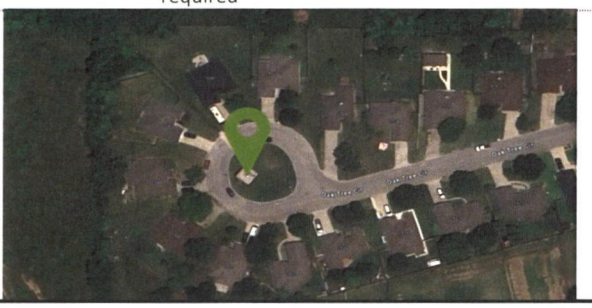
Additional Notes:

Lift Station #10: Westwood

Inspection Date: **Inspector:**

Facility Information	
Address:	1550 Oak Tree Lane
Year in Service:	1987
Type of Facility:	
Number of Pumps:	2
Design Point:	122 gpm @ 160' TDH
Horsepower:	13.0 RPM: 3,450
Electrical Service:	240 V, 3 PH, 1/0 -Wire
Utility Transformer:	85 KVA; Pad / (Pole Mounted)
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required



CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	4	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	2	20%	
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	5	5%	
Site - Drainage, Access Drive, Security, Fencing	2	10%	fence to short
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #11: East Lake

Inspection Date: **Inspector:**

Facility Information	
Address:	1523 East Lake Drive
Year in Service:	1990
Type of Facility:	
Number of Pumps:	2
Design Point:	140 gpm @ 50' TDH
Horsepower:	7.5 and 5 RPM: 1,750
Electrical Service:	240 V, 3 PH, #2 -Wire
Utility Transformer:	~~25~~ 17 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	Conduits need to be sealed
Structure - Hatches, Corrosion, Cracks, Leaking	3	20%	hatches won't close
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	3	5%	no odor control
Site - Drainage, Access Drive, Security, Fencing	3	10%	No safe place to park
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #12: WTP

Inspection Date: **Inspector:**

Facility Information	
Address:	114 West Lake Drive
Year in Service:	1996
Type of Facility:	
Number of Pumps:	2
Design Point:	450 gpm @ 97' TDH
Horsepower:	25.0 RPM: 1,750
Electrical Service:	240 V, 3 PH, 1/0 -Wire
Utility Transformer:	~~37~~ 26 KVA; Pad / (Pole Mounted)
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / (Cellular))
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required



CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	1	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	1	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	1	20%	
Piping and Valves	1	15%	
Mechanical - Ventilation, Odor Control	2	5%	
Site - Drainage, Access Drive, Security, Fencing	1	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #13: Lake Hills

Inspection Date:

Inspector:

Facility Information	
Address:	3611 Foot Hills Drive
Year in Service:	1996 not correct
Type of Facility:	
Number of Pumps:	2
Design Point:	307 and 290 gpm @ 71' TDH
Horsepower:	20 and 15 RPM: 1,750
Electrical Service:	480 V, 3 PH, _____-Wire
Utility Transformer:	150 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	2	20%	
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	3	5%	Odor Control doesn't work
Site - Drainage, Access Drive, Security, Fencing	3	10%	driveway needs work drainage problem
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #14: Brazos Electric Plant

Inspection Date:

Inspector:

Facility Information	
Address:	601 West Lake Drive
Year in Service:	1990
Type of Facility:	
Number of Pumps:	3
Design Point:	600 gpm @ 210' TDH
Horsepower:	84 and 87 RPM: 1,770 & 1,750
Electrical Service:	208 V, 3 PH, 350 -Wire
Utility Transformer:	150 KVA; Pad / (Pole Mounted)
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	1 brand new pump
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	3	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	3	15%	Scada has some issues
Structure - Hatches, Corrosion, Cracks, Leaking	4	20%	structure undersized
Piping and Valves	2	15%	outgoing is new incoming needs work
Mechanical - Ventilation, Odor Control	3	5%	No odor Control
Site - Drainage, Access Drive, Security, Fencing	2	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #15: Suzanne Trail

Inspection Date: **Inspector:**

Facility Information	
Address:	NW of 2600 Suzanne Trail
Year in Service:	1990
Type of Facility:	
Number of Pumps:	2
Design Point:	700 gpm @ 98' TDH
Horsepower:	30.0 RPM: 1,750
Electrical Service:	480 V, 3 PH, _____-Wire
Utility Transformer:	112.5 KVA; (Pad) / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / (Cellular))
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required



CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	1	20%	
Piping and Valves	4	15%	
Mechanical - Ventilation, Odor Control	5	5%	
Site - Drainage, Access Drive, Security, Fencing	3	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #16: Love Country Brook

Inspection Date: **Inspector:**

Facility Information	
Address:	2440 Scotts Meadow Court
Year in Service:	1996
Type of Facility:	
Number of Pumps:	2
Design Point:	350 gpm @ 72' TDH
Horsepower:	20.0 RPM: 1,750
Electrical Service:	240 V, 3 PH, 1/0 -Wire
Utility Transformer:	43 KVA; Pad / (Pole Mounted)
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	3	20%	Conduits not sealed Showing signs of corrosion no soft starts
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	3	20%	deteriorating on outside
Piping and Valves	3	15%	Pipes & valves rusted
Mechanical - Ventilation, Odor Control	3	5%	None
Site - Drainage, Access Drive, Security, Fencing	3	10%	driveway needs work fence leaning barbwire broke
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #17: Sherry Trail

Inspection Date: **Inspector:**

Facility Information	
Address:	325 Sherry Trail
Year in Service:	1990
Type of Facility:	
Number of Pumps:	3
Design Point:	1,400 gpm @ 170' TDH
Horsepower:	100.0 RPM: 1780, 1750, and 1800
Electrical Service:	480 V, 3 PH, 350 -Wire
Utility Transformer:	225 KVA (Pad) / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	3	20%	West hatch broken
Piping and Valves	1	15%	
Mechanical - Ventilation, Odor Control	3	5%	No odor Control but have new system at shop
Site - Drainage, Access Drive, Security, Fencing	2	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #18: Crown Valley West

Inspection Date:

Inspector:

Facility Information	
Address:	1100 Block Reata Court
Year in Service:	2002
Type of Facility:	
Number of Pumps:	2
Design Point:	388 and 643 gpm @ 150' TDH
Horsepower:	50 and 30.8 RPM: 1,775 & 1,750
Electrical Service:	_____ V, _____ PH, _____-Wire
Utility Transformer:	_____ KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	2	20%	
Piping and Valves	1	15%	
Mechanical - Ventilation, Odor Control	3	5%	no odor Control
Site - Drainage, Access Drive, Security, Fencing	3	10%	fence not to Code spec
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #19: Bankhead Elementary

Inspection Date:

Inspector:

Facility Information	
Address:	1100 Terry Trail
Year in Service:	2000
Type of Facility:	
Number of Pumps:	2
Design Point:	100 gpm @ 50' TDH
Horsepower:	7.5 RPM: 1,750
Electrical Service:	120/240 V, 1 PH, 4/0 -Wire
Utility Transformer:	25 KVA; (Pad) / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	3	15%	1 pump is 23 years old
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	3	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	2	20%	fiberglass enclosure 5 aged components
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	3	5%	No odor Control
Site - Drainage, Access Drive, Security, Fencing	3	10%	no driveway left
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #20: Centerpoint

Inspection Date:

Inspector:

Facility Information	
Address:	Center Point Road
Year in Service:	2002
Type of Facility:	
Number of Pumps:	2
Design Point:	500 gpm @ 126' TDH
Horsepower:	30.0 RPM: 1,750
Electrical Service:	460 V, 3 PH, 1/0-Wire
Utility Transformer:	30 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	4	15%	impellers worn having to use different pump
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	3	15%	needs to be sealed & a few wiring issues
Structure - Hatches, Corrosion, Cracks, Leaking	3	20%	hatch broken on wet well
Piping and Valves	~~2~~ 3	15%	Check valves in bad shape & can't clean
Mechanical - Ventilation, Odor Control	3	5%	No
Site - Drainage, Access Drive, Security, Fencing	2	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #21: Crown Valley

Inspection Date:

Inspector:

Facility Information	
Address:	Crown Road
Year in Service:	2005
Type of Facility:	
Number of Pumps:	2
Design Point:	178 gpm @ 85' TDH
Horsepower:	15.0 RPM: 1,750
Electrical Service:	460 V, 3 PH, _____-Wire
Utility Transformer:	_____KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	≥ 3	20%	Panel rack settled
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	3	5%	no odor control
Site - Drainage, Access Drive, Security, Fencing	3	10%	Ponding water issue
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #22: Pleasant Valley

Inspection Date:

Inspector:

Facility Information	
Address:	302 Pleasant View Drive
Year in Service:	2002
Type of Facility:	
Number of Pumps:	2
Design Point:	300 gpm @ 112' TDH
Horsepower:	30 and 25 RPM: 1,800
Electrical Service:	240 V, 3 PH, 4/0 -Wire
Utility Transformer:	125 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	~~None~~ / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	3	15%	one pump new one pump 22 years old
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	No VFD's
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	3	15%	Conduit not sealed dirty, ~~rat~~
Structure - Hatches, Corrosion, Cracks, Leaking	~~2~~ 3	20%	Check valve vault needs sump pump
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	3	5%	no odor control
Site - Drainage, Access Drive, Security, Fencing	2	10%	gate needs roller
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #23: Dove Hill South

Inspection Date: **Inspector:**

Facility Information	
Address:	1723 North Main Street
Year in Service:	2003
Type of Facility:	
Number of Pumps:	2
Design Point:	100 gpm @ 46' TDH
Horsepower:	5 and 4.5 RPM: 1,750 & 1,150
Electrical Service:	240 V, 3 PH, 4/0 -Wire
Utility Transformer:	13 KVA; Pad / (Pole Mounted)
Monitoring:	None / (SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	2	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	3	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	2	20%	
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	3	5%	
Site - Drainage, Access Drive, Security, Fencing	4	10%	fence + drainag.
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #24: Dove Hill North

Inspection Date:

Inspector:

Facility Information	
Address:	1823 Sandpiper Drive
Year in Service:	2003
Type of Facility:	
Number of Pumps:	2
Design Point:	100 gpm @ 46' TDH
Horsepower:	4.5 RPM: 1,150
Electrical Service:	230 V, 3 PH, _____-Wire
Utility Transformer:	_____KVA; Pad / (Pole Mounted)
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / (Portable) / Permanent (Diesel) / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	3	15%	due to age
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	
Structure - Hatches, Corrosion, Cracks, Leaking	3	20%	infil from CV [illegible]
Piping and Valves	2	15%	
Mechanical - Ventilation, Odor Control	3	5%	No odor Control
Site - Drainage, Access Drive, Security, Fencing	2	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Lift Station #25

Inspection Date:

Inspector:

Facility Information	
Address:	1224 I-20 West
Year in Service:	
Type of Facility:	
Number of Pumps:	2
Design Point:	475 gpm @ 95' TDH
Horsepower:	25.0 RPM: 1,765
Electrical Service:	480 V, 3 PH, 3/0 -Wire
Utility Transformer:	150 KVA; Pad / Pole Mounted
Monitoring:	None / SCADA (Antenna / Fiber) / Autodialer (Phone / Cellular)
Generator:	None / Portable / Permanent Diesel / Natural Gas _____ KW, _____ V, _____ PH

Scoring Guidelines	
1	New condition, no improvements recommended to maintain function
2	Good condition, minor improvements recommended to enhance performance
3	Fair condition, improvements recommended to improve performance or efficiency
4	Poor condition, improvements recommended to maintain reliability
5	Eminent failure, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Comments
Pumps and Motors	1	15%	
Electrical – MCC, Motor Starters/VFD, Panelboards, Grounding, Back-up Power, Cables	2	20%	conduit not sealed & water inside
Instrumentation and Controls - SCADA Cabinet, Pump Controls, Communications	2	15%	Conduits not sealed
Structure - Hatches, Corrosion, Cracks, Leaking	1	20%	
Piping and Valves	1	15%	
Mechanical - Ventilation, Odor Control	3	5%	odor control not working
Site - Drainage, Access Drive, Security, Fencing	1	10%	
Condition Rating	-	100%	

Debris Notes:

Additional Notes:

Appendix L
Wastewater Collection System Capital Improvement Plan Opinion of Probable Construction Cost

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 1 — **Phase:** 5-Year

Project Name: Town Creek Interceptor Expansion Phase 1

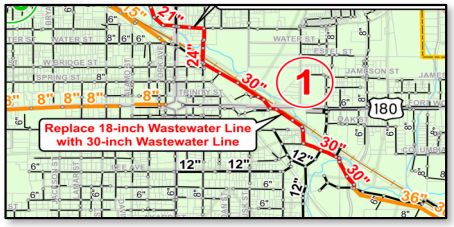
Project Description:

This project consists of expanding the 18-inch line to 30 inches, beginning southeast of where Jack Borden Way passes over the railroad and running northwest along Town Creek until terminating north of the intersection of North Elm Street and East Bridge Street.

Project Drivers:

The proposed wastewater line expansion will reduce existing capacity issues and accommodate future growth.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	30" Pipe	4,700	LF	$ 540	$ 2,538,000
2	48" Diameter Manhole	19	EA	$ 12,000	$ 228,000
3	30" Boring and Casing	370	LF	$ 1,500	$ 555,000
4	Concrete Pavement Repair	150	LF	$ 100	$ 15,000
				SUBTOTAL:	**$ 3,336,000**
		CONTINGENCY		30%	$ 1,000,800
				SUBTOTAL:	**$ 4,336,800**
		ENG/SURVEY		15%	$ 650,600
				SUBTOTAL:	**$ 4,987,400**
				Estimated Project Total:	**$ 4,987,400**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 2	**Phase: 5-Year**
Project Name:	**Lift Station #17 Force Main and Treatment Plant Influent Expansion**

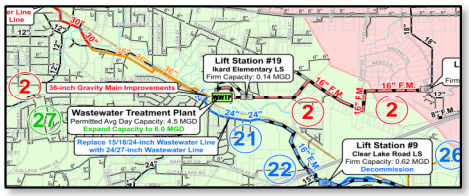
Project Description:

This project consists of expanding the 12-inch force main to 16 inches, beginning from the wastewater treatment plant influent line and running east to Lift Station #17. This project also consists of expanding the influent wastewater treatment plant line to 36 inches from the wastewater treatment plant to the under-design/construction 36-inch line.

Project Drivers:

Expanding the force main will accommodate the recently increased capacity of Lift Station #17, and expanding the influent wastewater treatment plant line is intended to reduce existing capacity issues.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	16" Force Main	10,250	LF	$ 320	$ 3,280,000
2	36" Pipe	550	LF	$ 648	$ 356,400
3	48" Diameter Manhole	3	EA	$ 12,000	$ 36,000
4	Concrete Pavement Repair	240	LF	$ 100	$ 24,000
				SUBTOTAL:	**$ 3,696,400**
		CONTINGENCY		30%	$ 1,109,000
				SUBTOTAL:	**$ 4,805,400**
		ENG/SURVEY		15%	$ 720,900
				SUBTOTAL:	**$ 5,526,300**
				Estimated Project Total:	**$ 5,526,300**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 3	**Phase: 5-Year**
Project Name:	**Lift Station #15 Capacity Expansion to 2.50 MGD**

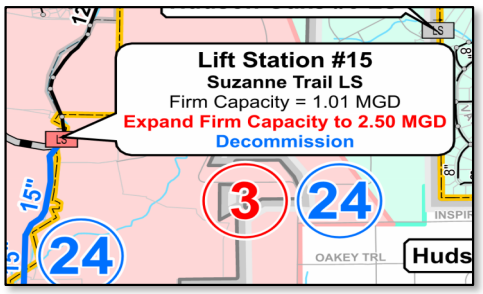
Project Description:

This project consists of expanding the firm capacity of Lift Station #15 from 1.01 MGD to 2.50 MGD.

Project Drivers:

Expanding Lift Station #15 will reduce existing capacity issues and accommodate future growth.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 1.5 MGD Expansion	1	LS	$ 1,500,000	$ 1,500,000
				SUBTOTAL:	**$ 1,500,000**
		CONTINGENCY		30%	$ 450,000
				SUBTOTAL:	**$ 1,950,000**
		ENG/SURVEY		15%	$ 292,500
				SUBTOTAL:	**$ 2,242,500**
				Estimated Project Total:	**$ 2,242,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 4 — **Phase:** 5-Year

Project Name: Highway 171 24-inch Gravity Main Expansion

Project Description:

This project consists of expanding the 18-inch wastewater line to 24 inches, beginning southeast of the intersection of East BB Fielder Road and the I-20 service road and running south, curving along East BB Fielder Road until tying into the Lift Station #8 force main.

Vicinity Map



Project Drivers:

The proposed wastewater line expansion will provide the capacity needed for Projects #5-#8.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Pipe	3,400	LF	$ 432	$ 1,468,800
2	48" Diameter Manhole	16	EA	$ 12,000	$ 192,000
3	24" Boring and Casing	200	LF	$ 1,200	$ 240,000
4	Concrete Pavement Repair	150	LF	$ 100	$ 15,000
				SUBTOTAL:	**$ 1,915,800**
		CONTINGENCY		30%	$ 574,800
				SUBTOTAL:	**$ 2,490,600**
		ENG/SURVEY		15%	$ 373,600
				SUBTOTAL:	**$ 2,864,200**
				Estimated Project Total:	**$ 2,864,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 5 — **Phase:** 5-Year

Project Name: Lift Station #8 Capacity Expansion to 5.10 MGD and Force Main Expansion

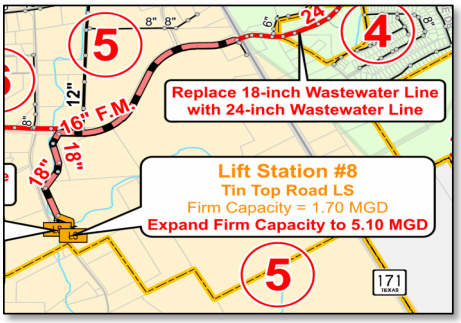
Project Description:

This project consists of expanding the firm capacity of Lift Station #8 from 1.70 MGD to 5.10 MGD and expanding the 10-inch force main to 16 inches, beginning by tying into the upstream end of Project #4 and running west until tying into the under-design/construction Lift Station #8.

Project Drivers:

Expanding Lift Station #8 will reduce existing capacity issues and accommodate future growth, and expanding the force main will accommodate the under-design/construction capacity of Lift Station #8.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 3.4 MGD Expansion	1	LS	$ 3,400,000	$ 3,400,000
2	16" Force Main	5,600	LF	$ 320	$ 1,792,000
				SUBTOTAL:	**$ 5,192,000**
		CONTINGENCY		30%	$ 1,557,600
				SUBTOTAL:	**$ 6,749,600**
		ENG/SURVEY		15%	$ 1,012,500
				SUBTOTAL:	**$ 7,762,100**
				Estimated Project Total:	**$ 7,762,100**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 6	**Phase: 5-Year**
Project Name:	**Lift Station #8 18-inch Gravity Main Expansion**

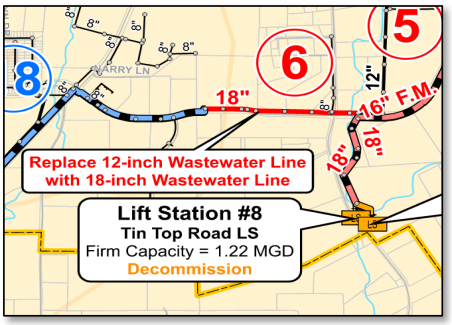
Project Description:

This project consists of expanding the 12-inch wastewater line to 18 inches, beginning by tying into Lift Station #8 and running north until it crosses West BB Fielder Road. It then runs west until it ties into the Lift Station #6 force main.

Project Drivers:

The proposed wastewater line expansion will increase wastewater system capacity for future growth and provide the capacity needed for Projects #7 and #8.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	18" Pipe	4,400	LF	$ 324	$ 1,425,600
2	48" Diameter Manhole	18	EA	$ 12,000	$ 216,000
3	Concrete Pavement Repair	140	LF	$ 100	$ 14,000
				SUBTOTAL:	**$ 1,655,600**
		CONTINGENCY		30%	$ 496,700
				SUBTOTAL:	**$ 2,152,300**
		ENG/SURVEY		15%	$ 322,900
				SUBTOTAL:	**$ 2,475,200**
				Estimated Project Total:	**$ 2,475,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 7 — **Phase:** 5-Year

Project Name: Lift Station #6 Capacity Expansion to 2.20 MGD

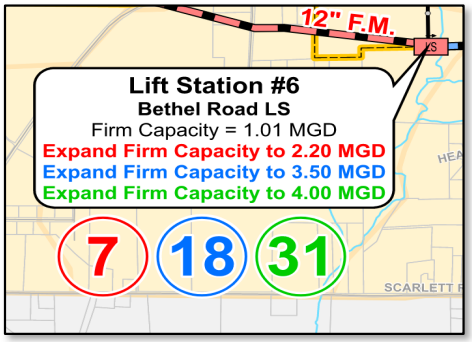
Project Description:

This project consists of expanding the firm capacity of Lift Station #6 from 1.01 MGD to 2.20 MGD.

Project Drivers:

Expanding Lift Station #6 will increase wastewater system capacity for future growth.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 1.2 MGD Expansion	1	LS	$ 1,200,000	$ 1,200,000
				SUBTOTAL:	**$ 1,200,000**
		CONTINGENCY		30%	$ 360,000
				SUBTOTAL:	**$ 1,560,000**
		ENG/SURVEY		15%	$ 234,000
				SUBTOTAL:	**$ 1,794,000**
				Estimated Project Total:	**$ 1,794,000**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 8	**Phase: 5-Year**
Project Name:	**Proposed 0.50 MGD Lift Station A, Force Main and Gravity Main Phase 1**

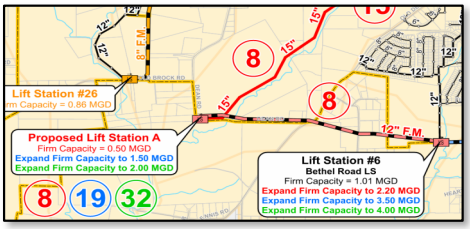
Project Description:

This project consists of the construction of the 0.50 MGD Lift Station A, which will be near the southwest corner of Dean Road, a 12-inch force main to connect Lift Station A to Lift Station #6 and a 15-inch gravity main that runs northeast from Lift Station A along the nearby creek until it terminates south of I-20.

Project Drivers:

The proposed Lift Station A, force main and gravity main construction will extend the wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 0.5 MGD	1	LS	$ 875,000	$ 875,000
2	12" Force Main	7,150	LF	$ 240	$ 1,716,000
3	15" Pipe	5,400	LF	$ 270	$ 1,458,000
4	48" Diameter Manhole	8	EA	$ 12,000	$ 96,000
5	Concrete Pavement Repair	60	LF	$ 100	$ 6,000
				SUBTOTAL:	**$ 4,151,000**
		CONTINGENCY		30%	$ 1,245,300
				SUBTOTAL:	**$ 5,396,300**
		ENG/SURVEY		15%	$ 809,500
				SUBTOTAL:	**$ 6,205,800**
				Estimated Project Total:	**$ 6,205,800**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 9	**Phase: 5-Year**
Project Name:	**Old Airport Road Proposed Gravity Main and Decommission Lift Station #4**

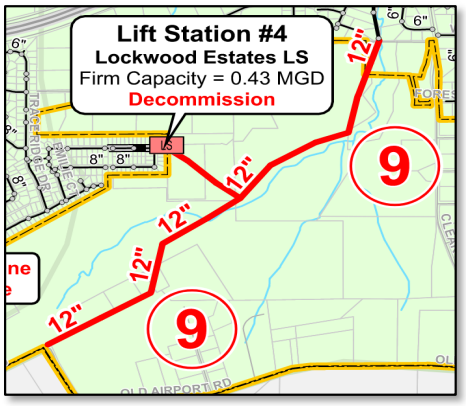
Project Description:

This project consists of the construction of a proposed 12-inch wastewater line that begins on the trail running west from the intersection of Clear Lake Road and Woodland Hills Lane and runs southwest until it terminates east of the intersection between Old Airport Road and Causbie Road. This project also consists of decommissioning Lift Station #4 and branching the proposed 12-inch line to run northwest and tie into the Lift Station #4 influent line.

Project Drivers:

The proposed wastewater line and Lift Station #4 decommission will extend the wastewater system to serve future developments and reduce the number of lift stations to be maintained by the City.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Decommission Lift Station	1	LS	$ 250,000	$ 250,000
2	12" Pipe	8,080	LF	$ 216	$ 1,745,280
3	48" Diameter Manhole	14	EA	$ 12,000	$ 168,000
				SUBTOTAL:	**$ 2,163,300**
		CONTINGENCY		30%	$ 649,000
				SUBTOTAL:	**$ 2,812,300**
		ENG/SURVEY		15%	$ 421,900
				SUBTOTAL:	**$ 3,234,200**
				Estimated Project Total:	**$ 3,234,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 10 — **Phase:** 5-Year

Project Name: Meadowview Road 15-inch Gravity Main Expansion and 12-inch Extension

Project Description:

This project consists of expanding the 8/10-inch wastewater line to 15 inches, beginning south of the intersection of Mitchell Boulevard and Meadowview Road and running north until it terminates north of the intersection of Mitchell Boulevard and Louis Trail. This project also consists of the construction of a proposed 12-inch wastewater line that continues north until it terminates east of Waterford Way.

Project Drivers:

The proposed wastewater line expansion and extension will increase wastewater system capacity for future growth and extend the wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Pipe	2,100	LF	$ 270	$ 567,000
2	12" Pipe	1,600	LF	$ 216	$ 345,600
3	48" Diameter Manhole	14	EA	$ 12,000	$ 168,000
4	Concrete Pavement Repair	2,200	LF	$ 100	$ 220,000
				SUBTOTAL:	**$ 1,300,600**
		CONTINGENCY		30%	$ 390,200
				SUBTOTAL:	**$ 1,690,800**
		ENG/SURVEY		15%	$ 253,700
				SUBTOTAL:	**$ 1,944,500**
				Estimated Project Total:	**$ 1,944,500**

Comments:

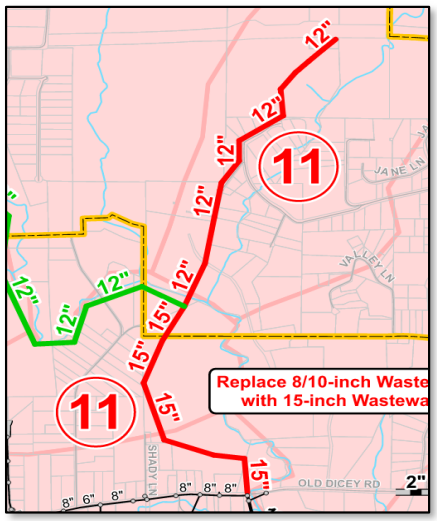
City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 11	**Phase: 5-Year**
Project Name:	**Old Dicey Road Proposed 12/15-inch Gravity Main**

Project Description:

The project consists of the construction of a proposed 15-inch wastewater line beginning northwest of where Willow Creek crosses Old Dicey Road and running north until it reaches a point between the north end of De La Cruz Street and Willow Creek. From there, the line sizes down to a 12-inch and continues north along Murls Lake Road until it terminates southwest of where Ric Williamson Memorial Highway crosses Holder Branch Creek.

Vicinity Map



Project Drivers:

The proposed wastewater line will extend the wastewater system to serve future developments.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Pipe	4,340	LF	$ 270	$ 1,171,800
2	12" Pipe	5,440	LF	$ 216	$ 1,175,040
3	48" Diameter Manhole	19	EA	$ 12,000	$ 228,000
4	Concrete Pavement Repair	2,000	LF	$ 100	$ 200,000
				SUBTOTAL:	**$ 2,774,900**
		CONTINGENCY		30%	$ 832,500
				SUBTOTAL:	**$ 3,607,400**
		ENG/SURVEY		15%	$ 541,200
				SUBTOTAL:	**$ 4,148,600**
				Estimated Project Total:	**$ 4,148,600**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

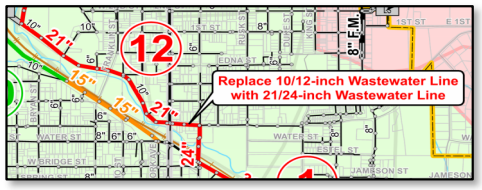
Construction Project Number: 12 — **Phase:** 5-Year

Project Name: Town Creek Interceptor Expansion Phase 2

Project Description:

This project consists of a 24-inch wastewater line expansion beginning upstream of Project #1 and running north until the intersection of Front Street and North Elm Street. From there, the line size changes to a 21-inch expansion and runs northwest along Town Creek until it ties into the Lift Station #1 force main.

Vicinity Map



Project Drivers:

The proposed wastewater line expansion will reduce existing capacity issues and accommodate future growth.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Pipe	850	LF	$ 432	$ 367,200
2	21" Pipe	4,550	LF	$ 378	$ 1,719,900
3	48" Diameter Manhole	20	EA	$ 12,000	$ 240,000
4	Concrete Pavement Repair	150	LF	$ 100	$ 15,000
				SUBTOTAL:	**$ 2,342,100**
		CONTINGENCY		30%	$ 702,700
				SUBTOTAL:	**$ 3,044,800**
		ENG/SURVEY		15%	$ 456,800
				SUBTOTAL:	**$ 3,501,600**
				Estimated Project Total:	**$ 3,501,600**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**13**	**Phase: 5-Year**
Project Name:	**Peaster Highway 12/15-inch Gravity Main Expansion**	

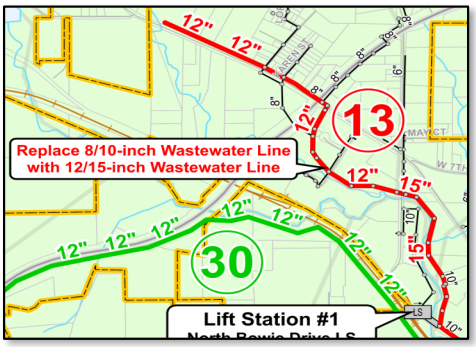
Project Description:

This project consists of a 15-inch wastewater line expansion beginning upstream of Project #12 and running northwest along Town Creek until it crosses North Bowie Drive. From there, the 12-inch line expansion continues northwest until the existing line ends east of the intersection of Peaster Highway and Ric Williamson Memorial Highway. The proposed 12-inch wastewater line continues northwest along Peaster Highway for approximately 2,500 feet.

Project Drivers:

The proposed wastewater line expansion and construction will reduce existing capacity issues, accommodate future growth and extend the wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Pipe	2,850	LF	$ 270	$ 769,500
2	12" Pipe	6,000	LF	$ 216	$ 1,296,000
3	48" Diameter Manhole	26	EA	$ 12,000	$ 312,000
4	18" Boring and Casing	250	LF	$ 900	$ 225,000
5	Concrete Pavement Repair	200	LF	$ 100	$ 20,000
				SUBTOTAL:	**$ 2,622,500**
				CONTINGENCY 30%	$ 786,800
				SUBTOTAL:	**$ 3,409,300**
				ENG/SURVEY 15%	$ 511,400
				SUBTOTAL:	**$ 3,920,700**
				Estimated Project Total:	**$ 3,920,700**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 14 — **Phase:** 5-Year

Project Name: Lift Station #12 Capacity Expansion to 1.00 MGD and Force Main Expansion

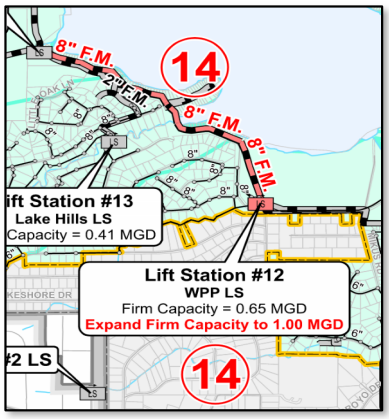
Project Description:

This project consists of expanding Lift Station #12's firm capacity from 0.65 MGD to 1.00 MGD and expanding the force main to 8 inches.

Project Drivers:

The proposed lift station and force main expansions will reduce existing capacity issues at Lift Station #12.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 0.45 MGD Expansion	1	LS	$ 450,000	$ 450,000
2	8" Force Main	5,600	LF	$ 160	$ 896,000
3	Concrete Pavement Repair	900	LF	$ 100	$ 90,000
				SUBTOTAL:	**$ 1,436,000**
		CONTINGENCY		30%	$ 430,800
				SUBTOTAL:	**$ 1,866,800**
		ENG/SURVEY		15%	$ 280,100
				SUBTOTAL:	**$ 2,146,900**
				Estimated Project Total:	**$ 2,146,900**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 15 — **Phase:** 5-Year

Project Name: Lift Station A Gravity Main Phase 2 and Decommission Lift Station #25

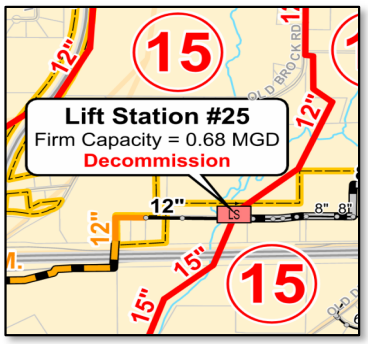
Project Description:

This project consists of decommissioning Lift Station #25 and extending the Lift Station A 15-inch wastewater line beginning upstream of Project #8 and running northwest to tie into the Lift Station #25 influent line.

Project Drivers:

The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Decommission Lift Station	1	LS	$ 250,000	$ 250,000
2	15" Pipe	1,750	LF	$ 270	$ 472,500
3	48" Diameter Manhole	3	EA	$ 12,000	$ 36,000
4	18" Boring and Casing	200	LF	$ 900	$ 180,000
				SUBTOTAL:	**$ 938,500**
		CONTINGENCY		30%	$ 281,600
				SUBTOTAL:	**$ 1,220,100**
		ENG/SURVEY		15%	$ 183,100
				SUBTOTAL:	**$ 1,403,200**
				Estimated Project Total:	**$ 1,403,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 16	**Phase: 5-Year**
Project Name:	**Lift Station A Gravity Main Phase 3 and Decommission Lift Station #10**

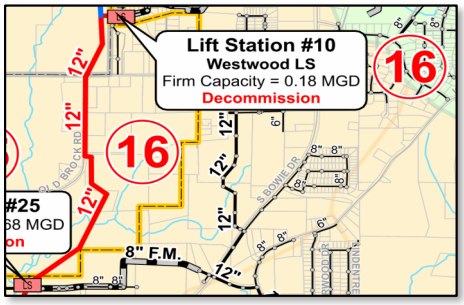
Project Description:

This project consists of decommissioning Lift Station #10 and the expansion of the Lift Station A wastewater line as a 12-inch beginning upstream of Project #15 and running north along Old Brock Road until it ties into the Lift Station #10 influent line.

Project Drivers:

The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Decommission Lift Station	1	LS	$ 250,000	$ 250,000
2	12" Pipe	5,850	LF	$ 216	$ 1,263,600
3	48" Diameter Manhole	12	EA	$ 12,000	$ 144,000
4	Concrete Pavement Repair	550	LF	$ 100	$ 55,000
				SUBTOTAL:	**$ 1,712,600**
		CONTINGENCY		30%	$ 513,800
				SUBTOTAL:	**$ 2,226,400**
		ENG/SURVEY		15%	$ 334,000
				SUBTOTAL:	**$ 2,560,400**
				Estimated Project Total:	**$ 2,560,400**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**17**	**Phase: 10-Year**
Project Name:	**Sanchez Creek Proposed 12-inch Gravity Main**	

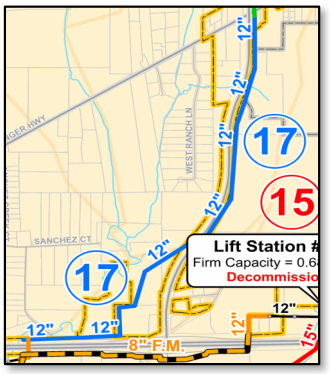
Project Description:

The project consists of the construction of a 12-inch wastewater line beginning east of where I-20 crosses Sanchez Creek and running east, then north along Ric Williamson Memorial Highway until it terminates southeast of the intersection between Ric Williamson Memorial Highway and Ranger Highway.

Project Drivers:

The proposed wastewater line will extend the wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	10,500	LF	$ 216	$ 2,268,000
2	48" Diameter Manhole	18	EA	$ 12,000	$ 216,000
3	Concrete Pavement Repair	240	LF	$ 100	$ 24,000
				SUBTOTAL:	**$ 2,508,000**
		CONTINGENCY		30%	$ 752,400
				SUBTOTAL:	**$ 3,260,400**
		ENG/SURVEY		15%	$ 489,100
				SUBTOTAL:	**$ 3,749,500**
				Estimated Project Total:	**$ 3,749,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 18 — **Phase:** 10-Year

Project Name: Lift Station #6 Capacity Expansion to 3.50 MGD and Force Main Expansion

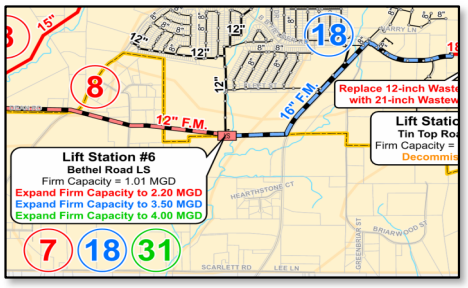
Project Description:

This project consists of expanding the firm capacity of Lift Station #6 from 2.20 MGD to 3.50 MGD as well as expanding the 10-inch force main to 16 inches, beginning by tying into the upstream end of Project #6 and running southwest until tying into Lift Station #6.

Project Drivers:

The proposed lift station and force main expansions will increase wastewater system capacity for future growth.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 1.3 MGD Expansion	1	LS	$ 1,300,000	$ 1,300,000
2	16" Force Main	7,050	LF	$ 320	$ 2,256,000
3	Concrete Pavement Repair	160	LF	$ 100	$ 16,000
				SUBTOTAL:	**$ 3,572,000**
		CONTINGENCY		30%	$ 1,071,600
				SUBTOTAL:	**$ 4,643,600**
		ENG/SURVEY		15%	$ 696,600
				SUBTOTAL:	**$ 5,340,200**
				Estimated Project Total:	**$ 5,340,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 19 — **Phase:** 10-Year

Project Name: Lift Station A Capacity Expansion to 1.50 MGD

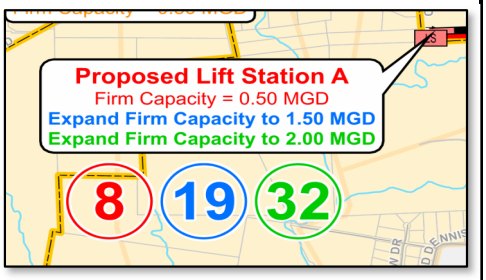
Project Description:

This project consists of expanding the firm capacity of Lift Station A from 0.50 MGD to 1.50 MGD.

Project Drivers:

The proposed lift station expansion will increase wastewater system capacity for future growth.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 1.0 MGD Expansion	1	LS	$ 1,000,000	$ 1,000,000
				SUBTOTAL:	**$ 1,000,000**
		CONTINGENCY		30%	$ 300,000
				SUBTOTAL:	**$ 1,300,000**
		ENG/SURVEY		15%	$ 195,000
				SUBTOTAL:	**$ 1,495,000**
				Estimated Project Total:	**$ 1,495,000**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 20 — **Phase:** 10-Year

Project Name: Lift Station A Gravity Main Phase 4 and Decommission Lift Station #22

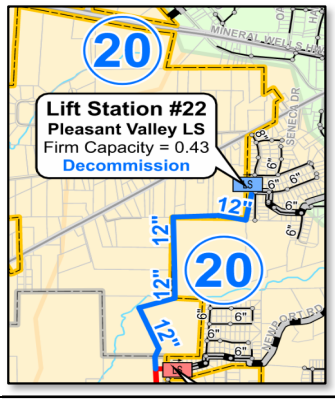
Project Description:

This project consists of decommissioning Lift Station #22 and the extension of the Lift Station A wastewater line as a 12-inch beginning upstream of Project #16 and running north until it ties into the Lift Station #22 influent line.

Project Drivers:

The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Vicinity Map


20
Lift Station #22
Pleasant Valley LS
Firm Capacity = 0.43
Decommission
12"
12"
12"
20
6"
6"
6"

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**21**	**Phase: 10-Year**
Project Name:	**Wastewater Treatment Plant Influent 24/27-inch Gravity Main Expansion**	

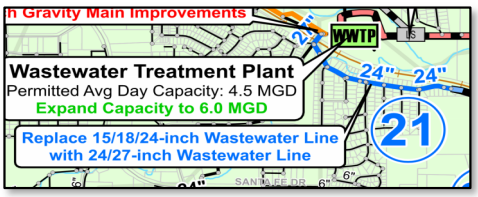
Project Description:

This project consists of upsizing the 24-inch wastewater treatment plant influent line to 27 inches, beginning north of Eureka Street and running southwest until it meets Holland Lake Trail. It then expands the 15/18-inch line to 24 inches, running southeast along King Arthur Drive until it ties into the existing Lift Station #9 force main.

Project Drivers:

The proposed wastewater line expansion will increase wastewater system capacity for future growth and provide the capacity needed for Projects #22 - #26.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	27" Pipe	250	LF	$ 486	$ 121,500
2	24" Pipe	2,600	LF	$ 432	$ 1,123,200
3	48" Diameter Manhole	15	EA	$ 12,000	$ 180,000
4	30" Boring and Casing	100	LF	$ 1,500	$ 150,000
5	Concrete Pavement Repair	1,050	LF	$ 100	$ 105,000
				SUBTOTAL:	**$ 1,679,700**
		CONTINGENCY		30%	$ 504,000
				SUBTOTAL:	**$ 2,183,700**
		ENG/SURVEY		15%	$ 327,600
				SUBTOTAL:	**$ 2,511,300**
				Estimated Project Total:	**$ 2,511,300**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**22**	**Phase: 10-Year**
Project Name:	**Proposed 3.50 MGD Lift Station B and 16-inch Force Main**	

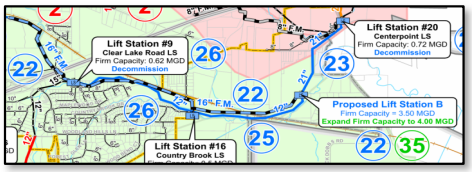
Project Description:

The project consists of the construction of the 3.50 MGD Lift Station B, which will be north of where the railroad crosses over Town Creek, and a 16-inch force main tying into the upstream end of Project #21 and running southeast along the existing Lift Station #9 and Lift Station #16 force mains, then east along Town Creek until tying into Lift Station B.

Project Drivers:

The proposed Lift Station B and force main will increase wastewater system capacity for future growth and provide the capacity needed for Projects #23 - #26.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 3.5 MGD	1	LS	$ 6,125,000	$ 6,125,000
2	16" Force Main	8,850	LF	$ 320	$ 2,832,000
3	18" Boring and Casing	320	LF	$ 900	$ 288,000
				SUBTOTAL:	**$ 9,245,000**
		CONTINGENCY		30%	$ 2,773,500
				SUBTOTAL:	**$ 12,018,500**
		ENG/SURVEY		15%	$ 1,802,800
				SUBTOTAL:	**$ 13,821,300**
				Estimated Project Total:	**$ 13,821,300**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 23 — **Phase:** 10-Year

Project Name: Center Point Road Gravity Main and Decommission Lift Station #20

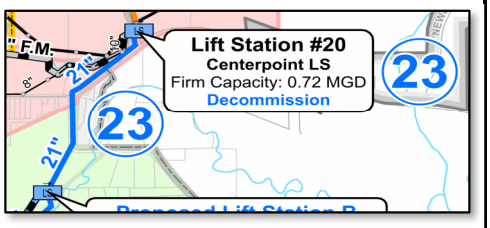
Project Description:

This project consists of decommissioning Lift Station #20 and the construction of a 21-inch wastewater line beginning at the proposed Lift Station B and running north along Center Point Road, then northeast along East Bankhead Highway until tying into the existing Lift Station #20 influent line.

Project Drivers:

The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Decommission Lift Station	1	LS	$ 250,000	$ 250,000
2	21" Pipe	3,050	LF	$ 378	$ 1,152,900
3	48" Diameter Manhole	7	EA	$ 12,000	$ 84,000
4	Concrete Pavement Repair	140	LF	$ 100	$ 14,000
				SUBTOTAL:	**$ 1,500,900**
		CONTINGENCY		30%	$ 450,300
				SUBTOTAL:	**$ 1,951,200**
		ENG/SURVEY		15%	$ 292,700
				SUBTOTAL:	**$ 2,243,900**
				Estimated Project Total:	**$ 2,243,900**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 24 — **Phase:** 10-Year

Project Name: Fort Worth Highway Gravity Main and Decommission Lift Station #15

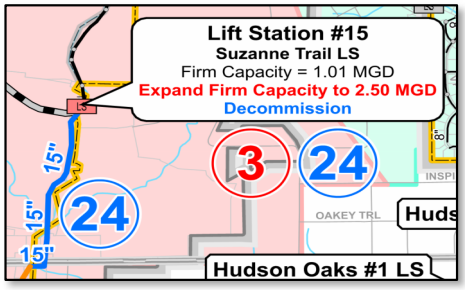
Project Description:

This project consists of decommissioning Lift Station #15 and the construction of a 15-inch wastewater line beginning southwest of where Fort Worth Highway crosses Underwood Branch Creek. The line runs east to cross Underwood Branch Creek, then north until tying into the existing Lift Station #15 influent line.

Project Drivers:

The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Decommission Lift Station	1	LS	$ 250,000	$ 250,000
2	15" Pipe	3,250	LF	$ 270	$ 877,500
3	48" Diameter Manhole	8	EA	$ 12,000	$ 96,000
4	18" Boring and Casing	150	LF	$ 900	$ 135,000
				SUBTOTAL:	**$ 1,358,500**
		CONTINGENCY		30%	$ 407,600
				SUBTOTAL:	**$ 1,766,100**
		ENG/SURVEY		15%	$ 265,000
				SUBTOTAL:	**$ 2,031,100**
				Estimated Project Total:	**$ 2,031,100**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 25 — **Phase:** 10-Year

Project Name: Lift Station B Gravity Main Phase 1 and Decommission Lift Station #16

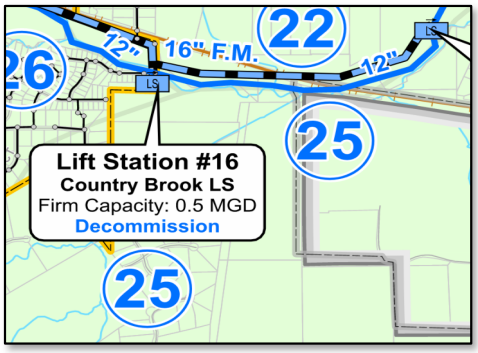
Project Description:

This project consists of decommissioning Lift Station #16 and the construction of a 12-inch wastewater line tying into Lift Station B and running west parallel to the force main from Project #22 until tying into the existing Lift Station #16 influent line.

Project Drivers:

The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Decommission Lift Station	1	LS	$ 250,000	$ 250,000
2	12" Pipe	4,350	LF	$ 216	$ 939,600
3	48" Diameter Manhole	6	EA	$ 12,000	$ 72,000
4	18" Boring and Casing	120	LF	$ 900	$ 108,000
				SUBTOTAL:	**$ 1,369,600**
		CONTINGENCY		30%	$ 410,900
				SUBTOTAL:	**$ 1,780,500**
		ENG/SURVEY		15%	$ 267,100
				SUBTOTAL:	**$ 2,047,600**
				Estimated Project Total:	**$ 2,047,600**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 26 — **Phase:** 10-Year

Project Name: Lift Station B Gravity Main Phase 2 and Decommission Lift Station #9

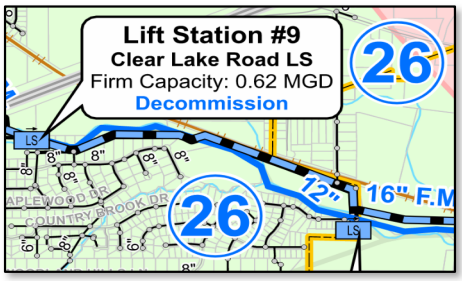
Project Description:

This project consists of decommissioning Lift Station #9 and the construction of a 12-inch wastewater line tying into the upstream end of Project #25 and running northwest along Town Creek until tying into the existing Lift Station #9 influent line.

Project Drivers:

The proposed wastewater line construction and lift station decommission will increase wastewater system capacity for future growth and reduce the number of lift stations to be maintained by the City.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Decommission Lift Station	1	LS	$ 250,000	$ 250,000
2	12" Pipe	4,800	LF	$ 216	$ 1,036,800
3	48" Diameter Manhole	9	EA	$ 12,000	$ 108,000
				SUBTOTAL:	**$ 1,394,800**
		CONTINGENCY		30%	$ 418,500
				SUBTOTAL:	**$ 1,813,300**
		ENG/SURVEY		15%	$ 272,000
				SUBTOTAL:	**$ 2,085,300**
				Estimated Project Total:	**$ 2,085,300**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**27**	**Phase: 25-Year**
Project Name:	**Wastewater Treatment Plant Expansion to 6.00 MGD**	

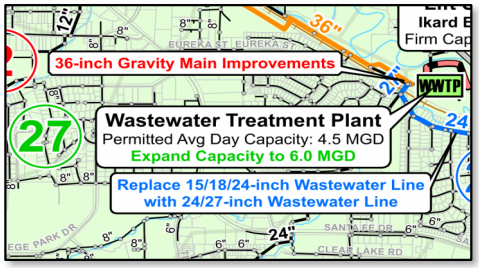
Project Description:

This project consists of expanding the treatment capacity of the wastewater treatment plant from 4.50 MGD to 6.00 MGD.

Project Drivers:

The proposed treatment plant expansion will provide enough capacity to treat projected average day flows through the twenty-five-year planning period.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	WWTP - 1.5 MGD Expansion	1	WWTP	$ 67,500,000	$ 67,500,000
				SUBTOTAL:	**$ 67,500,000**
		CONTINGENCY		30%	$ 20,250,000
				SUBTOTAL:	**$ 87,750,000**
		ENG/SURVEY		15%	$ 13,162,500
				SUBTOTAL:	**$ 100,912,500**
				Estimated Project Total:	**$ 100,912,500**

Comments:

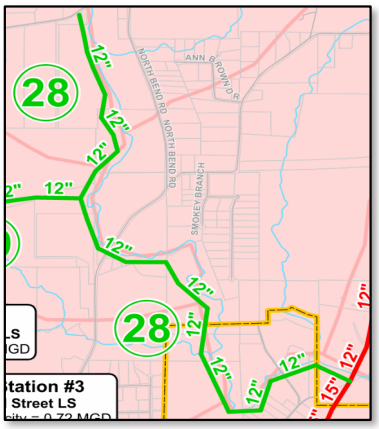
City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 28	**Phase: 25-Year**
Project Name:	**North Willow Creek Proposed 12-inch Gravity Main Phase 1**

Project Description:

This project consists of the construction of a 12-inch wastewater line tying into Project #11 south of where it crosses Willow Creek and running northwest along Willow Creek until it terminates southwest of where North Bend Road crosses Willow Creek.

Vicinity Map



Project Drivers:

The proposed wastewater line will extend the wastewater system to serve future developments.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	13,200	LF	$ 216	$ 2,851,200
2	48" Diameter Manhole	20	EA	$ 12,000	$ 240,000
3	18" Boring and Casing	130	LF	$ 900	$ 117,000
4	Concrete Pavement Repair	50	LF	$ 100	$ 5,000
				SUBTOTAL:	**$ 3,213,200**
		CONTINGENCY		30%	$ 964,000
				SUBTOTAL:	**$ 4,177,200**
		ENG/SURVEY		15%	$ 626,600
				SUBTOTAL:	**$ 4,803,800**
				Estimated Project Total:	**$ 4,803,800**

Comments:

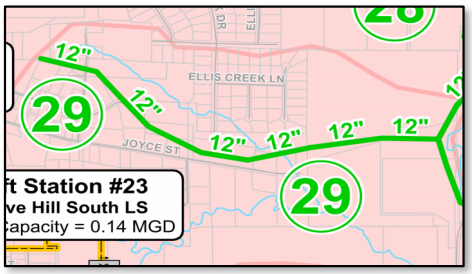
City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 29	**Phase: 25-Year**
Project Name:	**North Willow Creek Proposed 12-inch Gravity Main Phase 2**

Project Description:

This project consists of the construction of a 12-inch wastewater line tying into Project #28 south of where it crosses Ric Williamson Memorial Highway and running west along Ric Williamson Memorial Highway until it terminates east of the intersection of Ric Williamson Memorial Highway and North Main Street.

Vicinity Map



Project Drivers:

The proposed wastewater line will extend the wastewater system to serve future developments.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	8,100	LF	$ 216	$ 1,749,600
2	48" Diameter Manhole	7	EA	$ 12,000	$ 84,000
3	18" Boring and Casing	200	LF	$ 900	$ 180,000
4	Concrete Pavement Repair	100	LF	$ 100	$ 10,000
				SUBTOTAL:	**$ 2,023,600**
		CONTINGENCY		30%	$ 607,100
				SUBTOTAL:	**$ 2,630,700**
		ENG/SURVEY		15%	$ 394,700
				SUBTOTAL:	**$ 3,025,400**
				Estimated Project Total:	**$ 3,025,400**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 30 — **Phase:** 25-Year

Project Name: York Avenue 12-inch Proposed Gravity Main

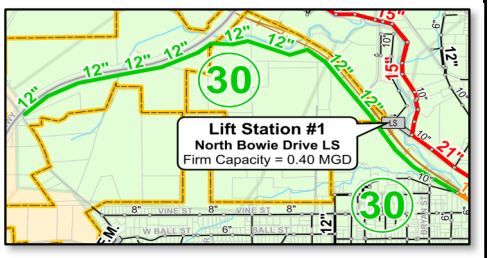
Project Description:

This project consists of the construction of a 12-inch wastewater line tying into the under-design/construction 15-inch line along the railroad, running northwest, then southwest along Ric Williamson Memorial Highway until it terminates east of the intersection of Ric Williamson Memorial Highway and Old Garner Road.

Project Drivers:

The proposed wastewater line will extend the wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	10,350	LF	$ 216	$ 2,235,600
2	48" Diameter Manhole	19	EA	$ 12,000	$ 228,000
				SUBTOTAL:	**$ 2,463,600**
		CONTINGENCY		30%	$ 739,100
				SUBTOTAL:	**$ 3,202,700**
		ENG/SURVEY		15%	$ 480,500
				SUBTOTAL:	**$ 3,683,200**
				Estimated Project Total:	**$ 3,683,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**31**	**Phase: 25-Year**
Project Name:	**Lift Station #6 Capacity Expansion to 4.00 MGD**	

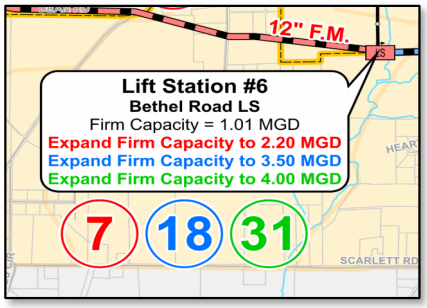
Project Description:

This project consists of expanding the firm capacity of Lift Station #6 from 3.50 MGD to 4.00 MGD.

Project Drivers:

The proposed lift station expansion will increase wastewater system capacity for future growth.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 0.5 MGD Expansion	1	LS	$ 500,000	$ 500,000
				SUBTOTAL:	**$ 500,000**
		CONTINGENCY		30%	$ 150,000
				SUBTOTAL:	**$ 650,000**
		ENG/SURVEY		15%	$ 97,500
				SUBTOTAL:	**$ 747,500**
				Estimated Project Total:	**$ 747,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**32**	**Phase: 25-Year**
Project Name:	**Lift Station A Capacity Expansion to 2.00 MGD**	

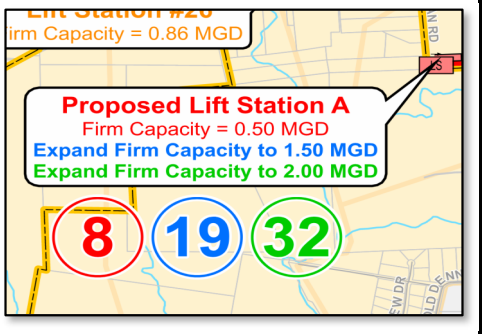
Project Description:

This project consists of expanding the firm capacity of the proposed Lift Station A from 1.50 MGD to 2.00 MGD.

Project Drivers:

The proposed lift station expansion will increase wastewater system capacity for future growth.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 0.5 MGD Expansion	1	LS	$ 500,000	$ 500,000
				SUBTOTAL:	**$ 500,000**
		CONTINGENCY		30%	$ 150,000
				SUBTOTAL:	**$ 650,000**
		ENG/SURVEY		15%	$ 97,500
				SUBTOTAL:	**$ 747,500**
				Estimated Project Total:	**$ 747,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 33 — **Phase:** 25-Year

Project Name: Ranger Highway Proposed 12-inch Gravity Main

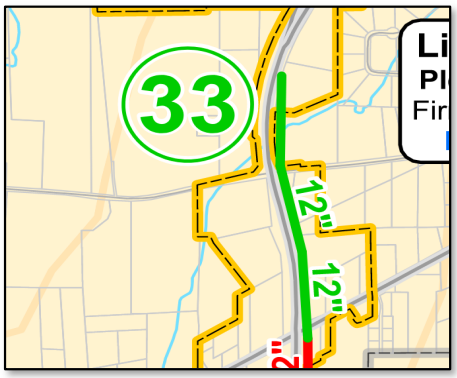
Project Description:

This project consists of the construction of a 12-inch wastewater line tying into the upstream end of Project #14 and running north along Ric Williamson Memorial Highway for approximately 2,800 feet.

Project Drivers:

The proposed wastewater line will extend the wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	3,000	LF	$ 216	$ 648,000
2	48" Diameter Manhole	3	EA	$ 12,000	$ 36,000
3	18" Boring and Casing	150	LF	$ 900	$ 135,000
4	Concrete Pavement Repair	60	LF	$ 100	$ 6,000
				SUBTOTAL:	**$ 825,000**
		CONTINGENCY		30%	$ 247,500
				SUBTOTAL:	**$ 1,072,500**
		ENG/SURVEY		15%	$ 160,900
				SUBTOTAL:	**$ 1,233,400**
				Estimated Project Total:	**$ 1,233,400**

Comments:

City of Weatherford

Capital Improvement Cost Estimate	**June 2025**
Construction Project Number: 34	**Phase: 25-Year**
Project Name:	**Mitchell Boulevard Proposed 12-inch Gravity Main**

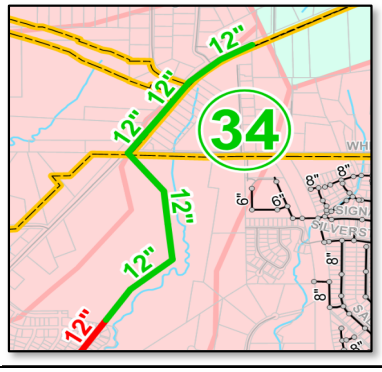
Project Description:

This project consists of the construction of a 12-inch wastewater line tying into the upstream end of Project #10 and running north until it terminates southwest of the intersection of Azle Highway and Trailwood Drive.

Project Drivers:

The proposed wastewater line will extend the wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	5,334	LF	$ 216	$ 1,152,144
2	48" Diameter Manhole	9	EA	$ 12,000	$ 108,000
3	18" Boring and Casing	150	LF	$ 900	$ 135,000
4	Concrete Pavement Repair	200	LF	$ 100	$ 20,000
				SUBTOTAL:	**$ 1,415,200**
		CONTINGENCY		30%	$ 424,600
				SUBTOTAL:	**$ 1,839,800**
		ENG/SURVEY		15%	$ 276,000
				SUBTOTAL:	**$ 2,115,800**
				Estimated Project Total:	**$ 2,115,800**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**35**	**Phase: 25-Year**
Project Name:	**Lift Station B Capacity Expansion to 4.00 MGD**	

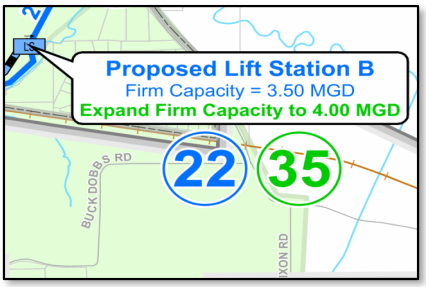
Project Description:

This project consists of expanding the firm capacity of the proposed Lift Station B from 3.50 MGD to 4.00 MGD.

Project Drivers:

The proposed lift station expansion will increase wastewater system capacity for future growth.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - 0.5 MGD Expansion	1	LS	$ 500,000	$ 500,000
				SUBTOTAL:	**$ 500,000**
		CONTINGENCY		30%	$ 150,000
				SUBTOTAL:	**$ 650,000**
		ENG/SURVEY		15%	$ 97,500
				SUBTOTAL:	**$ 747,500**
				Estimated Project Total:	**$ 747,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**36**	**Phase: 5-Year**
Project Name:	**LaSalle Package Plant Proposed 12-inch Gravity Main**	

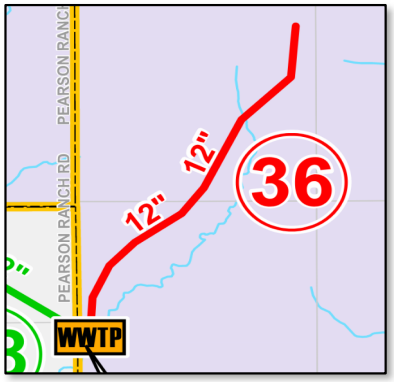
Project Description:

This project consists of the construction of a 12-inch wastewater line tying into the LaSalle Package Wastewater Treatment Plant and running northeast until it terminates when it reaches the south-most trail running east from Pearson Ranch Road.

Project Drivers:

The proposed wastewater line will extend the LaSalle Ranch wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	4,700	LF	$ 216	$ 1,015,200
2	48" Diameter Manhole	4	EA	$ 12,000	$ 48,000
				SUBTOTAL:	**$ 1,063,200**
		CONTINGENCY		30%	$ 319,000
				SUBTOTAL:	**$ 1,382,200**
		ENG/SURVEY		15%	$ 207,400
				SUBTOTAL:	**$ 1,589,600**
				Estimated Project Total:	**$ 1,589,600**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**37**	**Phase: 25-Year**
Project Name:	**LaSalle Package Plant Expansion to 0.60 MGD**	

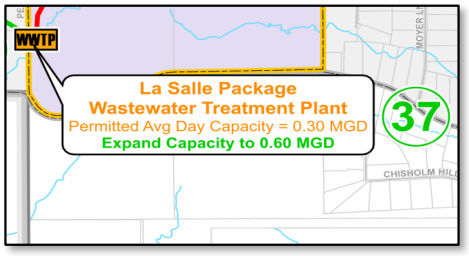
Project Description:

This project consists of expanding the treatment capacity of the LaSalle Package Wastewater Treatment Plant from 0.30 MGD to 0.60 MGD.

Project Drivers:

The proposed treatment plant expansion will provide enough capacity to treat projected flows in the LaSalle Ranch Development through the twenty-five-year planning period.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Package Plant - 0.30 MGD Expansion	1	WWTP	$ 10,500,000	$ 10,500,000
				SUBTOTAL:	**$ 10,500,000**
		CONTINGENCY		30%	$ 3,150,000
				SUBTOTAL:	**$ 13,650,000**
		ENG/SURVEY		15%	$ 2,047,500
				SUBTOTAL:	**$ 15,697,500**
				Estimated Project Total:	**$ 15,697,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**38**	**Phase: 25-Year**
Project Name:	**LaSalle Package Plant Proposed 12-inch Gravity Main Phase 1**	

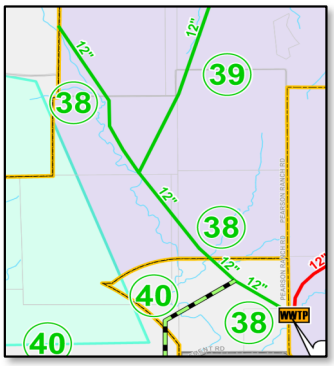
Project Description:

This project consists of the construction of a 12-inch wastewater line tying into the LaSalle Package Wastewater Treatment Plant and running northwest until it terminates at the city limits.

Project Drivers:

The proposed wastewater line will extend the LaSalle Ranch wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	10,400	LF	$ 216	$ 2,246,400
2	48" Diameter Manhole	5	EA	$ 12,000	$ 60,000
				SUBTOTAL:	**$ 2,306,400**
		CONTINGENCY		30%	$ 692,000
				SUBTOTAL:	**$ 2,998,400**
		ENG/SURVEY		15%	$ 449,800
				SUBTOTAL:	**$ 3,448,200**
				Estimated Project Total:	**$ 3,448,200**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 39 — **Phase:** 25-Year

Project Name: LaSalle Package Plant Proposed 12-inch Gravity Main Phase 2

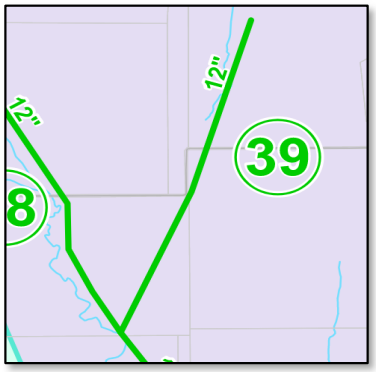
Project Description:

This project consists of the construction of a 12-inch wastewater line tying into Project #38 approximately 5,500 feet upstream of the LaSalle Package Wastewater Treatment Plant and running northeast to the city limits.

Project Drivers:

The proposed wastewater line will extend the LaSalle Ranch wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe	5,300	LF	$ 216	$ 1,144,800
2	48" Diameter Manhole	2	EA	$ 12,000	$ 24,000
				SUBTOTAL:	**$ 1,168,800**
		CONTINGENCY		30%	$ 350,700
				SUBTOTAL:	**$ 1,519,500**
		ENG/SURVEY		15%	$ 228,000
				SUBTOTAL:	**$ 1,747,500**
				Estimated Project Total:	**$ 1,747,500**

Comments:

City of Weatherford

Capital Improvement Cost Estimate — **June 2025**

Construction Project Number: 40 — **Phase:** 25-Year

Project Name: Proposed 0.50 MGD Lift Station C, Force Main and Gravity Main

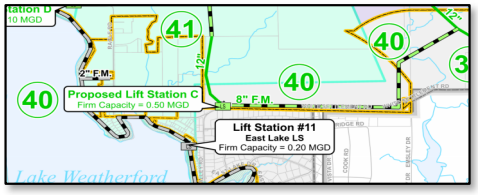
Project Description:

This project consists of the construction of the 0.50 MGD Lift Station C on White Settlement Road, an 8-inch force main tying into the LaSalle Package Wastewater Treatment Plant influent line, and a 15-inch gravity main running north along city limits until it terminates after approximately 2,300 feet.

Project Drivers:

The proposed Lift Station C, force main and gravity main will extend the LaSalle Ranch wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 0.5 MGD	1	LS	$ 875,000	$ 875,000
2	8" Force Main	8,500	LF	$ 160	$ 1,360,000
3	12" Pipe	2,500	LF	$ 216	$ 540,000
4	48" Diameter Manhole	2	EA	$ 12,000	$ 24,000
				SUBTOTAL:	**$ 2,799,000**
		CONTINGENCY		30%	$ 839,700
				SUBTOTAL:	**$ 3,638,700**
		ENG/SURVEY		15%	$ 545,900
				SUBTOTAL:	**$ 4,184,600**
				Estimated Project Total:	**$ 4,184,600**

Comments:

City of Weatherford

Capital Improvement Cost Estimate		**June 2025**
Construction Project Number:	**41**	**Phase: 25-Year**
Project Name:	**Proposed 0.10 MGD Lift Station D, Force Main and Gravity Main**	

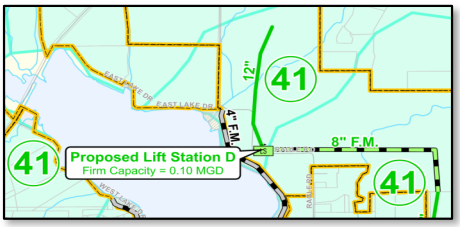
Project Description:

This project consists of the construction of the 0.10 MGD Lift Station D on Ragle Road, an 8-inch force main tying into the proposed 12-inch gravity main from Project #40, and a 12-inch gravity main running north until it terminates after approximately

Project Drivers:

The proposed Lift Station D, force main and gravity main will extend the LaSalle Ranch wastewater system to serve future developments.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Lift Station - New 0.1 MGD	1	LS	$ 175,000	$ 175,000
2	8" Force Main	4,850	LF	$ 160	$ 776,000
3	12" Pipe	3,350	LF	$ 216	$ 723,600
4	48" Diameter Manhole	2	EA	$ 12,000	$ 24,000
				SUBTOTAL:	**$ 1,698,600**
		CONTINGENCY		30%	$ 509,600
				SUBTOTAL:	**$ 2,208,200**
		ENG/SURVEY		15%	$ 331,300
				SUBTOTAL:	**$ 2,539,500**
				Estimated Project Total:	**$ 2,539,500**

Comments: