CITY OF LAGO VISTA

WASTEWATER MASTER PLAN

2024

PREPARED BY:

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WASTEWATER MASTER PLAN

Prepared for:

City of Lago Vista

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ENGINEERING FIRM
F-2144

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LGV22265

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EXECUTIVE SUMMARY

The City of Lago Vista (City) is a growing community located in central Texas, within Travis County. Lago Vista currently provides sewer service to over 5,200 connections and counting. The service area is projected to grow by over 3,200 connections in the next 10 years and over 14,600 connections by buildout. Defining a capital improvement plan (CIP) for accommodating this growth in an efficient and cost-effective manner, while also focusing on the maintenance of wastewater system assets, is the primary goal of this Wastewater Master Plan. Freese and Nichols, Inc. (FNI) has prepared this report to provide the City of Lago Vista with a planning tool that will serve as a guide for short-term and long-term improvements to the wastewater system.

Historical and Projected Growth

Projected development and land use are important elements in the analysis of wastewater collection systems. Present and future wastewater flows determine the size and location of system improvements necessary to serve residential populations, commercial, and institutional enterprises. A variety of circumstances can influence the rate of future development within cities. Growth projections were developed in terms of wastewater connections to the City's collection system. **Table ES-1** presents growth projections used in the Master Plan 5-year, 10-year, and buildout planning phases.

Table ES-1. Connection Projections

Planning Year	Wastewater Connections
2023	5,200
2028	6,637
2033	8,470
Buildout	19,801

Wastewater System Analysis

Lago Vista's existing wastewater system consists of 91 miles of low-pressure sewer mains, 18 miles of wastewater gravity mains, 20 lift stations and 15 miles of associated force mains. Low-pressure pipeline diameters range in size from 1-inch to 10-inches, Gravity pipeline diameters range in size from 2-inches to 15-inches, and force main diameters range from 3-inches to 18-inches. The wastewater system is served by one wastewater treatment plant with a permitted capacity of 1.0 million gallons per day (MGD) average annual daily flow (AADF).

To determine the historical trends in systemwide average daily flow and per-connection flow needed for existing and future system analysis, FNI reviewed historical wastewater flow data from 2015 through 2022. Future average daily wastewater flows were calculated by applying per-connection flow rates to the total number of projected connections for each planning period. **Table ES-2** lists the wastewater flow projections for Lago Vista in units of MGD.

Table ES-2. Summary of Average Wastewater Flow Projections

Planning Year	Wastewater Connections	Average Day Flow (MGD)
2023	5,200	0.70
2028	6,637	0.90
2033	8,470	1.14
Buildout	19,801	2.67

Risk Based Assessment

In addition to capacity analysis, FNI performed lift station risk-based assessments (RBA) to address the need for renewing existing assets in deteriorating or failing condition. FNI and City staff conducted site visits and assigned scores for the condition of all City operated lift stations, summarized in **Table ES-3**. FNI developed lift station renewal CIP projects based on the assessed risk scores, summarized in **Table ES-4**.

Table ES-3. Lift Station Condition Score

Lift Station	Overall Condition Score	Overall Rating
17th Lift Station	2.50	Good
Alfalfa	2.05	Good
Bar K	3.10	Poor
The Cove	2.50	Good
Destination	2.60	Fair
Driving Range	2.10	Good
High Drive	2.15	Good
The Inn	3.00	Fair
Lower Boone	3.30	Poor
MacArthur	3.55	Very Poor
Mira Lago	2.90	Fair
Old Burnet Rd	2.85	Fair
Pool	1.75	Good
Santo Carlo	3.30	Poor
Tessera	2.25	Good
Truman	2.45	Good
Turner	3.40	Poor
Upper Boone	2.75	Fair
Veranda Walk	2.65	Fair
WWTP	3.10	Poor

Table ES-4. Lift Station Rehabilitation Recommendations

Rehabilitation Priority Order	Lift Station	Estimated Rehabilitation Cost
1	MacArthur Lift Station Condition Rehabilitation	$82,500
2	Santa Carlo Lift Station Condition Rehabilitation	$97,500
3	Mira Lago Lift Station Condition Rehabilitation	$7,100
4	17th Lift Station Condition Rehabilitation(1)	$59,700
5	Turner Lift Station Condition Rehabilitation	$562,700
6	Bar K Lift Station Condition Rehabilitation(1)	$71,100
7	WWTP Influent Lift Station Condition Rehabilitation(1)	$258,400
8	The Inn Lift Station Condition Rehabilitation	$242,100
9	Lower Boone Lift Station Condition Rehabilitation	$97,100
10	Old Burnet Lift Station Condition Rehabilitation	$65,300
11	Destination Way Lift Station Condition Rehabilitation	$150,500
12	Upper Boone Lift Station Condition Rehabilitation	$13,400
13	Veranda Walk Lift Station Condition Rehabilitation	$7,100
14	Tessera Lift Station Condition Rehabilitation(2)	$18,000
15	Alfalfa Lift Station Condition Rehabilitation	$66,900
16	Driving Range Lift Station Condition Rehabilitation	$87,300
17	The Cove Lift Station Condition Rehabilitation	$15,200

(1) 5-Year CIP Capacity Improvement
(2) 10-Year CIP Capacity Improvement

Wastewater System Capital Improvements

FNI developed a wastewater capital improvement plan (CIP) that will effectively and efficiently continue to convey existing and future flow to the City's wastewater treatment plant. The recommended improvements will provide the required capacity and reliability to meet projected wastewater flows through a service area buildout scenario. FNI assessed the wastewater collection system under maximum flows, and improvements were grouped into the three phases in which they become necessary. FNI recommends that these projects be constructed generally in the order listed; however, development patterns may make it necessary to construct some projects sooner or later than anticipated. **Table ES-5** summarizes the costs, in 2023 dollars, of the recommended wastewater system capital improvements plan for Lago Vista.

Table ES-5. Summary of Wastewater Capital Improvements Plan

Phase	Cost
2028 (5-year)	$41,859,200
2033 (10-year)	$6,635,900
Buildout	$42,386,900

1.0 INTRODUCTION

The City of Lago Vista (City) is a growing community located in central Texas, within Travis County. Lago Vista currently provides sewer service to over 5,200 connections and counting. The population within the service area is projected to grow by over 3,200 connections in the next 10 years and over 14,600 connections by buildout. Defining a capital improvement plan (CIP) for accommodating this growth in an efficient and cost-effective manner, while also focusing on the maintenance of wastewater system assets, is the primary goal of this Wastewater Master Plan. Freese and Nichols, Inc. (FNI) has prepared this report to provide the City of Lago Vista with a planning tool that will serve as a guide for short-term and long-term improvements to the wastewater system.

1.1 SCOPE OF WORK

Freese and Nichols, Inc. (FNI) was retained in 2022 by the City of Lago Vista to prepare a Wastewater Master Plan. Master Plan goals were to evaluate the integrity of the existing wastewater system and to recommend a phased capital improvement plan (CIP) of the service area for 5-year, 10-year, and buildout planning scenarios The recommended improvements will serve as a basis for the design, construction and financing of facilities required to meet the City's wastewater capacity needs. The major elements of the scope of this project included:

- Wastewater Connection Projections
- Wastewater Flow Projections
- Wastewater Model Build and Analysis
- Lift Station Risk-Based Assessment
- Wastewater Capital Improvement Plans
- Wastewater Master Plan Report

1.2 LIST OF ABBREVIATIONS

Table 1-1 provides a list of abbreviations used in this report.

Table 1-1. List of Abbreviations

Abbreviation	Full Nomenclature
AADF	Annual Average Daily Flow
CCN	Certificate of Convenience and Necessity
CIP	Capital Improvement Plan
ETJ	Extra Territorial Jurisdiction
FNI	Freese and Nichols, Inc.
GIS	Geographic Information System
gpm	gallons per minute
LS	Lift Station
MGD	Million Gallons per Day
OPCC	Opinion of Probable Construction Cost
P2HF	Peak 2-Hour Flow
RBA	Risk-Based Assessment
RDII	Rainfall Derived Inflow and Infiltration
SCADA	Supervisory Control and Data Acquisition
TCEQ	Texas Commission on Environmental Quality
WWTP	Wastewater Treatment Plant

2.0 HISTORICAL AND PROJECTED GROWTH

Growth projections are an important component of the wastewater master planning process. The magnitude and distribution of the growth in residential and non-residential development will dictate where future infrastructure is required. It is important to note that projecting future population is challenging, especially for relatively small geographic areas like cities because it can be difficult to predict how fast or slow development will occur when there are a variety of circumstances that can have an impact. FNI assessed parcels within the City's sewer CCN and ETJ against a number of factors to locate parcels likely to develop over the next 10 years and by system buildout. City staff provided FNI with a list of potential master development communities with wastewater entitlements to connect that were prioritized based on the staff's understanding on the timing and movement of developers. Additionally, FNI identified other subdivided parcels within City Limits as "likely to develop" in due time as the system builds out. Master developments with wastewater entitlements identified by City staff were prioritized to develop first, followed by fill-in parcels identified by FNI. Timing and sizing of capital improvements are related to existing needs as well as the amount, location, and urgency of projected growth. The following sections describe the process used to develop wastewater connection growth projections.

2.1 SERVICE AREA

The service area assessed for the Wastewater Master Plan generally consists of the Sewer Certificate of Convenience and Necessity (CCN). A CCN is a state-regulated agreement in which the CCN holder is required to provide continuous and adequate utility service to all its retail customers, and in turn is protected from encroachment by other retail service providers. The current boundaries of Lago Vista's sewer CCN encompasses the entirety of the City Limits. The boundary is defined by FM 1431 to the north-northwest and the Colorado River to the west and south. The boundary to the east is less easily defined as some large areas are either incorporated (Destination Way and Shoreline Ranch) or excluded (Rancho Cielo, Lago Ranchos, and Travis Hollow) from the City Limits and CCN.

In addition to service provided within its CCN boundaries, Lago Vista provides wastewater wholesale service to The Hollows Subdivision in Jonestown, Texas. **Figure 2-1** illustrates the wastewater service area evaluated as part of the Wastewater Master Plan.

FIGURE 2-1
CITY OF LAGO VISTA
WASTEWATER SYSTEM SERVICE AREA

LEGEND

- Road
- Water Body
- City Limit
- ETJ Boundary
- Other City Limit

LIFT STATION SERVICE AREAS

- 17th Lift Station
- Alfalfa
- Bar K
- Driving Range Lift Station
- High Dive Lift Station
- Lower Boone Lift Station
- MacArthur Lift Station
- Mira Lago Lift Station
- Santa Carlo Lift Station
- Tessera
- The Cove Lift Station
- The Inn
- Truman Lift Station
- Turner Lift Station
- Upper Boone Lift Station
- Veranda Walk Lift Station
- WWTP

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2.2 HISTORICAL CONNECTIONS

Projecting future growth is an integral part of the master plan process. The projections serve as the basis for future wastewater loads that will be utilized to determine needed improvements. An initial estimate of the existing number of connections to the wastewater system was developed based on development data and geocoded wastewater meter billing provided by the City. The historical wastewater connections and year-over-year growth rates are summarized in **Table 2-1**.

Table 2-1. Historical Wastewater Connections

Year	Wastewater Connections	Average Annual Connection Growth Rate
2015	2,720	--
2016	2,818	3.6%
2017	2,934	4.1%
2018	3,150	7.4%
2019	3,434	9.0%
2020	3,740	8.9%
2021	4,015	7.4%
2022	4,279	6.6%
2023	5,200	21.5%
Average Growth Rate		**8.6%**
Average Growth Rate (Excluding 2023)		**6.7%**
Projected Growth Rate		**5.0%**

2.3 DEVELOPER ENTITLEMENTS

To aid in determining where new growth would occur, FNI utilized input from City staff on location of known future developments and associated number of residential connections of each development at buildout as well as estimated timeline of construction for each development. The City of Lago Vista Department for Development Services has approved multiple master development communities and allowed for the allotment of dedicated connections to be served by the City's wastewater system. While some developer agreements have stipulations for a minimum number of constructed homes in a given time period to avoid penalty of lost entitlements, there is no standard term of limitations for the holding period of the entitlements. City staff informed FNI with estimates for buildout time, ultimate buildout, and rate of buildout for each master development community to incorporate into this master plan.

Table 2-2 summarizes the known developments, associated number of entitled buildout connections, and assumed number of connections built by planning period.

Table 2-2. Wastewater Entitlements

Entitlements	Entitled Connections	Active Connections	2028 Connections (5-Year)	2033 Connections (10-Year)	Buildout Connections
Peninsula	200	0	0	0	100
Firefly Cove	325	0	0	0	325
Winn Ranch	1,222	0	200	400	1,222
Groseclose	350	3	25	50	350
Montechino	432	0	50	106	432
Shoreline Ranch	568	0	0	0	568
Villas at Keegans Crossing	151	0	0	0	151
The Hollows	532	35	100	200	532
Tessera	1,055	315	500	1,000	1,055
Turnback Ranch	724	0	350	724	724
Total Entitled	**5,559**	**353**	**1,225**	**2,480**	**5,459**

2.4 PROJECTED GROWTH

Growth in connections through the planning years was determined by evaluating historical wastewater connection trends, review of new customer connection data, and working with City staff to identify areas of potential growth for the 2028, 2033 and Buildout planning periods. Future wastewater connections are projected to grow at 5.0 % per year. Summaries of these projections are in **Table 2-3**.

Table 2-3. Projected Wastewater Connections

Year	Wastewater Connections
2023 (Existing)	5,200
2028 (5-Year)	6,637
2033 (10-Year)	8,470
Buildout	19,801

Once a total connection count was calculated based on the overall 5% growth rate assumption, the parcels likely to be developed were phased for 5-year, 10-year, and buildout growth. Proposed master development communities with wastewater connections entitled were assumed to develop in accordance with City staff projections and were prioritized first in a given planning period. Following the entitled areas, parcels identified by FNI based on state tax code designations and sewer service availability were

prioritized second. Lastly, fill-in growth of pre-platted parcels were used to match the proposed future connections for each planning period.

To identify large areas likely to develop in the next 10 years, parcels were selected if they were not a part of impending developments, proximity to existing pressure or gravity sewer mains, and likely developable land use types as identified by state tax code designations (C1, D1, or E1). Large areas were loaded with a density of 2 connections per acre. Though there are some large areas that can still be built out with multiple connections on site, much of the City of Lago Vista is pre-platted for single family residential use on a plot-by-plot basis. Pre-platted parcels with an area greater than 0.1 acre were loaded with 1 connection. Pre-platted parcels with an area greater than 1.0 acre were loaded with the density of 2 connections/acre with the assumption that the parcel could be subdivided.

To summarize where growth is projected to occur, all parcels identified for future development were combined into seven unique growth zones. **Table 2-4** summarizes the anticipated additional connections per planning year for each of the growth zones. **Figure 2-2** illustrates the growth zones and all parcels identified for growth in each of the growth zones.

Table 2-4. Added Connections By Growth Zone Between Planning Periods

Growth Zone	2028 Connections	2033 Connections	Buildout Connections
1	152	190	1,856
2	254	310	2,358
3	116	169	1,527
4	285	121	2,057
5	65	100	332
6	535	874	686
7	10	26	560
8	20	43	1,555
Total	**1,437**	**1,833**	**10,931**

2.5 GROWTH IN THE ETJ

In addition to known growth in the City Limit there is also anticipated growth in the Extra-Territorial Jurisdiction (ETJ), which is a buffer around the city limits that grants a city the right to unilaterally annex an area within its ETJ. Excluding the Balcones Canyonlands National Wildlife Refuge, there is approximately 6,698 acres within the City's ETJ that could be incorporated into City Limits or into the City's water and wastewater CCNs. At 2 connections per acre, the ETJ area could accommodate an additional 13,396 connections. For the purposes of this Master Plan, expansion of the CCN to areas within the City's ETJ was not considered in sizing of infrastructure.

Tessera
1055 Entitled Connections
302 Active Connections

Growth Zone 6
Entitlements: Tessera and Turnback Ranch
Added Connections
2028 (5-Year): 535
2033 (10-Year): 874
Buildout: 686

Semi-Public Land

Growth Zone 8
Non-Entitled Undeveloped Area: 332 ac
Undeveloped Platted Parcels: 918
Added Connections
2028 (5-Year): 20
2033 (10-Year): 43
Buildout: 1,555

Growth Zone 7
Non-Entitled Undeveloped Area: 122 ac
Undeveloped Platted Parcels: 366
Added Connections
2028 (5-Year): 10
2033 (10-Year): 26
Buildout: 560

Turnback Ranch
724 Entitled Connections
0 Active Connections

Growth Zone 3
Non-Entitled Undeveloped Area: 554 ac
Undeveloped Platted Parcels: 442
Added Connections
2028 (5-Year): 116
2033 (10-Year): 169
Buildout: 1,527

Growth Zone 5
Entitlement: The Hollows
Added Connections
2028 (5-Year): 65
2033 (10-Year): 100
Buildout: 332

The Hollows
532 Entitled Connections
35 Active Connections

Villas at Keegans Crossing
151 Entitled Connections
0 Active Connections

Growth Zone 4
Entitlements: Villas at Keegans Crossing, Shoreline Ranch, and Monetechino
Non-Entitled Undeveloped Area: 170 ac
Added Connections
2028 (5-Year): 285
2033 (10-Year): 121
Buildout: 2,057

Shoreline Ranch
568 Entitled Connections
0 Active Connections

Growth Zone 2
Entitlements: Firefly Cove and Winn Ranch
Non-Entitled Undeveloped Area: 370 ac
Undeveloped Platted Parcels: 557
Added Connections
2028 (5-Year): 254
2033 (10-Year): 310
Buildout: 2,358

Growth Zone 1
Entitlement: Peninsula
Non-Entitled Undeveloped Area: 599 ac
Undeveloped Platted Parcels: 1,081
Added Connections
2028 (5-Year): 152
2033 (10-Year): 190
Buildout: 1,856

Groseclose
350 Entitled Connections
0 Active Connections

Montechino
432 Entitled Connections
3 Active Connections

Firefly Cove
325 Entitled Connections
0 Active Connections

Peninsula
200 Entitled Connections
0 Active Connections

Winn Ranch
1222 Entitled Connections
0 Active Connections

Colorado River

Lake Travis

JONESTOWN

LAKEWAY

POINT VENTURE

BRIARCLIFF

FIGURE 2-2
CITY OF LAGO VISTA
EXISTING AND PROJECTED CUSTOMERS

LEGEND

Growth Zone Boundary
1
2
3
4
5
6
7
8

Road
Water Body
City Limit
ETJ Boundary
Developable Parcel (Multiple Colors)
Semi-Public Land
Entitlement

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3.0 WASTEWATER FLOWS

Wastewater flows in a municipal collection system vary by time of day, wastewater discharge source and weather conditions. Average daily flow is defined as the total wastewater flow over a one-year period divided by the number of days in that year. Wastewater treatment plants are typically sized in terms of average daily flow. Collection systems are sized to convey peak wastewater flow consisting of three components: peak dry weather flow, infiltration, and inflow. Infiltration is the seepage of groundwater into sewer pipes and manholes below the ground surface. It is estimated as the difference between the minimum nighttime flow during dry weather, low groundwater periods and the maximum nighttime flow during high groundwater periods, which occur immediately after a storm event. Inflow is storm water runoff from paved and non-paved areas flowing into manholes and sewer cleanouts. The collection system must be able to convey the peak flow that results from design level storm events without overflowing.

3.1 HISTORICAL WASTEWATER FLOWS

FNI analyzed yearly wastewater treatment plant flow data provided by the City from 2015 to 2022 to determine the historical trends in systemwide average daily flow and per-connection flow for Lago Vista and wholesale wastewater connections. The collection system per-connection flow rate ranged from a low of 95 gallons per connection in 2022 to a high of 152 gallons per connection in 2015 with an average of 119 gallons per connection. **Table 3-1** summarizes historical Lago Vista's wastewater flows.

Table 3-1. Historical Wastewater Flows

Year	Wastewater Connections	Average Day Flow (MGD)	Average Day Flow Per Connection (gpd)
2015	2,720	0.41	152
2016	2,818	0.38	136
2017	2,934	0.36	124
2018	3,150	0.38	120
2019	3,434	0.37	107
2020	3,740	0.40	108
2021	4,015	0.46	116
2022 (through March)	4,279	0.41	95
Average	**-**	**0.40**	**119**
Maximum	**-**	**0.46**	**152**

3.2 PROJECTED AVERAGE WASTEWATER FLOW

Average day wastewater flows were projected for the existing, 2028, 2033, and buildout planning scenarios by applying an average, per-connection flow to the additional wastewater connections. The future per-connection wastewater flows were assumed to remain the same as the established average per-connection wastewater flows. Recent data points to a stagnating trend of daily average treatment volumes, resulting in a decreasing per-connection production of wastewater. Despite the low wastewater production in 2019 and 2020, for the purposes of this analysis, it was assumed that these reduced volumes may not be representative of likely future discharge patterns. Consequently, a conservative average discharge rate of 135 gallons per connection per day was assigned for future year projections. The resulting wastewater flow projections compared with historical flows seen at the wastewater treatment plant are summarized in **Figure 3-1**. Even though area within the City's ETJ was not considered for sizing of infrastructure in this Master Plan, it is important to note the potential impact to the ultimate sizing of the City's existing wastewater treatment plant. Based on the projected wastewater flow per connection and the projected growth within the ETJ of 13,396 connections, the City would receive an additional 1.81 MGD of average day dry weather flow.

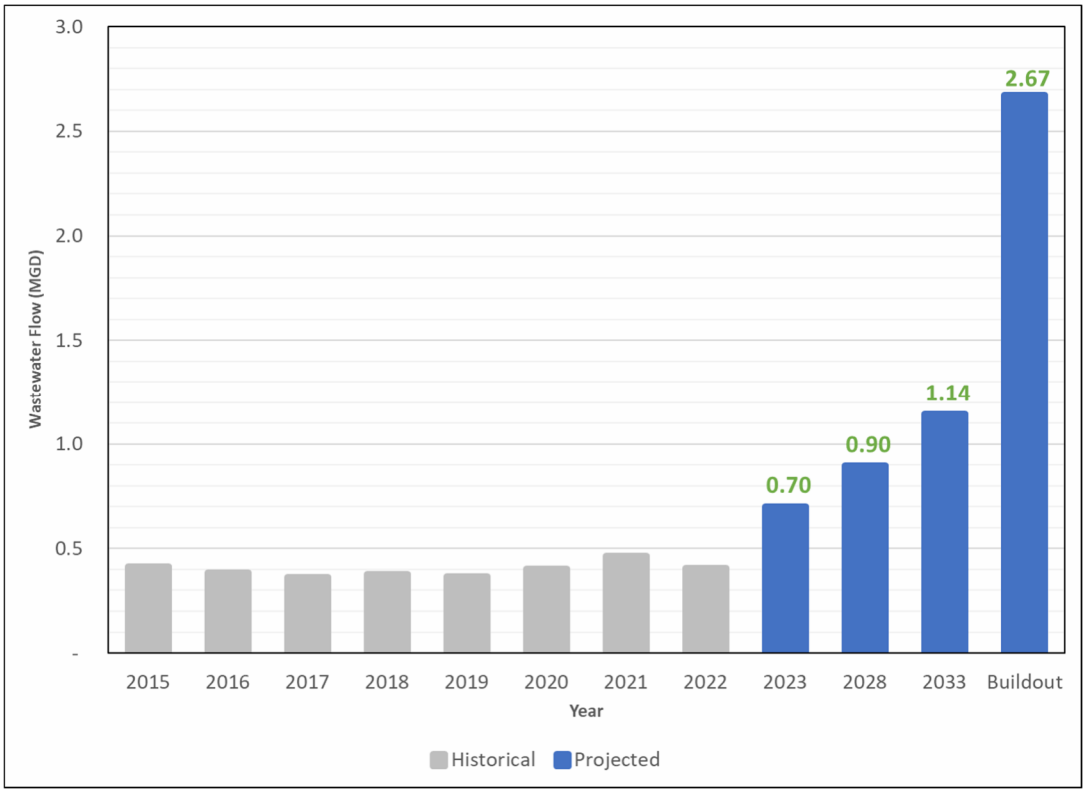

Figure 3-1. Historical and Projected Average Day Wastewater Flow

4.0 EXISTING AND FUTURE WASTEWATER SYSTEM ANALYSIS

The existing wastewater collection system consists of 91 miles of low-pressure sewer mains, 18 miles of wastewater gravity mains, 20 lift stations and 15 miles of associated force mains, and one wastewater treatment plant. **Figure 4-2** illustrates the existing wastewater collection system.

4.1 EXISTING WASTEWATER SYSTEM

4.1.1 Wastewater Lines

The existing wastewater system consists of a total of 124 miles of sewer pipe. Pipeline diameters range in size from 1-inch to 10-inches for pressure pipes, 2-inches to 15-inches for gravity pipes, and 3-inches to 18-inches for force mains. **Figure 4-1** illustrates the percentage of pipe length by diameter and main type.

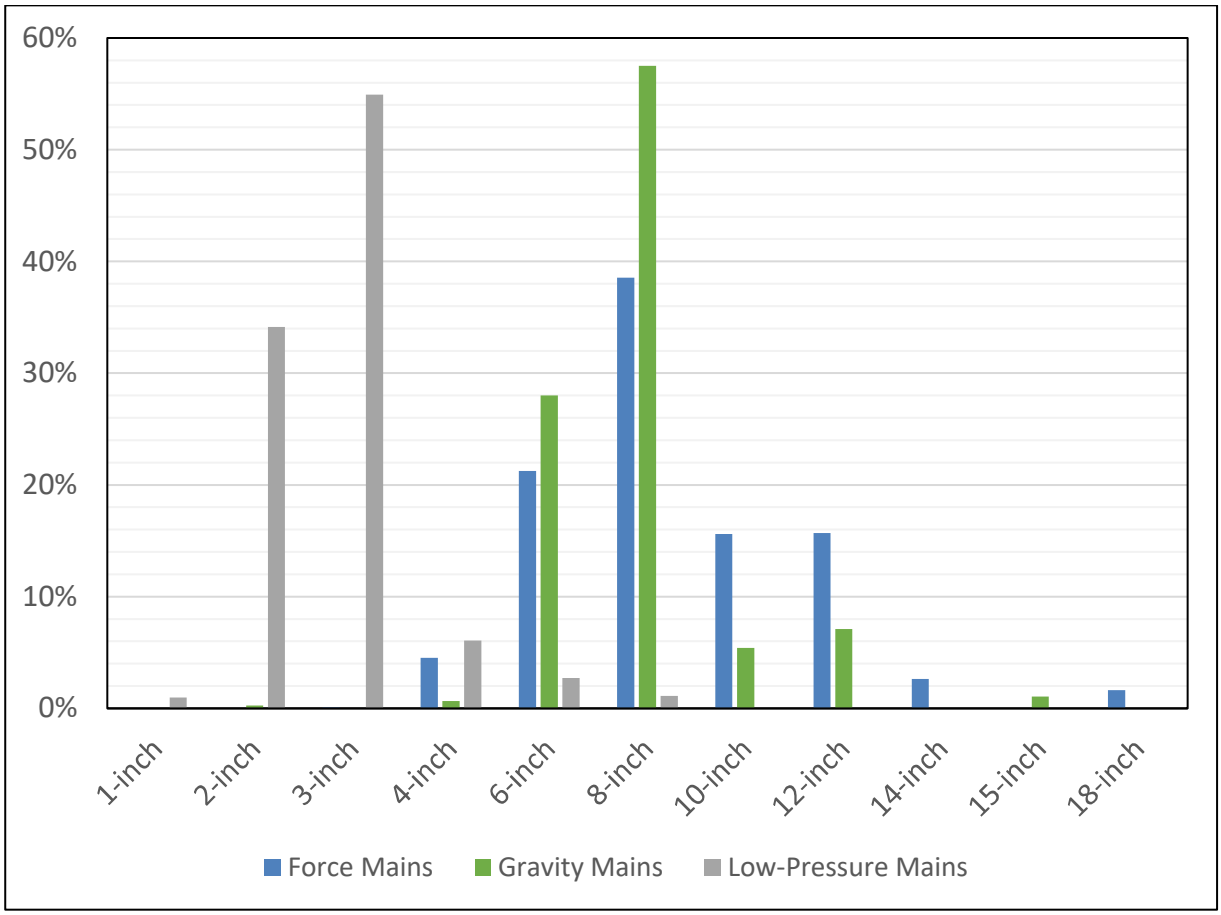

Figure 4-1 Pipeline Diameter by Length and Main Type

FIGURE 4-2

CITY OF LAGO VISTA

EXISTING WASTEWATER SYSTEM

LEGEND

- Lift Station
- Wastewater Treatment Plant
- 8" and Smaller Wastewater Line
- 10" and Larger Wastewater Line
- 4" and Smaller Force Main
- 6" and Larger Force Main
- Road
- Water Body
- City Limit
- ETJ Boundary
- Other City Limit

Lift Station Service Areas

- 17th Lift Station
- Alfalfa
- Bar K
- Driving Range Lift Station
- High Dive Lift Station
- Lower Boone Lift Station
- MacArthur Lift Station
- Mira Lago Lift Station
- Santa Carlo Lift Station
- Tessera
- The Cove Lift Station
- The Inn
- Truman Lift Station
- Turner Lift Station
- Upper Boone Lift Station
- Veranda Walk Lift Station
- WWTP

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4.1.2 Pressure Sewer Systems

The wide topographical range of the Lago Vista sewer CCN and limestone subsurface makes the conditions for a traditional gravity sewer system difficult and expensive. In lieu of multiple lift stations and force main networks to pump above or around hills, the Lago Vista sewer system relies heavily on a low-pressure sewer collection system. The low-pressure force mains can be installed in shallow trenches, which is financially advantageous considering the geology of the Hill Country.

A low-pressure collection system utilizes a small storage tank and pump located at each service connection. A storage tank for a residential customer is generally less than 50 gallons and a working volume of 1 pump cycle, about 8-15 gallons. As the storage tank reaches its full capacity, the grinder pump housed inside the storage tank will activate and discharge through a pressurized service lateral to the low-pressure collection system at a rate of 10-15 gallons per minute.

Per article 13.500 (Household Grinder Pumps) of the City's Municipal Code, grinder pumps are to be owned and maintained by the property owner as long as specifications and materials of the pump meet standards set by the utility department. Revised in 2004, the City's construction standards and details for grinder pump installation (Grinder Pump Installation, Construction Standards and Details No. WW-18, Building Code Sheet 7-1) require a minimum of a 2-horsepower pump. While grinder pumps are common, the pumps can vary significantly with respect to functionality based on the type of grinder pump and specifications. Grinder pumps are manufactured as either a centrifugal or progressive cavity pump.

Centrifugal pumps, commonly used in lift stations with dedicated force mains, are selected when the head and flow condition for the force main system is well-defined and unaffected by competing pumps. Force main systems are typically a closed system with only one active facility in operation to create a localized peak hydraulic gradient. For this reason, the pump can be designed with a flatter curve in which the optimal design point for its operation corresponds with the design headloss condition created by the force main and the desired flow rate. In systems with multiple centrifugal pumps, like multiple lift stations pumping to a common force main, varying head conditions within the force main network will cause the pumps to operate to the left of its curve (high head, low flow) as more pumps turn on and pressure builds in the force main, and to the right of its curve (low head, high flow) when fewer pumps are on and pressure in the force main is lower. The difference in flow output from the left side of the pump curve where a pump's flow rate can be reduced to a point where the outflow is less than the inflow can cause the water level in the upstream storage tank to rise to a point of overflow. On the other end, when a pump operates

too far to the right on its curve and doesn't have the downstream restriction needed for its proper operation, the pump can overheat and burn out. Varying operation conditions (no pumps on to many pumps on) with high topographical variation in a common force main network results in centrifugal pumps to operate on every part of its curve that results in times in which high amounts of flow are produced and times in which low amounts of flow are produced.

Progressive cavity pumps typically require motors sized between 1 to 1½ hp and produce consistent discharge flow rates across a wide spectrum of head ranges (i.e., the pump curve is steep). Progressive cavity pumps work well in systems with a wide range of head conditions because the flow rate is consistent regardless of the fluctuating head condition in the system. For this reason, progressive cavity pumps are not selected by engineers when designing lift stations with their own dedicated force main system and the head condition is known and static. The highlighted use of progressive cavity pumps is in systems with varying head conditions. Whether the condition is high head or low head, the pump discharges flow in a tight and consistent range. An example of progressive cavity and centrifugal pump curves is illustrated in **Figure 4-3**.

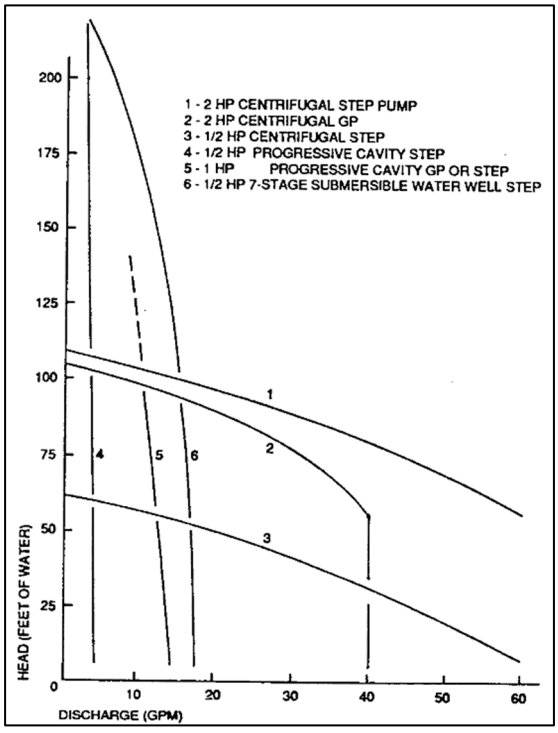

Figure 4-3. Head-Discharge Curves for Typical GP and STEP Systems

U.S. Environmental Protection Agency (US EPA). 1991 Alternative Wastewater Collection Systems. EPA 625/1-91/024. Washington, DC: US Environmental Protection Agency.

On an average dry weather day, the production of wastewater in a low-pressure dominated sewer system should be equal to that of a gravity sewer system. In a gravity sewer system, flows generally move more slowly and attenuate in collection system pipelines. The effect of attenuation of flow in a gravity pipeline is a diurnal pattern that consists of relatively higher flows during high wastewater production times (mornings and evenings), and relatively lower flows when customers use less water (middle of the night). Due to the travel time and attenuation, flow through a gravity system can be seen as continuous at a downstream collection point. Wastewater generation in low-pressure systems differs due to the collection basin on the upstream end of the grinder pump, and the pressurized sewer system with presumably no in-line storage or excess capacity. Wastewater is attenuated at the site of the customer while the pressurized collection system downstream is immediately impacted by pressurized flows generated at individual connection points. The pressurized collection system downstream is immediately impacted by pressurized flows generated at individual connection points. The resulting flow response can indicate a more drastic instantaneous peak due to the absence of freeboard within the pipe. No buffer exists to attenuate the intermittent flows generated at individual pumping locations. Multiple pumps in operation simultaneously will create conditions with higher velocities and establish the basis for pipeline sizing. Due to the binary status of pumps and short pump run times (1-2 minutes) there is less likelihood of multiple pumps in a stretch of main to be on at one given point in time. As more customers are connected to longer sewer mains, the likelihood of multiple pumps operating simultaneously should increase. The maximum number of pumps in operation simultaneously has been empirically derived and summarized in **Figure 4-4**. This table was used as the basis for determining peak flows in pressure mains. The corresponding peak flow rates were then used to determine the minimum and maximum number of customers connected upstream of a given pipe segment and the necessary corresponding pipe size to achieve flushing velocity (greater than 2 ft/s) and avoid excessive peak velocities (below 6 ft/s). The minimum and maximum number of standard grinder pumps per pipe size are summarized in **Table 4-1.** This table was used as the basis for determining capacity in pressure mains in the existing system assessment as CIP development.

Table 3 MAXIMUM NUMBER OF GRINDER PUMP CORES OPERATING DAILY	
Number of Grinder Pump Cores Connected	Maximum Daily Number of Grinder Pump Cores Operating Simultaneously
1 2–3 4–9 10–18 19–30	1 2 3 4 5
31–50 51–80 81–113 114–146 147–179	6 7 8 9 10
180–212 213–245 246–278 279–311 312–344	11 12 13 14 15
345–377 378–410 411–443 444–476 477–509	16 17 18 19 20
510–542 543–575 576–608 609–641 642–674	21 22 23 24 25
675–707 708–740 741–773 774–806 807–839	26 27 28 29 30
840–872 873–905 906–938 939–971 972–1,004	31 32 33 34 35

Figure 4-4. E-One Maximum Number of Grinder Pump Cores Operating Daily
Low Pressure Sewer Systems Using Environment One Grinder Pumps (E/One, 2008, p.14)

Table 4-1. Number of Connections per Pipe Diameter

Pipe Size	Minimum Flows			Maximum Flows		
	Flow Rate (gpm) At 2 ft/s	Number of Pumps Operating Simultaneously	Minimum Number of Pumps	Flow Rate (gpm) At 6 ft/s	Number of Pumps Operating Simultaneously	Maximum Number of Pumps
1-inch	4.9	0	0	14.7	1	1
2-inch	19.6	1	0	58.8	4	18
3-inch	44.1	3	4	132.2	10	179
4-inch	78.3	6	31	235.0	18	443
6-inch	176.3	14	279	528.8	42	1,285(1)
8-inch	313.3	25	642	940.0	75	2,440(1)

(1) FNI Extrapolated

4.1.3 Lift Stations

Lift stations are necessary where wastewater must be pumped to a higher elevation or where there is insufficient grade to convey flow entirely by gravity. Because of the topographical change across the City's wastewater service area, Lago Vista operates 20 lift stations throughout the service area. The lift stations vary in size from small lift stations that serve a public pool to the three primary regional lift stations that serve as the collection point before sending flow to the WWTP. The hierarchy of lift stations is illustrated in **Figure 4-5**. 17th, Driving Range, and Turner LS pump roughly a third each of the total daily flow to the WWTP and are crucial facilities in the wastewater system. The City provided an inventory of pump manufacturer information for active lift stations, where available. This information was used, in coordination with the pump manufacturer, to obtain the pump curves and estimate the flow with the largest pump out of service (i.e., the "firm capacity"). For duplex lift stations, the one-pump flow is the firm capacity. The summation of individual pump capacities for each lift station presented in **Table 4-2** as the *Existing Total Capacity* should not be interpreted as the actual total capacity with all pumps running. Multiple pumps operating simultaneously do not have a totalized output equal to the sum of rated capacity of each pump operating alone because the additional flow generated by multiple pumps discharging into a common force main increases head loss, and pump output decreases the higher the head it must pump against. A field draw down test would be required to understand the field rating for a given lift station.

Figure 4-5. Lift Station Hierarchy

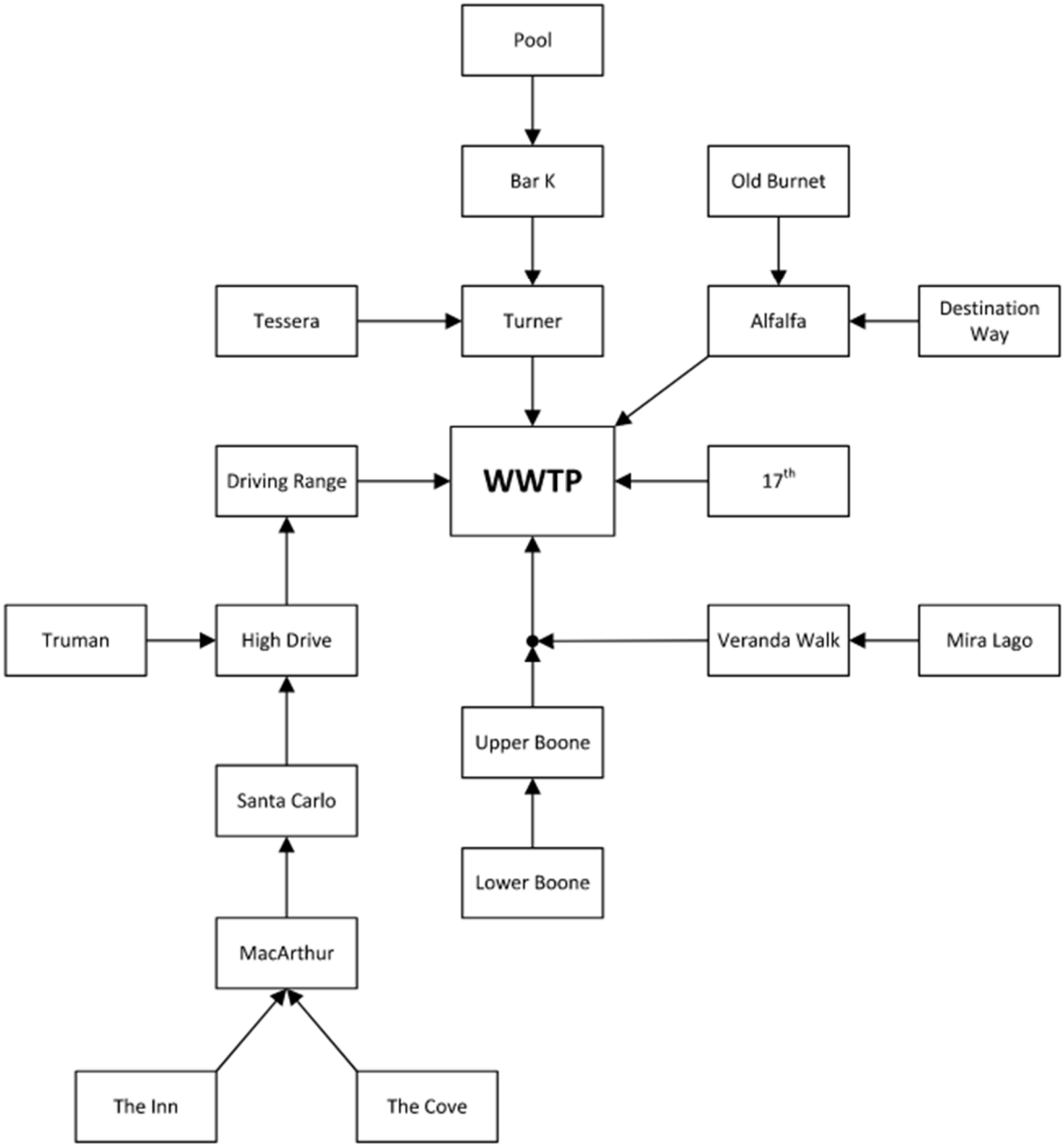

Table 4-2. Existing Lift Station Capacities

Lift Station	Number of Pumps	Existing Total Capacity(1) (gpm)	Existing Firm Capacity (gpm)
17th	2	880	440
Alfalfa	2	1,056	528
Bar K	2	1,120	560
Destination Way	2	--(2)	--(2)
Driving Range	2	2,828	1,414
High Dive	2	1,800	900
Lower Boone	2	900	450
MacArthur	2	1,120	560
Mira Lago	2	--(2)	--(2)
Pool	2	--(2)	--(2)
Old Burnet Rd	2	1,200	600
Santa Carlo	2	1,440	720
Tessera	2	640	320
The Cove	2	378	189
The Inn	2	521	261
Truman	2	449	249
Turner	3	3,330	2,220
Upper Boone	2	600	300
Veranda Walk	2	--(2)	--(2)
WWTP	3 Active (1 Offline)	2,680	1,680

(1) Total Capacity presented herein is the sum of all individual, rated pump capacities.
(2) Pump curve unavailable

4.1.4 Wastewater Treatment Plant

The wastewater system is served by a single wastewater treatment plant owned and operated by the City of Lago Vista. The wastewater treatment plant is located on a 5-acre site at 21001 Seminole Drive, Lago Vista, Texas, just east of the Texas Colorado River. The WWTP is a conventional activated sludge plant with a current permitted capacity of 1.0 MGD average annual daily flow (AADF) and no permitted peak 2-hour flow (P2HF). **Table 4-3** summarizes the current permitted effluent limits of the wastewater treatment plant.

Table 4-3. Existing Permitted Effluent Requirements

Effluent Parameter	Daily Average Limit
$CBOD_5$	10 mg/l
TSS	15 mg/l
NH_3-N	N/A
E. coli	120 colonies/100 ml

4.2 COLLECTION SYSTEM CAPACITY ANALYSIS

The existing collection system was evaluated to determine deficiencies in its ability to adequately convey wastewater through its lift stations and pipelines to the WWTP and to provide a baseline for the current level of service. The critical flow condition for analyzing a wastewater collection system is the time of day where the maximum number of grinder pumps are active during a peak wet weather event. Due to the reliance on a low-pressure sewer main network, pressurized by customer-owned grinder pumps, wet weather contribution is expected to be lower relative to gravity dominant collection systems. For this reason, flows conveyed by the collection system are primarily the result of direct discharge from customers. Direct discharge from customers represents the non-irrigation water consumption at a given connection point. The rate of wastewater production at a moment is equal to the rated capacity of each individual grinder pump tied to a low-pressure main multiplied by the number of grinder pumps operating simultaneously. The desktop analysis used to assess the available capacity for assets in the collection system used the maximum flow generated by grinder pumps operating simultaneously to estimate the peak velocity in pressure mains and the available wet weather peaking factor in gravity mains. This assessment was conducted for the existing system and repeated for future system scenarios with the addition of projected customers.

Existing and future system analyses were conducted to identify deficiencies in the existing wastewater collection system and to guide development of a wastewater capital improvements plan (CIP) that will improve the existing system and provide capacity for projected wastewater flows through the buildout. Various combinations of improvements and modifications were investigated to determine the most appropriate approach for conveying projected flows, while integrating gravity pipelines where possible. Goals considered in the development of the CIP included increasing system reliability, improving and simplifying system operations, and maintaining proper velocities in pressurized pipes. The following sections summarize the findings of the collection system capacity analysis.

4.2.1 Collection System Analysis

A collection system model is a valuable tool used to simulate the flow conditions in a wastewater collection system. FNI developed a desktop model network of the Lago Vista Wastewater System using AutoDesk's InfoWorks ICM® software. The model was built utilizing the City's Geographic Information System (GIS) data. FNI validated invert elevations, manhole depths, and lift station parameters utilizing as-built plans where available and inferred pipe depth where needed based on the ground elevation.

Once the physical elements of the model were developed, wastewater flows were allocated to the model nodes. The distribution, or allocation, of wastewater flows is a crucial step in the development of a model. This distribution was achieved using the addresses of wastewater customers from sewer billing data provided by the City. The wastewater billing data included the water usage type which could be related to the monthly total consumption in gallons for every customer type from July 2022. The active meters were geocoded using parcel and street centerline data. Geocoding is a GIS technique used to generate a geographic location (x-y coordinates) from an address. If the meter was adjacent to a gravity sewer main, wastewater flows were spatially allocated by joining the meters to the nearest model node and assigning the associated flow to that node. If the meter was adjacent to a low-pressure sewer main, the number of connections was spatially allocated by joining the meters to the nearest node.

Using the model network, the existing collection system was evaluated to assess the ability of the system to adequately convey wastewater flows through pipelines to the WWTP. A desktop analysis was performed by summing the flow upstream of a given pipe segment to determine the steady state dry weather flow rate for each pipe segment. With the average dry weather flow known at each pipe segment, the flow was compared with the carrying capacity of the pipe. Due to largely absent pipe invert information, pipe slopes were inferred with engineering judgment. Where the ground slope was adverse, the pipe inverts were assumed to be anywhere between 5 and 10 feet below the ground level. Where the ground level did not change much from pipe segment to pipe segment, TCEQ minimum design slope was assumed for the corresponding pipe diameter. The pipe diameter, generated pipe slope, and a Manning's roughness factor of 0.013 were used to determine the carrying capacity of gravity sewer pipes, $Q_{\text{-capacity}}$.

The critical flow condition for analyzing a wastewater collection system dominated by low-pressure sewer mains is when the maximum number of grinder pumps are active. The maximum number of pumps for a given pipe segment was determined by **Table 4-1** for this analysis. Foul flow via rainfall derived inflow and infiltration (RDII) was excluded from the analysis of low-pressure sewer mains with the assumptions that

the outward pressure of the low-pressure mains would prevent subterraneous infiltration and the lack of manholes does not provide for the opportunity of above ground inflow into a low-pressure system. An instantaneous calculation of the maximum number of pumps likely to be on, multiplied by a standard grinder pump output of 12.5 gallons/minute set the calculation for the maximum flow rate through a pressure pipe. Capacity for low-pressure gravity mains was accessed based on the maximum velocity of wastewater flow that corresponds to the maximum flow rate generated from the calculation described above. Velocities were categorized into the following ranges:

- 0-2 feet/second – Incapable of meeting a 2 ft/s flushing velocity, but capable of accommodating future customers upstream
- 2-4 feet/second – Capable of meeting a 2 ft/s flushing velocity and capable of accommodating future customers upstream
- 4-6 feet/second – Capable of meeting a 2 ft/s flushing velocity, but nearing its maximum capacity
- Greater than 6 feet/second – High velocity, needs to be upsized

The capacity of gravity sewer mains was determined by summing the maximum flow rate generated by pressure sewer customers upstream and the discrete flow rate generated by gravity-served customers – the projected average flow rate multiplied by the number of connections served. This total results in a totalized flow through the gravity sewer, $Q_{\text{-calculated.}}$ The flow rate through a gravity wastewater pipeline divided by the capacity, or $Q_{\text{-calculated}}/q_{\text{-capacity}}$, was the basis to determine the excess capacity in the gravity pipeline in terms of a dry weather to wet weather peaking factor. The calculated $Q_{\text{-calculated}}/q_{\text{-capacity}}$ results in the excess carrying capacity of a wastewater line, or what wet weather peaking factor the wastewater line could handle under the existing dry weather conditions. Generally, a wet weather peaking factor of 4.0 is reasonable to use for collection system planning purposes. In consideration of the prevalence of low-pressure pipes in the collection system, a reduction in peak wet weather contribution to the collection was assumed. For the purposes of this master plan, a peaking factor of 3.0 was used as the driver for recommended capital improvements in gravity sewer pipes. **Figure 4-6** is a color-coded map that illustrates the q/Q value for each wastewater main for the existing system analysis.

To serve the future growth, Lago Vista must rehabilitate, replace, or upsize existing infrastructure and provide additional service to areas of growth where little or no infrastructure currently exists. The existing wastewater system was evaluated at the 2028, 2033, and buildout planning scenarios to determine the effects of future growth**. Figure 4-6**, **Figure 4-7**, **Figure 4-8,** and **Figure 4-9** illustrate the existing system

and its response to a maximum pump-on scenario with future planning year flows. Predicted overflows in the existing system are worsened by projected growth, particularly in the southernmost part of the collection system. Growth upstream of LS-9 requires additional capacity in the gravity main and at LS-9 itself. The effects of increasing the pumping capacity of LS-9 will require upsizing the already-constrained gravity main between LS-9 and LS-7. Growth in the western part of the system will result in flows exceeding the capacity of lift stations, but merely increasing pumping capacity will result in excessive force main velocities (7.0 ft/s or higher). Gravity main solutions in the western part of the service area, where possible, will need to be studied as an alternative to upsizing lift stations and manifold force mains to eliminate the complications of operating a manifold force main system. Wastewater system capital improvement projects were developed to accommodate anticipated growth through the 2040 planning year and resolve capacity deficiencies projected to occur in the future system analysis.

Tessera
Peak Flow: 188 gpm
Firm Capacity: 320 gpm

Pool
Peak Flow: 0 gpm
Firm Capacity: Not Known

Bar K
Peak Flow: 48 gpm
Firm Capacity: 560 gpm

Turner
Peak Flow: 660 gpm
Firm Capacity: 2220 gpm

Old Burnet Rd
Peak Flow: 0 gpm
Firm Capacity: 600 gpm

Alfalfa
Peak Flow: 88 gpm
Firm Capacity: 528 gpm

Destination Way
Peak Flow: 0 gpm
Firm Capacity: Not Known

17th
Peak Flow: 677 gpm
Firm Capacity: 440 gpm

WWTP
Peak Flow: 2005 gpm
Firm Capacity: 1680 gpm

Driving Range
Peak Flow: 692 gpm
Firm Capacity: 1414 gpm

High Dive
Peak Flow: 640 gpm
Firm Capacity: 900 gpm

Truman
Peak Flow: 176 gpm
Firm Capacity: 249 gpm

Upper Boone
Peak Flow: 125 gpm
Firm Capacity: 600 gpm

Lower Boone
Peak Flow: 125 gpm
Firm Capacity: 300 gpm

Santa Carlo
Peak Flow: 91 gpm
Firm Capacity: 720 gpm

MacArthur
Peak Flow: 67 gpm
Firm Capacity: 560 gpm

The Cove
Peak Flow: 117 gpm
Firm Capacity: 378 gpm

The Inn
Peak Flow: 130 gpm
Firm Capacity: 521 gpm

Veranda Walk
Peak Flow: 38 gpm
Firm Capacity: Not Known

Mira Lago
Peak Flow: 13 gpm
Firm Capacity: Not Known

Winn Ranch
Peak Flow: 0 gpm
Firm Capacity: Not Known

FIGURE 4-6
CITY OF LAGO VISTA
EXISTING WASTEWATER SYSTEM
EXISTING SYSTEM ANALYSIS
LEGEND

- Water Body
- Insufficient Capacity
- Unknown Capacity
- Sufficient Capacity
- Wastewater Treatment Plant
- Road
- City Limit
- ETJ Boundary
- Other City Limit

Model Predicted Excess Gravity Main Capacity

- 2x DWF or Less
- 2-3x DWF
- 3-4x DWF
- 4-6x DWF
- 6x DWF or More

Model Predicted Pressure Main Velocity

- 0 - 2 ft/s
- 2 - 4 ft/s
- 4 - 6 ft/s
- Greater than 6 ft/s

Model Predicted Force Main Velocity

- 0 - 2 ft/s
- 2 - 4 ft/s
- 4 - 6 ft/s
- Greater than 6 ft/s

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CITY OF LAGO VISTA TEXAS

0 1,400 2,800
SCALE IN FEET

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User Name: 02874

Tessera
Peak Flow: 251 gpm
Firm Capacity: 320 gpm

Pool
Peak Flow: 0 gpm
Firm Capacity: Not Known

Bar K
Peak Flow: 593 gpm
Firm Capacity: 560 gpm

Old Burnet Rd
Peak Flow: 0 gpm
Firm Capacity: 600 gpm

Turner
Peak Flow: 707 gpm
Firm Capacity: 2220 gpm

Alfalfa
Peak Flow: 104 gpm
Firm Capacity: 528 gpm

17th
Peak Flow: 552 gpm
Firm Capacity: 440 gpm

WWTP
Peak Flow: 2505 gpm
Firm Capacity: 1680 gpm

Destination Way
Peak Flow: 0 gpm
Firm Capacity: Not Known

Driving Range
Peak Flow: 1066 gpm
Firm Capacity: 1414 gpm

High Dive
Peak Flow: 829 gpm
Firm Capacity: 900 gpm

Truman
Peak Flow: 192 gpm
Firm Capacity: 249 gpm

Veranda Walk
Peak Flow: 244 gpm
Firm Capacity: Not Known

Mira Lago
Peak Flow: 50 gpm
Firm Capacity: Not Known

Upper Boone
Peak Flow: 138 gpm
Firm Capacity: 600 gpm

Lower Boone
Peak Flow: 125 gpm
Firm Capacity: 300 gpm

Santa Carlo
Peak Flow: 81 gpm
Firm Capacity: 720 gpm

MacArthur
Peak Flow: 293 gpm
Firm Capacity: 560 gpm

The Cove
Peak Flow: 118 gpm
Firm Capacity: 378 gpm

The Inn
Peak Flow: 155 gpm
Firm Capacity: 521 gpm

Winn Ranch
Peak Flow: 72 gpm
Firm Capacity: Not Known

Colorado River

Lake Travis

JONESTOWN

BRIARCLIFF

FIGURE 4-7
CITY OF LAGO VISTA
EXISTING WASTEWATER SYSTEM
2028 SYSTEM ANALYSIS
LEGEND

- Water Body
- Insufficient Capacity
- Unknown Capacity
- Sufficient Capacity
- Wastewater Treatment Plant
- Road
- City Limit
- ETJ Boundary
- Other City Limit

Model Predicted Excess Gravity Main Capacity

- 2x DWF or Less
- 2-3x DWF
- 3-4x DWF
- 4-6x DWF
- 6x DWF or More

Model Predicted Pressure Main Velocity

- 0 - 2 ft/s
- 2 - 4 ft/s
- 4 - 6 ft/s
- Greater than 6 ft/s

Model Predicted Force Main Velocity

- 0 - 2 ft/s
- 2 - 4 ft/s
- 4 - 6 ft/s
- Greater than 6 ft/s

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CITY OF LAGO VISTA TEXAS

0 1,400 2,800
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Tessera
Peak Flow: 426 gpm
Firm Capacity: 320 gpm

Pool
Peak Flow: 0 gpm
Firm Capacity: Not Known

Bar K
Peak Flow: 769 gpm
Firm Capacity: 560 gpm

Turner
Peak Flow: 884 gpm
Firm Capacity: 2220 gpm

Old Burnet Rd
Peak Flow: 0 gpm
Firm Capacity: 600 gpm

Alfalfa
Peak Flow: 141 gpm
Firm Capacity: 528 gpm

17th
Peak Flow: 688 gpm
Firm Capacity: 440 gpm

WWTP
Peak Flow: 3191 gpm
Firm Capacity: 1680 gpm

Destination Way
Peak Flow: 0 gpm
Firm Capacity: Not Known

Driving Range
Peak Flow: 1165 gpm
Firm Capacity: 1414 gpm

High Dive
Peak Flow: 915 gpm
Firm Capacity: 900 gpm

Truman
Peak Flow: 204 gpm
Firm Capacity: 249 gpm

Upper Boone
Peak Flow: 138 gpm
Firm Capacity: 600 gpm

Lower Boone
Peak Flow: 138 gpm
Firm Capacity: 300 gpm

Santa Carlo
Peak Flow: 94 gpm
Firm Capacity: 720 gpm

MacArthur
Peak Flow: 307 gpm
Firm Capacity: 560 gpm

The Cove
Peak Flow: 130 gpm
Firm Capacity: 378 gpm

The Inn
Peak Flow: 155 gpm
Firm Capacity: 521 gpm

Veranda Walk
Peak Flow: 363 gpm
Firm Capacity: Not Known

Mira Lago
Peak Flow: 50 gpm
Firm Capacity: Not Known

Winn Ranch
Peak Flow: 144 gpm
Firm Capacity: Not Known

FIGURE 4-8
CITY OF LAGO VISTA
EXISTING WASTEWATER SYSTEM
2033 SYSTEM ANALYSIS
LEGEND

- Water Body
- Insufficient Capacity
- Unknown Capacity
- Sufficient Capacity
- Wastewater Treatment Plant
- Road
- City Limit
- ETJ Boundary
- Other City Limit

Model Predicted Excess Gravity Main Capacity

- 2x DWF or Less
- 2-3x DWF
- 3-4x DWF
- 4-6x DWF
- 6x DWF or More

Model Predicted Pressure Main Velocity

- 0 - 2 ft/s
- 2 - 4 ft/s
- 4 - 6 ft/s
- Greater than 6 ft/s

Model Predicted Force Main Velocity

- 0 - 2 ft/s
- 2 - 4 ft/s
- 4 - 6 ft/s
- Greater than 6 ft/s

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CITY OF LAGO VISTA TEXAS

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Tessera
Peak Flow: 687 gpm
Firm Capacity: 320 gpm

Pool
Peak Flow: 0 gpm
Firm Capacity: Not Known

Bar K
Peak Flow: 1663 gpm
Firm Capacity: 560 gpm

Turner
Peak Flow: 1971 gpm
Firm Capacity: 2220 gpm

Old Burnet Rd
Peak Flow: 100 gpm
Firm Capacity: 600 gpm

Alfalfa
Peak Flow: 429 gpm
Firm Capacity: 528 gpm

Destination Way
Peak Flow: 100 gpm
Firm Capacity: Not Known

17th
Peak Flow: 712 gpm
Firm Capacity: 440 gpm

WWTP
Peak Flow: 7225 gpm
Firm Capacity: 1680 gpm

Driving Range
Peak Flow: 2315 gpm
Firm Capacity: 1414 gpm

High Dive
Peak Flow: 1689 gpm
Firm Capacity: 900 gpm

Truman
Peak Flow: 420 gpm
Firm Capacity: 249 gpm

Santa Carlo
Peak Flow: 110 gpm
Firm Capacity: 720 gpm

MacArthur
Peak Flow: 475 gpm
Firm Capacity: 560 gpm

The Cove
Peak Flow: 168 gpm
Firm Capacity: 378 gpm

The Inn
Peak Flow: 157 gpm
Firm Capacity: 521 gpm

Upper Boone
Peak Flow: 250 gpm
Firm Capacity: 600 gpm

Lower Boone
Peak Flow: 225 gpm
Firm Capacity: 300 gpm

Veranda Walk
Peak Flow: 1367 gpm
Firm Capacity: Not Known

Mira Lago
Peak Flow: 169 gpm
Firm Capacity: Not Known

Winn Ranch
Peak Flow: 441 gpm
Firm Capacity: Not Known

FIGURE 4-9
CITY OF LAGO VISTA
EXISTING WASTEWATER SYSTEM BUILDOUT SYSTEM ANALYSIS

LEGEND

- Water Body
- Sufficient Capacity
- Insufficient Capacity
- Sufficient Capacity
- Wastewater Treatment Plant
- Road
- City Limit
- ETJ Boundary
- Other City Limit

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CITY OF LAGO VISTA TEXAS

Model Predicted Excess Gravity Main Capacity

- 2x DWF or Less
- 2-3x DWF
- 3-4x DWF
- 4-6x DWF
- 6x DWF or More

Model Predicted Pressure Main Velocity

- 0 - 2 ft/s
- 2 - 4 ft/s
- 4 - 6 ft/s
- Greater than 6 ft/s

Model Predicted Force Main Velocity

- 0 - 2 ft/s
- 2 - 4 ft/s
- 4 - 6 ft/s
- Greater than 6 ft/s

0 1,400 2,800
SCALE IN FEET

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User Name: 02874

4.2.2 Wastewater Facility Analysis

Lift station capacity was analyzed under peak wet weather flow conditions. FNI recommends that new lift stations and lift station expansions be sized in accordance with TCEQ requirements. TCEQ Chapter 217.61 (c) states that "the firm pumping capacity of a lift station must handle the expected peak flow." Firm pumping capacity at a lift station is defined as the maximum pumping capacity with the largest pumping unit out of service. Because of the complex interaction of service grinder pumps, the peak flows into each lift station were established as the maximum number of grinder pump cores operating simultaneously based on the sum of all low-pressure sewer customers upstream and the E-One maximum number of grinder pumps on **Figure 4-4.** A wet weather peaking factor of 3 was applied to all gravity flow to assess lift station wet weather capacity. **Table 4-4** summarizes the existing capacity of each lift station as well as the future peak wet weather flow that the lift station is projected to convey based on the current alignments of the existing wastewater system. Through the capital improvement project development process, proposed collection system improvements will re-route some flows resulting in higher projected peak flow rates at some lift stations and lower projected peak flow rates at other lift stations. Future lift station sizing will ultimately be based on the projected buildout flow rate. Lift stations in need of capacity improvements where the difference between the projected buildout flow rates greatly exceeds the projected 2033 flow rate will be recommended to be phased such that the wet well will be oversized for the planning year in order to accommodate future flows and an additional pump.

Table 4-4. Projected Average Day and Peak Wet Weather Flow into Lift Stations

Lift Station	Existing Firm Capacity (Total Capacity[2]) gpm	Projected Peak Wet Weather Flow gpm			
		2023	2028	2033	Buildout
17th	440 (880)	677	**889**	**948**	**2,671**
Alfalfa	528 (1,056)	88	104	141	429
Bar K	560 (1,120)	448	**593**	**769**	**1,663**
Destination Way	--[1]	0	0	0	100
Driving Range	1,414 (2,828)	692	1,066	1,165	**2,315**
High Dive	900 (1,800)	640	829	**915**	**1,689**
Lower Boone	450 (900)	125	125	138	225
MacArthur	560 (1,120)	267	293	307	475
Mira Lago	--[1]	13	50	50	169
Old Burnet Rd	600 (1,200)	0	0	0	100
Pool	--[1]	~0	~0	~0	~0
Santa Carlo	720 (1,440)	91	81	94	110
Tessera	320 (640)	188	251	**426**	**687**
The Cove	189 (378)	117	118	130	168
The Inn	261 (521)	130	155	155	157
Truman	249 (499)	176	192	204	**420**
Turner	2,220 (3,330)	660	707	884	1,971
Upper Boone	300 (600)	125	138	138	250
Veranda Walk	--[1]	38	244	363	1,367
Winn Ranch	--[1]	0	72	144	441
WWTP	1,680 (2,680)	2,005	**2,505**	**3,191**	**7,225**

(1) Pump Curve Unavailable

(2) Total Capacity presented herein is the sum of all individual, rated pump capacities.

Based on the growth projections described in **Section 2** and the projected wastewater flows described in **Section 3**, Lago Vista will have adequate WWTP capacity through the 2028 planning scenario assuming all flow continues to be conveyed to the existing plant. Around the 2027-2028 time period, the WWTP influent flow is projected to exceed the 75% rule that stipulates improvements to the WWTP must be in-design to accommodate future flows. Improvements to increase the WWTP's ability to treat up to 1.5 MGD on an annualized average daily flow basis would provide the buffer beyond the 2033 planning year. As the wastewater collection system continues to grow and receive more wastewater, the wastewater treatment plant will ultimately need to be able to treat 2.57 MGD of annualized average daily flow at system buildout. **Figure 4-10** illustrates the projected flows into the WWTP for the next 10 years.

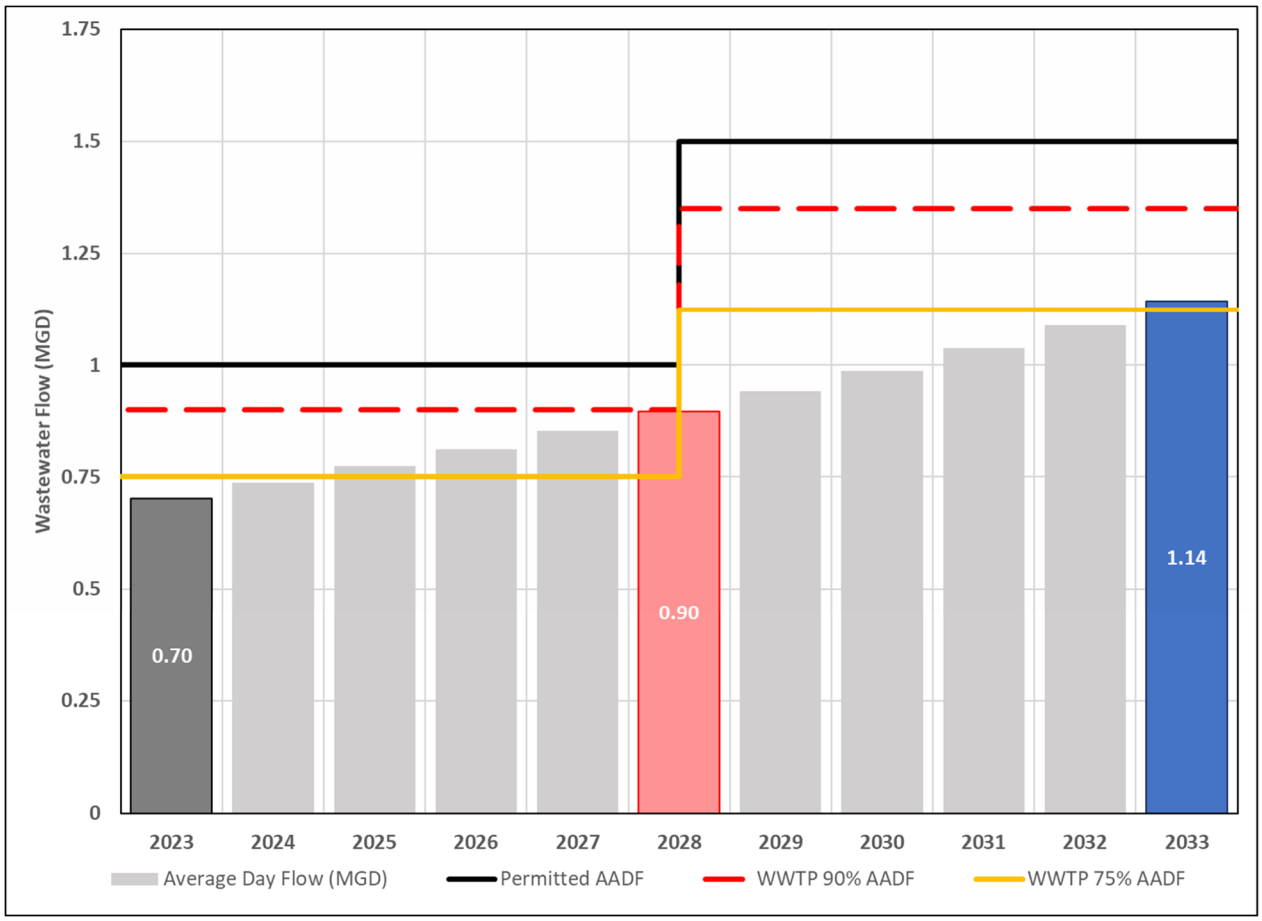

Figure 4-10. Projected Average Day Flow into the WWTP

4.2.3 Flow Monitoring Considerations

The model assessment described in the sections above are based on average day flows verified at the wastewater treatment plant. The loading of flows is based on billed wastewater customers' service location and assumed flow rates at a given time. Flows at intermediate locations throughout the collection system could not be validated due to the closed nature of the low-pressure collection system and minimal segments of gravity mains.

The low-pressure sewer collection system is a challenge to validate sewer flows; however, there are alternatives to validating flows elsewhere in the system. Options include SCADA monitoring at each lift station, deployment of in-pipe depth and velocity sensors in gravity sewer pipes as more gravity pipes are constructed, and pressure recorders on the low-pressure sewer mains. Monitoring of lift stations through SCADA will require a depth reading, pump on/off status, and the rate of flow being pumped out from each pump. A calculation from these parameters will give the City the ability to develop diurnal wastewater patterns for the service area that terminates at each lift station. Flow monitors in gravity pipes will only be available as more gravity sewer mains are installed in the collection system. Flow monitors in the existing sewer network would either be too heavily influenced by upstream lift station operations or collect flow from too small of a service area to be worthwhile for the expenditure of temporary flow monitoring. Pressure recorders may be placed on low-pressure sewer lines; however, this will only give a pressure reading that has to relate back to the number of grinder pumps on and a flow rate for each grinder pump.

5.0 LIFT STATION RISK BASED ASSESSMENT

As part of the Wastewater Master Plan, FNI performed a risk-based assessment (RBA) of all lift stations in the Lago Vista service area. The aim of the RBA was to help develop a more comprehensive CIP that includes both growth related improvements and renewal improvements.

Lago Vista operates and maintains 20 lift stations within the wastewater collection system. The first step in the RBA process involved site visits and condition assessments of all lift station facilities. FNI conducted lift station site visits with City staff on July 7 and 8, 2022. The site visit team was composed of master planning engineers, facility design engineers, electrical engineers, and utility staff. The team took photos of each site and collectively decided scores for each of the condition parameters before leaving the site. These condition scores allowed FNI to compile a list of renewal improvements that, alongside the capacity improvement recommendations, form a comprehensive CIP. Rehabilitation costs, by lift station, are summarized in **Figure 5-5**. These rehabilitation projects do not add additional capacity to the wastewater collection system and must be paid for from the utility fund rather than impact fees. Detailed cost sheets of renewal improvements for all lift stations are summarized in **Appendix B.** Rehabilitation costs of lift stations, without increasing the capacity of a lift station, are not impact fee eligible. The cost to rehabilitate lift stations will need to be funded from operations-related funds maintained by the utility.

In an RBA, an asset's condition score is used to represent its likelihood of failure. Condition parameters and scoring are based on a combination of physical data (e.g., material, age, field condition assessment, etc.), and operational data (maintenance history), which are used to develop a best estimate of the assumed condition of each component. A summary of condition scores and their definitions are presented in **Table 5-1**.

Table 5-1. Condition Assessment Scoring for Lift Station Components

Condition Rating	Scoring Guidelines
1	Very good condition: no improvements recommended to maintain function
2	Good condition: minor improvements recommended to maintain function
3	Fair condition: improvements recommended to improve performance or efficiency
4	Poor condition: improvements recommended to maintain reliability
5	Very poor condition: rehabilitation or replacement required

The lift station components and corresponding condition weighting used in the condition assessment are summarized in **Table 5-2**. The weighting factor was assigned to each component group based on its relative importance to the overall function of the lift station. During the site visit, the team took pictures and assigned a condition score to each parameter based on the visual inspection and operational history provided by Lago Vista staff.

Table 5-2. Condition Assessment Component Groups and Weighting

Component Group	Weight Factor
Pumps and Motors	20%
Electrical – MCC, Back-up Power, Cables	20%
Instrumentation – SCADA, Alarms	10%
Structure – Wet Well Walls, Top Slab, Hatches	20%
Piping and Valves	15%
Mechanical – Ventilation, Odor Control	10%
Site – Drainage, Access Drive, Security, Fencing	5%

An example lift station inspection sheet is shown on **Figure 5-1**. Completed inspection sheets for assessed lift stations can be found in **Appendix A.** Once the visual inspections were completed, ranges were developed for each category, based on the condition scores of individual components, to assign a category score from very good to very poor. The condition designation and corresponding condition score range are summarized in **Table 5-3**. During the inspections, it was observed that the existing on-site odor control Biocube™ systems were not being used. Staff noted the internal media is expensive and has not been refilled. Most of the lift station facility sites, as well as the pumps and motors were deemed to be in good condition. The overall lift station condition scores, as well as the lowest condition score and corresponding component, are summarized in **Table 5-4.**

Table 5-3. Condition Score Ranges

Condition Rating	Minimum	Maximum
Very Good	0.00	1.50
Good	1.51	2.50
Fair	2.51	3.00
Poor	3.01	3.50
Very Poor	3.51	5.00

Turner Lift Station

Inspection Date: 7/7/2022
Address: 5900 1/2 Lakeshore Drive Lago Vista Tx

Facility Information

Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	3
Total Capacity (Firm):	3,330 gpm (2,220 gpm)
Horsepower:	68.7
Monitoring:	
Generator:	

Scoring Guidelines

1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	4	20%	0.80	Utility CTs, weather heads, and conduit entering the main disconnect show signs of corrosion. ATS shows signs of water intrusion. MCC HMI is not functional, does not have as built drawings and/or one-lines and comms bucket is open and has a fan blowing on it due to overheating. Electrical room is full of storage items. Half of the light fixtures are not working properly. Conduits penetrating pull box shows signs of corrosion underneath. Most hardware for odor control system is completely corroded. Generator is not properly grounded. Generator tank shows signs of corrosion. Cable mounting hardware at wet wells show signs of minor corrosion.
Instrumentation - SCADA, Alarms	3	10%	0.30	Auto dialer is unplugged and unused. SCADA cabinet does not contain any drawings. Existing flow meter (DF868) is not online and it is not working.
Structure - Wet Well Walls, Top Slab, Hatches	4	20%	0.80	No safety grating. Corrosion on pump rails and wet well lining, especially near inflow. Corrosion/rust around hatch seals.
Piping and Valves	4	15%	0.60	Significant corrosion on valves in valve vault. Corrosion on discharge piping.
Mechanical - Ventilation, Odor Control	4	10%	0.40	Biocube odor control system not functioning at the site. No proper wet well ventilation (vertical vent has 5-gallon bucket placed over it). Breaker for odor control is flipped off. Aerators were installed in 2021.
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	Rust on fence barbed wire. Vegetation has enveloped small section of site fence. Manual gate looks in good condition. No cameras or door access.
Condition Rating	-	100%	**3.40**	

Site is 480Y/277V.
Arc flash labels are missing.
No cameras, manual gate, manual lock. Arc flash labels are missing.
Fats, oils, and grease are still an issue as LS serves nearby restaurants. This is moderated by the aerators installed in 2021.
Radio communications, there is fiber nearby but it is old.
Generator back up power, 250kW.
Complaints of odor from nearby residents.
Window AC unit for electrical room.

Figure 5-1. Example Lift Station Inspection Sheet

Table 5-4. Lift Station Condition Score Summary

Lift Station	Overall Condition Score	Overall Rating	Lowest Component Condition Rating	Lowest Rated Component(s)
17th Lift Station	2.50	Good	5	Piping and Valves
Alfalfa	2.05	Good	4	Mechanical
Bar K	3.10	Poor	4	Structure, Piping and Valves, Site
The Cove	2.50	Good	4	Site
Destination	2.60	Fair	4	Piping and Valves, Mechanical
Driving Range	2.10	Good	4	Site
High Drive	2.15	Good	3	Pumps and Motors
The Inn	3.00	Fair	4	Electrical, Instrumentation, Mechanical
Lower Boone	3.30	Poor	4	Pumps and Motors, Mechanical
MacArthur	3.55	Very Poor	5	Structure, Piping and Valves
Mira Lago	2.90	Fair	5	Electrical
Old Burnet Rd	2.85	Fair	4	Mechanical
Pool	1.75	Good	3	Mechanical
Santo Carlo	3.30	Poor	5	Mechanical
Tessera	2.25	Good	4	Mechanical
Truman	2.45	Good	3	Pumps and Motors, Electrical, Site
Turner	3.40	Poor	4	Electrical, Structure, Piping and Valves, Mechanical
Upper Boone	2.75	Fair	4	Mechanical
Veranda Walk	2.65	Fair	4	Electrical
WWTP	3.10	Poor	4	Instrumentation, Structure, Mechanical

Table 5-5. Lift Station Rehabilitation Projects Summary

Rehabilitation Priority Order	Lift Station	Estimated Rehabilitation Cost
1	MacArthur Lift Station Condition Rehabilitation	$82,500
2	Santa Carlo Lift Station Condition Rehabilitation	$97,500
3	Mira Lago Lift Station Condition Rehabilitation	$7,100
4	17th Lift Station Condition Rehabilitation(1)	$59,700
5	Turner Lift Station Condition Rehabilitation	$562,700
6	Bar K Lift Station Condition Rehabilitation(1)	$71,100
7	WWTP Influent Lift Station Condition Rehabilitation(1)	$258,400
8	The Inn Lift Station Condition Rehabilitation	$242,100
9	Lower Boone Lift Station Condition Rehabilitation	$97,100
10	Old Burnet Lift Station Condition Rehabilitation	$65,300
11	Destination Way Lift Station Condition Rehabilitation	$150,500
12	Upper Boone Lift Station Condition Rehabilitation	$13,400
13	Veranda Walk Lift Station Condition Rehabilitation	$7,100
14	Tessera Lift Station Condition Rehabilitation(2)	$18,000
15	Alfalfa Lift Station Condition Rehabilitation	$66,900
16	Driving Range Lift Station Condition Rehabilitation	$87,300
17	The Cove Lift Station Condition Rehabilitation	$15,200
18	Truman Lift Station Condition Rehabilitation	None
19	High Drive Lift Station Condition Rehabilitation(2)	None
20	Pool Lift Station Condition Rehabilitation	None

(1) 5-Year CIP Capacity Improvement
(2) 10-Year CIP Capacity Improvement

6.0 WASTEWATER SYSTEM CAPITAL IMPROVEMENT PLAN

The recommended CIP improvements presented on **Figure 6-1** will provide the required capacity and reliability to meet projected peak flows through the buildout scenario. All of the recommended projects add capacity to the wastewater collection system and are eligible for impact fees. Locations shown for new pipelines and other recommended improvements were generalized. Specific pipeline alignments and facility sites will need to be determined as part of the design process. All dollar values presented in this section can be assumed to be nominal values with a price base of 2023. If values are to be used in a year other than 2023, they should be adjusted for factors that affect nominal prices over time, as appropriate.

Using the collection system model to analyze the wastewater collection system, improvements were phased into the three planning periods in which they become necessary. Improvements to the capacity of the wastewater treatment plant and effluent pond are front-loaded in the proposed near-term (5-year) CIP. The existing deficiencies contribute to observed and model-predicted surcharging and sanitary sewer overflows and act as bottlenecks to providing wastewater service in future growth areas. Sewer main capacity improvements were biased toward gravity solutions, where possible, to more easily accommodate future growth. Because of the topography of the collection system service area, some gravity sewer main replacement alternatives are not possible. **Table 6-1** summarizes a Class 5 opinion of probable construction costs (OPCC) of the wastewater system CIP projects. Capital costs were calculated for the major sewer pipelines but do not include costs for individual service connections or internal subdivision lines. Additionally, fees associated with design, surveying, environmental studies, geotechnical studies, land acquisition, legal fees, etc. are not included In OPCCs. This OPCC is a prediction based on available information at the present time to represent a forecast of conditions at some point in the future. As such, an OPCC is necessarily an approximation and thus, has an inherent level of uncertainty. Unit prices and quantities associated with each line item shown in the OPCC are subject to some variability. In addition, most large-scale construction projects encounter cost requirements during bidding and/or construction that could not have been reasonably identified during the design phase. A 30% contingency cost was assigned to the unknowns in the definition of the project. It is intended to account for construction costs that have not yet been identified due to the project's maturity and should be expected to be fully used for construction. Detailed descriptions of the projects and their associated costs are included in **Appendix C**.

FIGURE 6-1
CITY OF LAGO VISTA
WASTEWATER CAPITAL IMPROVEMENT PLAN
LEGEND

- Road
- Water Body
- City Limit
- ETJ Boundary
- Semi-Public Land
- WWTP — Wastewater Treatment Plant
- LS — Lift Station
- Gravity Main
- Pressure Main
- Force Main

Growth Zone Boundary

1 2 3 4 5 6 7 8

CIP PROJECT

- Existing
- 2028
- 2033
- Buildout
- Extension

FREESE AND NICHOLS

CITY OF LAGO VISTA TEXAS

Growth Zone 6 · Growth Zone 7 · Growth Zone 8 · Growth Zone 3 · Growth Zone 5 · Growth Zone 4 · Growth Zone 2 · Growth Zone 1

Semi-Public Land

Tessera — New 687 gpm LS

Bar K — New 850 gpm LS — 850 gpm Expansion

WWTP — New 7,225 gpm LS

1.5 MGD WWTP Expansion (1) — Effluent Pond Liner Rehabilitation (2)

17th — New 712 gpm LS

Driving Range — New 2,315 gpm LS

High Dive — New 1,689 gpm LS

Truman — New 420 gpm LS

Veranda Walk — New 1,367 gpm LS

Pool · Turner · Alfalfa · Old Burnet Rd · Destination Way · Upper Boone · Lower Boone · Santa Carlo · MacArthur · The Cove · The Inn · Mira Lago · Winn Ranch

Colorado River · Lake Travis · JONESTOWN · POINT VENTURE · LAKEWAY · BRIARCLIFF

0 1,400 2,800
SCALE IN FEET

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User Name: 02874

Table 6-1. Wastewater System Capital Improvements Capacity Projects Summary

Project No.	Project Name	Cost ($)
1	WWTP Expansion	$16,519,800
2	WWTP Effluent Pond Improvements	$2,514,400
3	24-inch Lakefront Drive Gravity Main Replacement	$1,467,000
4	Parliament Cove Gravity Main Replacement – Segment 1	$3,455,300
5	Patriot Drive 15-inch Gravity Main	$1,194,400
6	Highland Lake Drive 12-inch Gravity Main	$631,400
7	Twisting Trail Pressure Main Relief 18-inch Gravity Main	$2,134,800
8	High Drive/Outpost Trace Gravity Main	$1,953,300
9	Parliament Cove Gravity Main Replacement – Segment 2	$1,644,800
10	Tessera Pressure Main Replacement	$3,627,500
11	Miscellaneous Pressure Main Capacity Replacement	$3,209,100
12	New Bar K Lift Station	$1,997,400
13	New 17th Lift Station	$1,510,000
	Short Term (2020 – 2025) Total	**$41,859,200**
14	Patriot Drive Pressure Main Replacement	$812,600
15	Lower Boone Drive Pressure Main Replacement	$428,000
16	Rockwood Drive Pressure Main Replacement	$394,000
17	Bar K Ranch Road Pressure Main Replacement	$787,300
18	High Drive Lift Station Improvements and New Force Main	$3,829,700
19	Tessera Lift Station Improvements	$384,300
	Intermediate (2026 – 2030) Total	**$ 6,635,900**
20	New Influent WWTP Lift Station	$7,808,400
21	New Driving Range Lift Station and 16-inch Force Main	$6,575,100
22	National Drive 18-inch Gravity Main	$3,080,000
23	New Veranda Walk Lift Station and 12-inch Force Main	$4,383,200
24	Bar K Lift Station Expansion	$183,900
25	Timber Trail to Bar K Lift Station Gravity Main	$4,921,400
26	Lohman Ford Road to 17th Hole Lift Station Gravity Main	$5,251,900
27	Truman Lift Station Replacement Pumps	$180,900
28	Growth Zone 1 Buildout Pressure Main Replacement	$1,877,700
29	Growth Zone 2 Buildout Pressure Main Replacement	$811,100
30	Growth Zone 3 Buildout Pressure Main Replacement	$4,002,400
31	Growth Zone 4 Buildout Pressure Main Replacement	$578,800
32	Growth Zone 5 Buildout Pressure Main Replacement	$572,400
33	Growth Zone 7 Buildout Pressure Main Replacement	$903,000
34	Growth Zone 8 Buildout Pressure Main Replacement	$1,256,700
	Long Term (2031 – 2040) Total	**$ 42,386,900**
	Wastewater Capital Improvement Plan Total	**$ 90,882,000**

6.1.1 2023 through 2028 Wastewater System Improvements

The timing of projects is based on projected demands. Some projects may be initiated sooner than indicated because of development pressure or rehabilitation urgency.

1. WWTP Expansion

   This project expands the existing wastewater treatment plant's annual average daily flow capacity from 1.0 MGD to 1.5 MGD and peak 2-hour peak flow discharge to 6.0 MGD. In the expansion, the effluent quality is to remain as Type 2 discharge per TAC Chapter 217. This cost estimate is inclusive of project contingency, basic engineering cost, as well as construction inspection and services costs. The improvements to the WWTP are an estimate based on the assumption that some existing process units and structures are suitable for use. Condition and potential structural damage to existing process units may result in higher cost estimates for the WWTP expansion. In addition to treatment plant improvements, three1,500 gpm pumps are recommended to fill the one existing blank slot in the influent wet well and replace the two existing 600 gpm pumps. The increased capacity at the influent lift station will be able to accommodate peak flows beyond the projected 2033 planning period. This project is needed as the City is approaching 75% of the permitted average daily flow. The City will need to be in the design of a WWTP expansion once a 3-month average daily flow reaches 90% of the permitted effluent flow rate.

2. WWTP Effluent Pond Improvements

   This project consists of repairs to the Effluent Pond No. 17 and improvements to the Effluent Pond No. 2. Improvements to the ponds will consist of an expansion in storage capacity at Pond No. 2, rehabilitation of the concrete basin at Pond No. 17, and the replacement of a new HDPE and geotextile liner at Pond No. 17. Cracks in the liner of Pond No. 17 are cause for replacement. While dewatered, inspection of the concrete and underdrain system will justify any potential need for additional rehabilitation efforts. Improvements to Pond No. 2's storage capacity will provide the excess capacity to serve as bypass storage when Effluent Pond No. 17 is being repaired as well as bypass storage for any future cleaning and maintenance required at Pond No. 17.

3. 24-inch Lakefront Drive Gravity Main Replacement

   This project includes a 24-inch gravity sewer line beginning at Arrowhead Point and ending at the existing Driving Range LS. The proposed gravity main is needed to relieve existing capacity deficiencies as determined by the existing system analysis. The existing 8-inch has significant grade, however the main is undersized to receive flow from High Drive LS and has a history of sanitary sewer overflows along Lakefront Drive. This main will be sized to accommodate buildout flows from Growth Zone 1 as well as some flows redirected from Growth Zone 2.

4. Parliament Cove Gravity Main Replacement - Segment 1

   This project consists of a 24-inch gravity sewer line to replace an existing 12-inch sewer along Parliament Cove, ending at the existing High Drive LS. The existing 12-inch sewer main along Parliament Cove has a history of sanitary sewer overflows. The overflows are due in part to the sewer main being undersized and also in part to a low-lying manhole. The increased size of the sewer main will increase the conveyance capacity in the pipe and relieve the area of localized capacity constraints identified in the existing system analysis. This project will be sized for buildout flows in Growth Zone 1.

5. Patriot Drive 15-inch Gravity Main

   This project consists of a 15-inch gravity sewer line to replace an existing 12-inch sewer along Parliament Cove, ending at the existing High Drive LS. The existing 12-inch sewer main along Parliament Cove has a history of sanitary sewer overflows. The overflows are due in part to the sewer main being undersized and also in part to a low-lying manhole. The increased size of the sewer main will increase the conveyance capacity in the pipe and relieve the area of localized capacity constraints identified in the existing system analysis. This project will be sized for buildout flows in Growth Zone 1.

6. Highland Lake Drive 12-inch Gravity Main

   This project includes a 12-inch gravity sewer line that receives flow from the Inn LS and directs flow to the MacArthur LS. The proposed gravity main increases the conveyance capacity to MacArthur LS and relieves existing capacity deficiencies, as determined by the existing system analysis. The existing 10-inch and 6-inch gravity main on Highland Lake Drive are low lying, with little excess ground cover. As such, the risk of sanitary sewer overflows is

high in the event of minor surcharge. Sewer flow can be contained within the pipe if the pipe size is increased.

7. Twisting Trail Pressure Main Relief 18-inch Gravity Main

   This project includes an 18-inch gravity sewer line beginning at Twisting Trail and National Drive and ending at the existing Driving Range LS. The proposed gravity main is needed to relieve existing capacity deficiencies in the low-pressure sewer mains along Twisting Trail as determined by the existing system analysis. This main will be sized to accommodate buildout flows from part of Growth Zone 2 and all of Growth Zone 4 to be serviced by a future extension of the 18-inch sewer line along National Drive (Project #22).

8. High Drive/Outpost Trace Gravity Main

   This project includes a 12-inch gravity sewer line beginning at Outpost Trace and Oak Dale Drive and ending at the existing High Drive LS. The proposed gravity main redirects flow to relieve existing capacity deficiencies in the downstream low-pressure sewer mains as determined by the existing system analysis. This main will be sized to accommodate buildout flows from part of Growth Zone 2.

9. Parliament Cove Gravity Main Replacement – Segment 2

   This project includes segments of 15-inch and 12-inch gravity sewer lines beginning at American Drive and Boggy Ford Road and ending at the upstream end of Project #4. The proposed gravity mains receive flow from the buildout of the lower portion of Growth Zone 1. The need for this project was determined from the existing system analysis and will be sized for buildout flows. This project is dependent upon the construction of Project #4.

10. Tessera Pressure Main Replacement

    This project line item is a package of short segments of low-pressure wastewater lines in the collection system of the Tessera development to improve capacity. The projects consist of upsizing sewer lines ranging from 2-inches to 3-inches throughout the development. The recommendation to replace pressure pipes with larger diameter pipes will reduce maximum velocities in a maximum pump-on scenario. This project is not impact fee eligible as many of the areas where pipes are recommended to be replaced are fully built out. The recommended improvements will need to be financed by an internal utility fund.

11. Miscellaneous Pressure Main Capacity Replacement

    This project line item is a package of short segments of low-pressure wastewater lines in various parts of the collection system to improve capacity. The projects consist of sewer lines ranging in size from 2-inches to 6-inches throughout the service area. The recommendation to replace pressure pipes with larger diameter pipes will reduce maximum velocities in a maximum pump-on scenario.

12. New Bar K Lift Station

    This project includes a new wet well at the existing Bar K location and improves the pumping capacity to 850 gpm. Additional capacity is required to accommodate future flows. This project is dependent upon growth in Growth Zones 6, 7 and 8.

13. New 17th Lift Station

    This project includes a new wet well at the existing 17th hole lift station location and improves the pumping capacity to 712 gpm. Additional capacity is required to accommodate future flows. This project is dependent upon growth in Growth Zone 6.

6.1.2 2029 through 2033 Wastewater System Improvements

14. Patriot Drive Pressure Main Replacement

    This project includes a 6-inch low-pressure sewer main beginning at Redbird Drive and Blue Jay Boulevard and ties into the proposed 15-inch gravity main of Project #7. The proposed pressure main accommodates buildout flows as a result from growth in Growth Zone 1. A gravity main could not be installed in place of the proposed pressure main due to the ground topography.

15. Lower Boone Drive Pressure Main Replacement

    This project includes a 4-inch low-pressure sewer main beginning at Boone Drive and Continental Drive and ties into the existing Lower Boone LS. The proposed pressure main accommodates buildout flows in the Lower Boone LS service area. A gravity main could not be installed in place of the proposed pressure main due to the ground topography.

16. Rockwood Drive Pressure Main Replacement

    This project includes a 3-inch low-pressure sewer main beginning at Boone Drive and Continental Drive and ties into the existing Lower Boone LS. The proposed pressure main

accommodates buildout flows in the Lower Boone LS service area. A gravity main could not be installed in place of the proposed pressure main due to the ground topography.

17. Bar K Ranch Road Pressure Main Replacement

    This project includes 6-inch and 4-inch low-pressure sewer mains along Bar K Ranch Road. The proposed pressure main project accommodates buildout flows generated from Growth Zone 8 and will be needed as more customers begin to populate the area. A gravity main could not be installed in place of the proposed pressure main due to the ground topography.

18. High Drive Lift Station Improvements and New Force Main

    This project includes a new lift station at the existing High Drive LS location to improve the pumping capacity to 1,689 gpm and replace the existing force main with a 12-inch force main. The design flow rate will accommodate projected buildout flow. This project is dependent upon growth in Growth Zones 1 and 2.

19. Tessera Lift Station Improvements

    This project includes a replacement of pumps at the existing Tessera LS to improve the pumping capacity to 687 gpm. A force main improvement from the Tessera LS is currently under design and will provide adequate capacity for the future flows from the lift station. The design flow rate will accommodate projected buildout flow. This project is dependent upon the buildout of the Tessera development. The projected capacity of this lift station will be dependent upon request for wastewater service connection within the ETJ, should an expansion of the ETJ and CCN be considered.

6.1.3 Buildout Wastewater System Improvements

20. New Influent WWTP Lift Station

    This project consists of a new 7,225 gpm influent lift station at the existing WWTP. A newly constructed wet well, pumps, and piping are required to accommodate future projected buildout peak wet weather flows.

21. New Driving Range Lift Station and 16-inch Force Main

    This project consists of a new 2,315 gpm Driving Range LS and associated 16-inch force main. This project is required to accommodate buildout of Growth Zones 1, 2, and 4.

22. National Drive 18-inch Gravity Main

    This project includes segments of 18-inch and 12-inch gravity sewer lines beginning at Boggy Ford Road and connects to the upstream end of the proposed 18-inch sewer main of Project #4. This project is dependent upon the buildout of the proposed Winn Ranch as well as the buildout of Growth Zone 4.

23. New Veranda Walk Lift Station and 12-inch Force Main

    This project consists of a new 1,367 gpm Veranda Walk LS and associated 12-inch force main. The proposed 12-inch force main disconnects local low-pressure sewer connections, so additional 3-inch and 4-inch pressure pipe will be required to reconnect existing pressure sewer customers. This project is dependent upon the buildout of the Winn Ranch development as well as Growth Zone 4. It was assumed the Winn Ranch development sewer customers would be served by a low-pressure sewer system. Should the development be served by a gravity sewer system, the future capacity of the proposed Veranda Walk improvement should be increased to accommodate additional foul flow from wet weather events.

24. Bar K Lift Station Expansion

    This project consists of adding an additional pump at the Bar K lift station in the empty pump slot created as a part of Project #11. This lift station expansion is necessary to accommodate peak flows generated from the buildout of Growth Zones 7 and 8.

25. Timber Trail to Bar K Lift Station Gravity Main

    This project includes segments of 18-inch, 15-inch, and 12-inch gravity sewer lines beginning near Bar K Ranch Road and FM 1431 and connects to the improved Bar K LS of Project #11. This project is largely dependent upon the buildout of Growth Zone 8. This project may be split into two segments, should Growth Zone 7 buildout quicker than Growth Zone 8.

26. Lohman Ford Road to 17th Hole Lift Station Gravity Main

    This project includes segments of 18-inch and 12-inch gravity sewer lines beginning at Lohmans Ford Road and ending at the 17th. This project is dependent upon the buildout of the proposed Villas at Keegans Crossing as well as the development of the 140-acre parcel across the street from the proposed development.

27. Truman Lift Station Replacement Pumps

    This project consists of the replacement pumps at Truman LS to bring the capacity of the lift station to 420 gpm. This improvement is necessary as peak flows increase in the buildout planning period. Considerations for improvements to the wet well and piping should be made upon replacement of the pumps as the condition of the components may deteriorate until this project is required and may necessitate replacement.

28. Growth Zone 1 Buildout Pressure Main Replacement

    This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 1. The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

29. Growth Zone 2 Buildout Pressure Main Replacement

    This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 2. The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

30. Growth Zone 3 Buildout Pressure Main Replacement

    This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 3. The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

31. Growth Zone 4 Buildout Pressure Main Replacement

    This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 4. The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

32. Growth Zone 5 Buildout Pressure Main Replacement

    This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 5. The timing of the pressure main

replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

33. Growth Zone 7 Buildout Pressure Main Replacement

    This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 7. The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

34. Growth Zone 8 Buildout Pressure Main Replacement

    This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 8. The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

APPENDIX A
Lift Station Site Visit Inspection Sheets

Turner Lift Station

Inspection Date: 7/7/2022
Address: 5900 1/2 Lakeshore Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	3
Total Capacity (Firm):	3,330 gpm (2,220 gpm)
Horsepower:	68.7
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	4	20%	0.80	Utility CTs, weather heads, and conduit entering the main disconnect show signs of corrosion. ATS shows signs of water intrusion. MCC HMI is not functional, does not have as built drawings and/or one-lines and comms bucket is open and has a fan blowing on it due to overheating. Electrical room is full of storage items. Half of the light fixtures are not working properly. Conduits penetrating pull box shows signs of corrosion underneath. Most hardware for odor control system is completely corroded. Generator is not properly grounded. Generator tank shows signs of corrosion. Cable mounting hardware at wet wells show signs of minor corrosion.
Instrumentation - SCADA, Alarms	3	10%	0.30	Auto dialer is unplugged and unused. SCADA cabinet does not contain any drawings. Existing flow meter (DF868) is not online and it is not working.
Structure - Wet Well Walls, Top Slab, Hatches	4	20%	0.80	No safety grating. Corrosion on pump rails and wet well lining, especially near inflow. Corrosion/rust around hatch seals.
Piping and Valves	4	15%	0.60	Significant corrosion on valves in valve vault. Corrosion on discharge piping.
Mechanical - Ventilation, Odor Control	4	10%	0.40	Biocube odor control system not functioning at the site. No proper wet well ventilation (vertical vent has 5-gallon bucket placed over it). Breaker for odor control is flipped off. Aerators were installed in 2021.
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	Rust on fence barbed wire. Vegetation has enveloped small section of site fence. Manual gate looks in good condition. No cameras or door access.
Condition Rating	-	100%	**3.40**	

Site is 480Y/277V.
Arc flash labels are missing.
No cameras, manual gate, manual lock. Arc flash labels are missing.
Fats, oils, and grease are still an issue as LS serves nearby restaurants. This is moderated by the aerators installed in 2021.
Radio communications, there is fiber nearby but it is old.
Generator back up power, 250kW.
Complaints of odor from nearby residents.
Window AC unit for electrical room.

WWTP Lift Station

Inspection Date: 7/7/2022
Address: 5206 1/2 Country Club Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	4
Total Capacity (Firm):	
Horsepower:	10
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	No MCC drawings. Outdoor Electrical room lights are not functional. Electrical room seems to be used as storage a ladder is located within the working space of the MCC. Multiple pull boxes and condulets are missing covers. No panel schedules.
Instrumentation - SCADA, Alarms	4	10%	0.40	No SCADA drawings. SCADA cabinet at LS has major corrosion. Flygt control system
Structure - Wet Well Walls, Top Slab, Hatches	4	20%	0.80	Significant corrosion on pump rails and wet well lining, especially near inflow. Corrosion/rust/deterioration around hatch seals. Safety grating in fair condition.
Piping and Valves	3	15%	0.45	Some corrosion on valves and piping in valve vault. Corrosion on discharge piping.
Mechanical - Ventilation, Odor Control	4	10%	0.40	No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper wet well ventilation (vertical vent is capped). Breaker for odor control is flipped off.
Site - Drainage, Access Drive, Security, Fencing	1	5%	0.05	Automatic gate and security cameras with key card access control. Radio communications but fiber nearby.
Condition Rating	-	100%	**3.10**	

Pole mounted transformer rack.
Arc flash labels are missing.
Odor control cube is not functional.
Radio communications, recently installed a 50'-0" antenna.
Generator back up power, 350kW. Located indoors with motorized roll up doors.

17th Lift Station

Inspection Date: 7/7/2022
Address: 21200 Greenshore Cove Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	880 gpm (440 gpm)
Horsepower:	5
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	A lot of debris in wet well (miscellaneous materials/plastics), but no problems with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	2	20%	0.40	Main disconnect mounting hardware shows signs on minor corrosion. Electrical equipment appears in good conditions. Canopy appears to have major corrosion. Cable mounting hardware at wet wells show signs of minor corrosion.
Instrumentation - SCADA, Alarms	1	10%	0.10	Flygt control system Radio communication.
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	No safety grating. Minor corrosion on pump rails. Hatches in good condition. Wet well walls/lining in fair condition.
Piping and Valves	5	15%	0.75	Severe corrosion on piping and valves in valve vault. Minor corrosion on wet well piping.
Mechanical - Ventilation, Odor Control	2	10%	0.20	No odor control at the site; crews indicated there is no motivation to add order control at this time. Wet well has vent in fair condition. Breaker for odor control is flipped off.
Site - Drainage, Access Drive, Security, Fencing	1	5%	0.05	Manual gate. No security cameras or access controls. Gravel access road is very uneven. May be difficult to access with vehicle in adverse weather conditions.
Condition Rating	-	100%	**2.50**	

Site is 480Y/277V. Underground utility feed.
Arc flash labels are missing.
Radio communications.
No back up power. Not a major issue during power outages.
Odor control cube not functional but smell is not major complaint.
A lot of debris in wet well.

Driving Range Lift Station

Inspection Date: 7/7/2022
Address: 21409 Lakefront Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	2,828 gpm (1,414 gpm)
Horsepower:	47
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	2	20%	0.40	Utility meter pole mounted on an inaccessible location. Generator enclosure shows signs of corrosion. Two motor controllers located outside under a canopy. Canopy in good condition. Termination box shoes minor sounds of corrosion. Light inside motor controller not functional. site light fixture is broken and not functional. Cable mounting hardware at wet wells show signs of minor corrosion.
Instrumentation - SCADA, Alarms	2	10%	0.20	Radio antenna not plugged into anything.
Structure - Wet Well Walls, Top Slab, Hatches	2	20%	0.40	Safety grating in good condition. Minor lining corrosion near wet well hatches. Wet well lining and pump rails in good condition. One wet well hatch has broken (rusted) handle.
Piping and Valves	2	15%	0.30	Minor corrosion on wet well discharge piping and on piping/valves in valve vault. Valve vault has concrete bottom instead of rock bottom, and is holding water.
Mechanical - Ventilation, Odor Control	2	10%	0.20	No odor control at the site; crews indicated there is no motivation to add order control at this time. Wet well has vent in good condition.
Site - Drainage, Access Drive, Security, Fencing	4	5%	0.20	Site has miscellaneous equipment/debris near site fence. Fence is in poor condition with barbed wire knocked down in some areas. Fence enveloped by vegataion in multiple areas. Non-Automatic motorized gate - key pad. No cameras. Motorized gate chain shows signs of major corrosion.
Condition Rating	-	100%	**2.10**	

Site is 480Y/277V. Utility pole in poor condition.
Arc flash labels are missing.
Radio communications.
Generator back up power, 125kW.
Lights do not switch off.

High Dive Lift Station

Inspection Date: 7/7/2022
Address: 21649 High Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	1,800 gpm (900 gpm)
Horsepower:	15
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	3	20%	0.60	Crews reported Pump #2 sometimes overheats and automatically shuts off. Crew member has to come to site to manually turn pump back on (approximately once a month).
Electrical – MCC, Back-up Power, Cables	2	20%	0.40	Generator shows signs on minor corrosion. Generator enclosure latch is loose. One motor starter in ATS under electrical canopy in good condition. Minor water intrusion in ATS. Service disconnect is mounted on utility pole next to utility meter. Conduits show signs of minor corrosion. Pull box shows signs on minor corrosion. Flygt system. Motor controller shows signs of water intrusion and corrosion. Outdoor light not in functional condition. main disconnect is locked. Cable mounting hardware at wet wells show signs of minor corrosion.
Instrumentation - SCADA, Alarms	2	10%	0.20	High level float.
Structure - Wet Well Walls, Top Slab, Hatches	2	20%	0.40	No safety grating, despite deep wet well. Hatches in good condition. Wet well and components in good condition.
Piping and Valves	2	15%	0.30	Minor corrosion on valve vault piping. Valves in good condition.
Mechanical - Ventilation, Odor Control	2	10%	0.20	No odor control at the site; crews indicated there is no motivation to add order control at this time. Wet well has vent in good condition.
Site - Drainage, Access Drive, Security, Fencing	1	5%	0.05	Metal fence with two gates. No security camera or access
Condition Rating	-	100%	**2.15**	

Site is 480Y/277V. Utility pole in poor condition.
Arc flash labels are missing.
Radio communications.
Generator back up power, 80kW.
Very deep wet well. Staff noted previous effort to clean cost $10k.
Staff suggested 3'rd rail could house agitator.

Truman Lift Station

Inspection Date: 7/7/2022
Address: 2809 Patriot Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	499 gpm (249 gpm)
Horsepower:	3.9
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	3	20%	0.60	Crews reported Pump #2 sometimes overheats and automatically shuts off. Crew member has to come to site to manually turn pump back on.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	Main disconnect shows signs of minor corrosion. One motor controller located outside with no canopy. No back up power. Major water intrusion inside motor controller. Light switch broken no maintenance pad for ease of access to electrical equipment. Cable mounting hardware at wet wells show signs of minor corrosion.
Instrumentation - SCADA, Alarms	2	10%	0.20	High and Low level float. Typically only utilize high level. SCADA screen is functional.
Structure - Wet Well Walls, Top Slab, Hatches	2	20%	0.40	No safety grating. Hatches in good condition. Wet well and components in good condition. Precast wet well cylinders installed slightly offset.
Piping and Valves	2	15%	0.30	Minor corrosion in valve vault.
Mechanical - Ventilation, Odor Control	2	10%	0.20	No odor control at the site; crews indicated there is no motivation to add order control at this time. Wet well has vent in good condition.
Site - Drainage, Access Drive, Security, Fencing	3	5%	0.15	Site fence showing age. Barbed wire misplaced in some areas. Vegetation interfering with fence in one area. Manual gate, no security cameras or access controls.
Condition Rating	-	100%	**2.45**	

Site is 480Y/277V. Underground utility feed.
Arc flash labels are missing.
Radio communications.
No back up power. Not a major issue during power outages.

Santa Carlo Lift Station

Inspection Date: 7/7/2022
Address: 21203 Santa Carlo Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	1,440 gpm (720 gpm)
Horsepower:	
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	One motor controlled enclosure mounted under a canopy. Canopy shows signs of rust. Electrical rack hardware shows major signs of corrosion as well as other mounting hardware Motor controller enclosure shows signs of water intrusion. No light maintenance vault opening located right in front of electrical rack. Inconvenient for maintenance. Cable mounting hardware at wet wells show signs of minor corrosion.
Instrumentation - SCADA, Alarms	3	10%	0.30	Have communication issues. Site should be on auto dialer but there is an antenna and radio on site.
Structure - Wet Well Walls, Top Slab, Hatches	4	20%	0.80	Asphalt supporting wet well top slab has sunk, creating a gap between. No safety grating. Concrete is deteriorating at the pump rail connection to top slab. Missing nut on pump rail connection to top slab. Pump rails in good condition. Valve vault hatch has significant rust/corrosion. Wet well lining corroded near hatch.
Piping and Valves	4	15%	0.60	Significant corrosion on piping/valves in valve vault. Some corrosion on wet well discharge piping.
Mechanical - Ventilation, Odor Control	5	10%	0.50	No odor control at the site; crews indicated there is no motivation to add order control at this time. Wet well has vent in imminent failure condition (rust and corrosion).
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	Manual gate, no security cameras or access controls
Condition Rating	-	100%	**3.30**	

Site is 120/240V. Underground utility feed. Utility meter requires some landscaping.
Arc flash labels are missing.
Radio communications.
No back up power. Not a major issue during power outages.
Staff suggested manhole overflowing on Highland Drive, near MacArthur LS, overflows caused by Santo Carlo LS.

The Inn Lift Station

Inspection Date: 7/7/2022
Address: 1906 1/2 American Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	521 gpm (261 gpm)
Horsepower:	5
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	4	20%	0.80	One motor controller enclosure located outside with no canopy. There is not enough working space clearance between the generator and ATS, 32". Generator is not in good condition and does not run well. ATS is also not in good condition and often have issues with it. Enclosure and tank show signs of corrosion. Motor controller enclosure shows signs of major corrosion and water intrusion.
Instrumentation - SCADA, Alarms	4	10%	0.40	No SCADA. No alarms.
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	No safety grating. Some deterioration of wet well exterior near the top. Pump rails, hatch, wet well interior in good condition. Pump rails connected directly to discharge piping.
Piping and Valves	2	15%	0.30	No valve vault. Minor rust on valves/valve piping.
Mechanical - Ventilation, Odor Control	4	10%	0.40	No odor control at the site; crews indicated there is no motivation to add order control at this time. No ventilation.
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	manual gate, no security cameras or access controls. Fencing shows minors signs of corrosion
Condition Rating	-	100%	**3.00**	

Site is 480Y/277V. Underground utility feed.
Arc flash labels are missing.
Generator backup power, 25kW. This site is a concern during power outages due to proximity to the water.
Odor control cube not functional. Have minor odor control issues.

MacArthur Lift Station

Inspection Date: 7/7/2022
Address: 20901 Highland Lakes Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	1,120 gpm (560 gpm)
Horsepower:	15
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	3	20%	0.60	No operational issues with pumps/motors indicated. Crews keep this lift station at a low "high mark" setting to provide extra protection from effluent reaching nearby creek; this is causing the pumps to operate on a very short pump cycle time. Crews have to occasionally break up debris/FOG in wet well with water hose/sprinkler.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	One motor controller mounted on the back of a wall with no canopy. Wooden structure not in good conditions. There is some lights behind structure but there no power anymore. Have issues with all power outlets. Utility meter an inconvenient location. Need major tree trimming. No site lighting. have issues with maintenance at night. signs of corrosion on electrical equipment mounting hardware. step down transformer shows signs of major corrosion.
Instrumentation - SCADA, Alarms	2	10%	0.20	Radio communication. Only use high level floats. Valve position broken. SCADA screen is responsive Control schematics mislabeled "Bar K"
Structure - Wet Well Walls, Top Slab, Hatches	5	20%	1.00	No safety grating. Significant corrosion of wet well ceiling near hatch. One pump rail had its bolts sheared off and fell into the wet well. Deterioration in top slab concrete near hatch. Corrosion on pump rail and wet well lining. Wet well hatch in good condition. Valve vault hatch in poor condition with significant rust/corrosion.
Piping and Valves	5	15%	0.75	Significant corrosion on wet well discharge piping and piping/valves in valve vault. Staff suspects the backflow preventer is not operating.
Mechanical - Ventilation, Odor Control	3	10%	0.30	No odor control at the site; crews indicated there is no motivation to add order control at this time. Makeshift ventilation.
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	Minor vegetation interferance with site fence. manual gate with no security cameras and no access controls.
Condition Rating	-	100%	**3.55**	

Site is 480Y/277V. Underground utility feed.
Arc flash labels are missing.
In the process of updating radios.
No back up Power.
Odor control cube not functional. Have minor odor control issues. Need to replace cube medium but it is too pricey.
Wall built for overflow.
LS short cycles: 40 seconds on, 10 seconds off continously.
LS cycles set short as to not overflow upstream gravity mains into the lake.

The Cove Lift Station

Inspection Date: 7/7/2022
Address: 2705 1/2 Highland Lake Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	378 gpm (189 gpm)
Horsepower:	7.4
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	Pull box shows signs on water intrusion and corrosion LS opening right in front of electrical rack. Inconvenient for maintenance. Major debris intrusion in motor controller enclosure. Main disconnect is locked and shows signs of minor corrosion. One motor controller enclosure with no canopy. Cable mounting hardware at wet wells show signs of minor corrosion.
Instrumentation - SCADA, Alarms	2	10%	0.20	Floats tend to get stuck on solenoids. Typically only use high level floats/alarms. Have 4 floats and one pressure probe. SCADA screen is responsive
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	Pump rails in good condition, one bolt/nut at pump rail/top slab connection needs to be replaced. No safety grating. Minimal liner deterioration near wet well hatch. Hatches in good condition. Manual gate, no security cameras or access controls.
Piping and Valves	2	15%	0.30	Piping and valves in good-fair condition. One of the two check valves has recently been replaced.
Mechanical - Ventilation, Odor Control	2	10%	0.20	No odor control at the site; crews indicated there is no motivation to add order control at this time. Ventilation in good condition.
Site - Drainage, Access Drive, Security, Fencing	4	5%	0.20	Landscaping hazard within site. Fence enveloped by vegetation, affecting fence integrity. Manual gate, no security cameras or access controls.
Condition Rating	-	100%	**2.50**	

Site is 480Y/277V. Underground utility feed.
Arc flash labels are missing.
In the process of updating radios.
No back up Power.
Check valves recently replaced.

Tessera Lift Station

Inspection Date: 7/8/2022
Address: 8010 1/2 Tessera Pkwy Lago Vista Tx

Facility Information

Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	640 gpm (320 gpm)
Horsepower:	
Monitoring:	
Generator:	

Scoring Guidelines

1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	2	20%	0.40	Minor corrosion on cable mounting hardware. One motor controller under a canopy mounted, minor debris inside panel. Generator in good condition. Main disconnect located behind generator. Not a good location. Burnt mark inside terminal/pull box and signs of corrosion
Instrumentation - SCADA, Alarms	1	10%	0.10	Radio communications. SCADA screen not responsive.
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	No safety grating. Hatches in good condition. Some corrosion on pump rails, one needs bolt replacment at connection to wet well hatch. Electrical wiring hanger in wet well has loose bolts.
Piping and Valves	2	15%	0.30	Valve vault in good condition. Minor corrosion on wet well discharge piping and in valve vault.
Mechanical - Ventilation, Odor Control	4	10%	0.40	No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation.
Site - Drainage, Access Drive, Security, Fencing	1	5%	0.05	Manual gate, no security cameras or access controls.
Condition Rating	-	100%	**2.25**	

Site is 480Y/277V. Underground utility feed.
Arc flash labels are missing.
Radio communications.
Generator back up power, 102kW.

Pool Lift Station

Inspection Date: 7/8/2022
Address: 8012 Bar K Ranch Road Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	
Horsepower:	5
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	1	20%	0.20	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	2	20%	0.40	No maintenance light. One motor controller enclosure not under a canopy. Minor rust on electrical equipment and cable hardware. No back up power Unable to locate main disconnect.
Instrumentation - SCADA, Alarms	1	10%	0.10	Auto dialer communications - no radio
Structure - Wet Well Walls, Top Slab, Hatches	2	20%	0.40	No safety grating. Wet well walls, hatch, pump rails in good condition.
Piping and Valves	2	15%	0.30	Wet well piping in good condition. Valve vault piping and valves in fair condition.
Mechanical - Ventilation, Odor Control	3	10%	0.30	No odor control at the site; crews indicated there is no motivation to add order control at this time. No ventilation.
Site - Drainage, Access Drive, Security, Fencing	1	5%	0.05	Manual gate. Extra tall fence. No security cameras or access controls.
Condition Rating	-	100%	**1.75**	

Site is 480Y/277V. Underground utility feed.
Arc flash labels are missing.
No back up power, no issues with power outages at this site because it's small.
LS is more a supplemental to hydraulics system. Only used seasonally.

Bar K Lift Station

Inspection Date: 7/8/2022
Address: 21502 1/2 Paseo De Vaca Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	1,120 gpm (560 gpm)
Horsepower:	15
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	Electrical equipment mounting hardware shows signs of major corrosion. Motor controller shows signs of minor water intrusion. No backup power at this site but have issues when there is a power outage. One motor controller located outside with no canopy.
Instrumentation - SCADA, Alarms	3	10%	0.30	Radio communications but constantly have communication losses and need to reset themselves.
Structure - Wet Well Walls, Top Slab, Hatches	4	20%	0.80	Top slab connection to wet well wall is deteriorating, rebar is exposed and cracks have formed in wet well wall exterior. Two holes in wet well wall plugged with concrete cylinders (not air-tight). No safety grating, hatch in good condition. Major corrosion of wet well ceiling around hatch. Pump rails connected to discharge piping in good condition.
Piping and Valves	4	15%	0.60	Wet well discharge piping in poor condition due to corrosion. No valve vault. Valves and piping in fair condition.
Mechanical - Ventilation, Odor Control	2	10%	0.20	No odor control at the site; crews indicated there is no motivation to add order control at this time. Ventilation in good condition.
Site - Drainage, Access Drive, Security, Fencing	4	5%	0.20	Site fence in fair condition, barbed wire rusted and misplaced in some areas. Manual gate, no security cameras or access controls. Fence shows signs of corrosion.
Condition Rating	-	100%	**3.10**	

Site is 480Y/277V. Main disconnect mounted on utility pole next to meter.
Arc flash labels are missing.
Radio communications.
No back up power. Not a major issue during power outages.
Site adjacent to drainage ditch, though staff indicated the LS has no history of flooding.

Old Burnet Rd Lift Station

Inspection Date: 7/8/2022
Address: 19201 1/2 Old Burnet Road Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	1,200 gpm (600 gpm)
Horsepower:	23
Monitoring:	Yes
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated. Thick layer of solid FOG/debris in wet well; crews break this up with water hose/sprinkler.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	One motor controller located under a canopy. Motor controller shows signs of minor water intrusion. ATS and generator both show signs of wasps nests. Pull box show signs of water intrusion. Generator is not functional but have not had issues with power outages in this area.
Instrumentation - SCADA, Alarms	3	10%	0.30	Radio communications, SCADA screen not functional.
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	Safety grating in good condition. Wet well hatch in good condition. Pump rails showing corrosion in lower level. Wet well liner in good condition.
Piping and Valves	3	15%	0.45	Wet well discharge piping showing significant corrosion in some areas. Unable to assess valve vault; crew could not get valve vault hatch open while on site. Duct tape on pump rail.
Mechanical - Ventilation, Odor Control	4	10%	0.40	No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation.
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	Manual gate. No security cameras or access controls
Condition Rating	-	100%	**2.85**	

Site is 480Y/277V. Utility pole located inside the fence.
Arc flash labels are missing.
Radio communications.
Generator back up power, 100kW.
ATS enclosure was not fully closed when we arrived but was properly closed after the site visit.
Low inflow rate, long detention, and foaming at wet well surface.

Alfalfa Lift Station

Inspection Date: 7/8/2022
Address: 19700 Alfalfa Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	3
Total Capacity (Firm):	1,056 gpm (528 gpm)
Horsepower:	23
Monitoring:	Yes
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated. Aerator running in wet well to break up FOG/debris.
Electrical – MCC, Back-up Power, Cables	2	20%	0.40	One motor control enclosure has minor debris. Unsure about generator condition.
Instrumentation - SCADA, Alarms	3	10%	0.30	SCADA screen is not functional, could be do to overheating. There is a hole cut out by the pipping with what appears a signal cable.
Structure - Wet Well Walls, Top Slab, Hatches	1	20%	0.20	Safety grating, wet well lining, pump rails in great condition.
Piping and Valves	2	15%	0.30	Wet well piping in good condition. Minimal corrosion in valve vault. Valve vault piping and valves in good condition.
Mechanical - Ventilation, Odor Control	4	10%	0.40	No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation. Aerator installed in wet well.
Site - Drainage, Access Drive, Security, Fencing	1	5%	0.05	Site in good condition. Vegetation growing within fence in a couple places. manual gate, no security cameras or access controls.
Condition Rating	-	100%	**2.05**	

Site is 480Y/277V. Underground utility feed.
Arc flash labels are missing.
Radio communications.
Generator back up power, 100kW.
ATS enclosure was not fully closed when we arrived but was properly closed after the site visit.

Destination Way Lift Station

Inspection Date: 7/8/2022
Address: 5900 1/2 Destination Way Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	
Horsepower:	11
Monitoring:	Yes
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated. Thick layer of solid FOG/debris in wet well; crews break this up with water hose/sprinkler.
Electrical – MCC, Back-up Power, Cables	2	20%	0.40	One motor controller located under a canopy. Motor controller shows sign on minor water intrusion. Maintenance light not functional. minor signs of what intrusion in motor control center.
Instrumentation - SCADA, Alarms	1	10%	0.10	Radio communications, no major issues with communication. HMI is responsive and don't have major communication issues
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	Safety grating and wet well hatch in good condition. Pump rails have corrosion in lower level of wet well. Wet well hatch handle is rusted/corroded.
Piping and Valves	4	15%	0.60	Wet well discharge piping showing major corrosion. Unable to assess valve vault; crew could not get valve vault hatch open while on site.
Mechanical - Ventilation, Odor Control	4	10%	0.40	No odor control at the site; crews indicated there is no motivation to add order control at this time. No ventilation.
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	Manual gate. No security cameras. No access controls.
Condition Rating	-	100%	**2.60**	

Site is 480Y/277V. Underground feed.
Arc flash labels are missing.
Radio communications.
Generator back up power, 100kW.
Significant foam generating on liquid surface.

Veranda Walk Lift Station

Inspection Date: 7/8/2022
Address: 19139 1/2 Veranda Walk Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	
Horsepower:	
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated. Thick layer of solid FOG/debris in wet well; crews break this up with water hose/sprinkler.
Electrical – MCC, Back-up Power, Cables	4	20%	0.80	Main disconnect is in poor condition and handle shows signs of major corrosion. One door on generator enclosure is broken. Generator enclosure and tank show minor signs of corrosion. Generator does not run ok. interface is not functional and is probably obsolete due to the age. Needs programing updates. One motor controller enclosure mounted under a canopy. Soft starter mounted in enclosure on inconvenient location and hard to maintenance. Motor controller enclosure shows signs on minor water intrusion. site light fixture has major debris inside fixture termination box shows signs of water intrusion.
Instrumentation - SCADA, Alarms	1	10%	0.10	radio communications. SCADA screen is responsive. Only really use high level float alarms
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	No safety grating. Hatches in good condition. Wet well liner deteriorating near hatch. Pump rails in good condition.
Piping and Valves	3	15%	0.45	Some corrosion on wet well piping, especially around bolts. Corrosion showing on bolts in valve vault and on valve wheels.
Mechanical - Ventilation, Odor Control	2	10%	0.20	Mulch required for odor control system. Odor control system not in operation currently. Ventilation in new condition.
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	Vegetation has begun to envolope site fence in multiple areas. Manual gate, no security cameras or access controls
Condition Rating	-	100%	**2.65**	

Site is 480Y/277V. Underground feed, utility transformer located within fence. Utility splice box located inside the fence near the utility transformer.
Arc flash labels are missing.
Radio communications.
Generator back up power, 50kW. generator panel was most likely broken by Generac but was never replaced.
51" between generator and utility transformer, 42" between electrical rack and generator.
Operators are not a big fan of ABB soft starters, prefer mechanical SSRV instead of digital.
CP USA provides maintenance for entire motor controller panel, both power and controls.

Mira Lago Lift Station

Inspection Date: 7/8/2022
Address: 4804 1/2 Mira Lago Way Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	
Horsepower:	11
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	No operational issues with pumps/motors indicated.
Electrical – MCC, Back-up Power, Cables	5	20%	1.00	Main disconnect shows signs of major corrosion and should be replaced immediately. Depending on utility standards, it does not appear there is enough working space clearance Infront of the transformer and location of main disconnect. Minor signs of corrosion on hardware in ATS Signs of corrosion on generator tank and one generator enclosure panel is not functional. One motor controlled mounted under a canopy. Motor controller enclosure shows signs of water intrusion. Termination box shows signs of corrosion.
Instrumentation - SCADA, Alarms	2	10%	0.20	Radio communications, no major issues.
Structure - Wet Well Walls, Top Slab, Hatches	2	20%	0.40	No safety grating on wet well. Hatches and valve vault safety grating in good condition. Pump rails in good condition but have two corroded bolts at the hatch.
Piping and Valves	3	15%	0.45	Discharge piping in good condition. Corrosion showing in valve vault piping and valves.
Mechanical - Ventilation, Odor Control	3	10%	0.30	Mulch required for odor control system. Odor control system not in operation currently. Ventilation in new condition.
Site - Drainage, Access Drive, Security, Fencing	3	5%	0.15	Some vegetation interfering with fence in some areas. Bent iron posts in site gate have left a hole in the gate. Manual gate, no security cameras or access controls. Major damage to fence from vehicle collision.
Condition Rating	-	100%	**2.90**	

Site is 480Y/277V. Underground feed, utility transformer located within fence. Utility splice box located inside the fence near the utility transformer. Have had issues with utility transformer on site before, it blew up once and current transformer has a major dent.
Arc flash labels are missing.
Radio communications.
Generator back up power, 60kW
Big discharge pipe, small pumps.
Nearly no flow to this lift station - 1 large ranch.

Upper Boone Lift Station

Inspection Date: 7/8/2022
Address: 3609 Boone Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	600 gpm (300 gpm)
Horsepower:	15
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	2	20%	0.40	Pumps have been replaced in recent years.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	existing pull box with spare conductors for future expansion. Has not been used. Electrical canopy and pull box mounting hardware show signs of major corrosion. Signs of major water intrusion in motor control panel and termination cabinet. Existing motor size is too large Main disconnect is locked. Experience transient power surges which trips motor starters. have replaced parts for the starters before. Cable mounting hardware at wet wells show signs of major corrosion.
Instrumentation - SCADA, Alarms	2	10%	0.20	Radio communications, SCADA screen is responsive.
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	No safety grating. Wet well hatch in good condition. Valve vault hatch has significant rust/corrosion. Pump rails in good condition with minimal corrosion. Electrical wiring hanger in wet well showing corrosion. Wet well has extension that was added after initial construction. There is a hole for an old vent/conduit in wet well wall which will spill effluent before wet well floods. This hole may also cause I&I in some rain events.
Piping and Valves	3	15%	0.45	Some corrosion on wet well piping, especially around flanges/bolts. Piping and valves in valve vault in fair condition showing corrosion. Check valve has a broken arm and can't tell position. Staff indicated force main breaks outside of lift station site are common.
Mechanical - Ventilation, Odor Control	4	10%	0.40	No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation. Aerator included in wet well.
Site - Drainage, Access Drive, Security, Fencing	2	5%	0.10	Site appears to drain rainwater into wet well/valve vault area, increasing potential for I&I and rusting. Manual gate, no security cameras of access controls.
Condition Rating	-	100%	**2.75**	

Site is 480Y/277V. Underground feed.
Arc flash labels are missing.
Radio communications.
No back up power.
When site overflows it gets into the motor controller.
Recently needed to get motor and pumps rebuilt since originals are obsolete.
Significant foam generating on water surface.

Lower Boone Lift Station

Inspection Date: 7/8/2022
Address: 3401 Boone Drive Lago Vista Tx

Facility Information	
Year Installed:	
Type of Facility:	Lift Station
Number of Pumps:	2
Total Capacity (Firm):	900 gpm (450 gpm)
Horsepower:	15
Monitoring:	
Generator:	

Scoring Guidelines	
1	Very good 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	Weighted Component Rating	Comments
Pumps and Motors	4	20%	0.80	One of the pumps has a corroded connection to its discharge piping, causing effluent to spray out. Layer of FOG/debris in wet well; crews break this up with water sprinkler.
Electrical – MCC, Back-up Power, Cables	3	20%	0.60	One motor controller mounted under an electrical canopy. Electrical canopy hardware shows signs of corrosion. Motor controller shows signs of water intrusion. Main disconnect is locked. Pull box with spare conduit for expansion but have not increased loads and are unused.
Instrumentation - SCADA, Alarms	3	10%	0.30	Radio communications. Screen is non-responsive. Have issues with overheating.
Structure - Wet Well Walls, Top Slab, Hatches	3	20%	0.60	No safety grating. Wet well hatch in good condition. Pump rails in good condition with minimal corrosion. Wet well has extension that was added after initial construction; there is potential for leaks during emergency situations with high wet well level. Valve vault hatch has significant rust/corrosion.
Piping and Valves	3	15%	0.45	Some corrosion on wet well piping, especially around flanges/bolts. Piping and valves in valve vault in fair condition showing corrosion.
Mechanical - Ventilation, Odor Control	4	10%	0.40	No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation. No proper ventilation. Yard sprinkler used in attempt to soften surface foam.
Site - Drainage, Access Drive, Security, Fencing	3	5%	0.15	Site appears to drain rainwater into wet well/valve vault area, increasing potential for I&I and rusting. Manual gate, no cameras or security access controls. Poor site grading.
Condition Rating	-	100%	**3.30**	

Site is 480Y/277V. Underground feed.
Arc flash labels are missing.
Radio communications.
No back up power.
When site overflows it gets into the motor controller.

APPENDIX B
Lift Station Rehabilitation Cost Sheets

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 1 — **Phase: Rehab**

Project Name: **MacArthur Lift Station Condition Rehabilitation**

Project Description:

Replace an existing 4" swing check valve, 4" gate valve, 4" ductile iron piping, and backflow preventer. Reconnect to existing 4" discharge pipe.

Project Drivers:

No safety grating. Significant corrosion of wet well ceiling near hatch. One pump rail had its bolts sheared off and fell into the wet well. Deterioration in top slab concrete near hatch. Corrosion on pump rail and wet well lining. Wet well hatch in good condition. Valve vault hatch in poor condition with significant rust/corrosion. Significant corrosion on wet well discharge piping and piping/valves in valve vault. Staff suspects the backflow preventer is not operating.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Bypass Pumping	1	LS	$ 15,000	$ 15,000
2	Replace Existing 4" Swing Check Valve	2	EA	$ 5,950	$ 11,900
3	Replace Existing 4" Gate Valve	2	EA	$ 1,700	$ 3,400
4	Reconnect to Existing 4" Discharge Piping	4	EA	$ 3,000	$ 12,000
5	Replace Existing 4" Ductile Iron Piping, Flange	45	LF	$ 170	$ 7,650
6	Replace backflow preventer	1	EA	$ 2,850	$ 2,850
				SUBTOTAL:	**$ 52,800**
		CONTINGENCY		30%	$ 15,900
				SUBTOTAL:	**$ 68,700**
		ENG/SURVEY		20%	$ 13,800
				SUBTOTAL:	**$ 82,500**
				Estimated Project Total:	**$ 82,500**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 2 — **Phase: Rehab**

Project Name: Santa Carlo Lift Station Condition Rehabilitation

Project Description:

Installation of new safety grate, door replacement, penetration concrete coating and pump guide rail reconnection on wet well access hatch. Replace existing 4" swing check valve, 4" gate valve, 2" air release valve and reconnect to existing 4" C-900 PVC discharge piping. Install new 10ft tall 6" SS vent and repair asphalt.

Project Drivers:

Asphalt supporting wet well top slab has sunk, creating a gap between. No safety grating. Concrete is deteriorating at the pump rail connection to top slab. Missing nut on pump rail connection to top slab. Pump rails in good condition. Valve vault hatch has significant rust/corrosion. Wet well lining corroded near hatch. Significant corrosion on piping/valves in valve vault. Some corrosion on wet well discharge piping. No odor control at the site; crews indicated there is no motivation to add order control at this time. Wet well has vent in imminent failure condition (rust and corrosion).

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Wet Well Access Hatch (48"X68") New Safety Grate Installation and Door Replacement	1	EA	$ 4,000	$ 4,000
2	Wet Well Access Hatch (48"X68") Penetration Concrete Coating and Pump Guide Rail Reconnection	1	EA	$ 1,000	$ 1,000
3	Wet Well Top Slab Concrete Support Beam	5	CY	$ 1,275	$ 6,375
4	Miscellaneous Asphalt Repair	1	LS	$ 5,900	$ 5,900
5	Replace Existing 4" Swing Check Valve	2	EA	$ 5,950	$ 11,900
6	Replace Existing 4" Gate Valve	2	EA	$ 1,700	$ 3,400
7	Replace Existing 2" Air Release Valve	2	EA	$ 4,250	$ 8,500
8	Reconnect to Existing 4" C-900 PVC	4	EA	$ 2,950	$ 11,800
9	Core Existing Wet Well Top Slab (10")	1	EA	$ 1,500	$ 1,500
10	Install New 10ft Tall, 6" SS Vent	1	EA	$ 8,000	$ 8,000
				SUBTOTAL:	**$ 62,400**
		CONTINGENCY		30%	$ 18,800
				SUBTOTAL:	**$ 81,200**
		ENG/SURVEY		20%	$ 16,300
				SUBTOTAL:	**$ 97,500**
				Estimated Project Total:	**$ 97,500**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 3 — **Phase: Rehab**

Project Name: **Mira Lago Lift Station Condition Rehabilitation**

Project Description:

Main disconnect to be replaced immediately. Address space clearance issue in front of transformer and location of main disconnect to meet utility standards. Address corrosion and water intrusion issues on corresponding equipment.

Project Drivers:

Main disconnect shows signs of major corrosion and should be replaced immediately. Depending on utility standards, it does not appear there is enough working space clearance Infront of the transformer and location of main disconnect. Minor signs of corrosion on hardware in ATS Signs of corrosion on generator tank and one generator enclosure panel is not functional. One motor controlled mounted under a canopy. Motor controller enclosure shows signs of water intrusion. Termination box shows signs of corrosion.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	480V, 100A Service Entrance Disconnect in NEMA 3R	1	EA	$ 3,650	$ 3,650
2	Demolition	1	LS	$ 800	$ 800
				SUBTOTAL:	**$ 4,500**
				CONTINGENCY 30%	$ 1,400
				SUBTOTAL:	**$ 5,900**
				ENG/SURVEY 20%	$ 1,200
				SUBTOTAL:	**$ 7,100**
				Estimated Project Total:	**$ 7,100**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 4 — **Phase: Rehab**

Project Name: **17th Lift Station Condition Rehabilitation**

Project Description:

Replace existing 4" swing check valve, 4" plug valve, and 2" air release valve. Then reconnect to existing 4" C-900 PVC discharge piping.

Vicinity Map

Project Drivers:

Severe corrosion on piping and valves in valve vault. Minor corrosion on wet well piping.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Replace Existing 4" Swing Check Valve	2	EA	$ 5,950	$ 11,900
2	Replace Existing 4" Plug Valve	2	EA	$ 2,975	$ 5,950
3	Replace Existing 2" Air Release Valve	2	EA	$ 4,250	$ 8,500
4	Reconnect to Existing 4" C-900 PVC Discharge Piping	4	EA	$ 2,950	$ 11,800
				SUBTOTAL:	**$ 38,200**
		CONTINGENCY		30%	$ 11,500
				SUBTOTAL:	**$ 49,700**
		ENG/SURVEY		20%	$ 10,000
				SUBTOTAL:	**$ 59,700**
				Estimated Project Total:	**$ 59,700**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 5 — **Phase: Rehab**

Project Name: **Turner Lift Station Condition Rehabilitation**

Project Description:

Reroute incoming 10" force main. New safety gate installation and door replacement of the wet well access hatch. Replace existing pump guide rails. Replace existing 8" swing check valve, 8" gate valve, 8" ductile iron class 250 discharge piping and repair coatings. remove existing Biocube odor control system and install a new system.

Project Drivers:

Utility CTs, weather heads, and conduit entering the main disconnect show signs of corrosion. ATS shows signs of water intrusion. MCC HMI is not functional, does not have as built drawings and/or one-lines and comms bucket is open and has a fan blowing on it due to overheating. Significant corrosion on valves in valve vault. Corrosion on discharge piping. Biocube odor control system not functioning at the site. No proper wet well ventilation (vertical vent has 5-gallon bucket placed over it). Breaker for odor control is flipped off. Aerators were installed in 2021. Electrical room is full of storage items. Half of the light fixtures are not working properly. Conduits penetrating pull box shows signs of corrosion underneath. Most hardware for odor control system is completely corroded. Generator is not properly grounded. Generator tank shows signs of corrosion. Cable mounting hardware at wet wells show signs of minor corrosion. No safety grating. Corrosion on pump rails and wet well lining, especially near inflow. Corrosion/rust around hatch seals.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	600A, 480V MCC in NEMA 1 Enclosure (Radio Communication)	1	EA	$ 36,250	$ 36,250
2	Demolition - Turner LS	1	LS	$ 1,000	$ 1,000
3	Misc. Electrical (Grounding, Lights, Receptacles, etc) - Turner LS	1	LS	$ 2,000	$ 2,000
4	Cable and Conduit - Turner LS	1	LS	$ 2,330	$ 2,330
5	Power System Studies - Turner LS	1	LS	$ 2,500	$ 2,500
6	Start-up and Testing - Turner LS	1	LS	$ 2,500	$ 2,500
7	Bypass Pumping (1100 gpm, 166 ft)	1	LS	$ 30,000	$ 30,000
8	Bypass Manhole (6ft Diameter, 10 ft Deep)	1	EA	$ 25,300	$ 25,300
9	Bypass Pumping Tie in to Existing LS 10" Discharge Force Main	1	LS	$ 24,000	$ 24,000
10	Incoming 6" PVC Gravity Main Temporary Reroute and Plug	20	LF	$ 184	$ 3,680
11	Incoming 10" Force Main Reroute	25	LF	$ 288	$ 7,200
12	10" Resilient Wedge Gate Valves (for incoming 10" FM reroute)	2	EA	$ 11,700	$ 23,400
13	Wet Well Access Hatch (36"X48") New Safety Grate Installation and Door Replacement	3	EA	$ 4,000	$ 12,000
14	Wet Well Access Hatch (36"X48"X8") Penetration Concrete Coating	3	EA	$ 1,150	$ 3,450
15	Valve Vault Access Hatch (36"X48") New Safety Grate Installation	3	EA	$ 1,500	$ 4,500

City of Lago Vista

Lift Station Rehabilitation Cost Estimate					Date: 10/20/22
16	Replace Existing Pump Guide Rails	48	LF	$ 138	$ 6,624
17	Wet Well Concrete Coating	81	SY	$ 863	$ 69,903
18	Replace Existing 8" Swing Check Valve	3	EA	$ 8,400	$ 25,200
19	Replace Existing 8" Gate Valve	3	EA	$ 9,600	$ 28,800
20	Repair Coatings	1	LS	$ 5,000	$ 5,000
21	Remove existing Biocube odor control system	1	LS	$ 5,000	$ 5,000
22	Install New Odor Control System	1	LS	$ 40,000	$ 40,000
				SUBTOTAL:	**$ 360,700**
		CONTINGENCY		30%	$ 108,300
				SUBTOTAL:	**$ 469,000**
		ENG/SURVEY		20%	$ 93,800
				SUBTOTAL:	**$ 562,800**
				Estimated Project Total:	**$ 562,800**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 6 — **Phase: Rehab**

Project Name: **Bar K Lift Station Condition Rehabilitation**

Project Description:

Demolish the existing top slap and install a new top slab. Addition of a new safety grate to the wet well access hatch and repair concrete. Replace existing 4" ductile iron class 250 discharge piping, exiting chain link fence, and the dual leaf swing gate.

Project Drivers:

Top slab connection to wet well wall is deteriorating, rebar is exposed and cracks have formed in wet well wall exterior. Two holes in wet well wall plugged with concrete cylinders (not air-tight). No safety grating, hatch in good condition. Major corrosion of wet well ceiling around hatch. Pump rails connected to discharge piping in good condition. Wet well discharge piping in poor condition due to corrosion. No valve vault. Valves and piping in fair condition. Site fence in fair condition, barbed wire rusted and misplaced in some areas. Manual gate, no security cameras or access controls. Fence shows signs of corrosion.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Bypass Pumping (560 gpm, 58 ft)	1	LS	$ 15,000	$ 15,000
2	Demolish Existing Top Slab	1	LS	$ 2,875	$ 2,875
3	Install New Top Slab, Reuse Existing Access Hatch	1	LS	$ 4,600	$ 4,600
4	Wet Well Access Hatch New Safety Grate	1	EA	$ 2,000	$ 2,000
5	Concrete Repair (two wet well cylinder holes)	1	LS	$ 1,725	$ 1,725
6	Replace Existing 4" Ductile Iron Class 250 Discharge Piping, FLG	40	LF	$ 120	$ 4,800
7	Replace Existing Chain Link Fence	90	LF	$ 94	$ 8,460
8	Replace Existing Dual Leaf Swing Gate (8ft)	1	EA	$ 6,000	$ 6,000
				SUBTOTAL:	**$ 45,500**
		CONTINGENCY		30%	$ 13,700
				SUBTOTAL:	**$ 59,200**
		ENG/SURVEY		20%	$ 11,900
				SUBTOTAL:	**$ 71,100**
				Estimated Project Total:	**$ 71,100**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 7 — **Phase: Rehab**

Project Name: **WWTP Influent Lift Station Condition Rehabilitation**

Project Description:

Address corrosion on corresponding equipment. Upgrade wet well ventilation. Replace existing pump guide rails. Remove existing 6" HDG steel vent and install a new 10ft tall 8 SS vent.

Project Drivers:

No SCADA drawings. SCADA cabinet at LS has major corrosion. Flygt control system. Significant corrosion on pump rails and wet well lining, especially near inflow. Corrosion/rust/deterioration around hatch seals. Safety grating in fair condition. No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper wet well ventilation (vertical vent is capped). Breaker for odor control is flipped off.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Demolition - WWTP	1	LS	$ 1,000	$ 1,000
2	Relay Panel in NEMA 4X Enclosure	1	LS	$ 6,250	$ 6,250
3	Misc. Electrical (Grounding, Lights, Receptacles, etc) - WWTP	1	LS	$ 700	$ 700
4	Cable and Conduit - WWTP	1	LS	$ 1,800	$ 1,800
5	Start-up and Testing - WWTP	1	LS	$ 1,000	$ 1,000
6	WWTP Bypass Pumping	1	LS	$ 30,000	$ 30,000
7	Wet Well Access Hatch (48"X60"X8") Penetration Concrete Coating	2	EA	$ 1,150	$ 2,300
8	Replace Existing Pump Guide Rails	50	LF	$ 138	$ 6,900
9	Wet Well Concrete Coating	120	SY	$ 863	$ 103,560
10	Remove Existing 6" HDG Steel Vent; Plug Concrete Penetration	1	LS	$ 1,500	$ 1,500
11	Core Existing Wet Well Top Slab (12")	1	EA	$ 1,500	$ 1,500
12	Install New 10ft Tall, 8" SS Vent	1	EA	$ 9,000	$ 9,000
				SUBTOTAL:	**$ 165,600**
		CONTINGENCY		30%	$ 49,700
				SUBTOTAL:	**$ 215,300**
		ENG/SURVEY		20%	$ 43,100
				SUBTOTAL:	**$ 258,400**
				Estimated Project Total:	**$ 258,400**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 8 — **Phase: Rehab**

Project Name: The Inn Lift Station Condition Rehabilitation

Project Description:

Add canopy to motor controller enclosure outside. Address working space clearance between generator and ATS 32". Upgrade generator and ATS. Address corrosion and water intrusion on corresponding equipment. Install a new 10ft tall 4" SS vent.

Vicinity Map

Project Drivers:

One motor controller enclosure located outside with no canopy. There is not enough working space clearance between the generator and ATS, 32". No SCADA. No alarms. No odor control at the site; crews indicated there is no motivation to add order control at this time. No ventilation.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Demolition - The Inn	1	LS	$ 2,500	$ 2,500
2	Motor Controller in NEMA 3R, 2 NEMA 1 Starters, and SCADA	1	LS	$ 18,750	$ 18,750
3	25kW, 480 V Generation in Weather Enclosure	1	EA	$ 86,250	$ 86,250
4	100A, 480 V ATS, Service Entrance Rated, NEMA 3R Enclosure	1	LS	$ 1,890	$ 1,890
5	Misc. Electrical (Grounding, Lights, Receptacles, etc) - The Inn	1	LS	$ 2,000	$ 2,000
6	Cable and Conduit - The Inn	1	LS	$ 19,390	$ 19,390
7	Electrical Pullboxes - The Inn	1	EA	$ 3,500	$ 3,500
8	Instrumental (Floats) - The Inn	4	LS	$ 580	$ 2,320
9	Power System Studies - The Inn	1	LS	$ 5,000	$ 5,000
10	Start-up and Testing - The Inn	1	LS	$ 5,000	$ 5,000
11	Core Existing Wet Well Manhole Wall (8")	1	LS	$ 1,500	$ 1,500
12	Install New 10ft Tall, 4" SS Vent	1	EA	$ 7,000	$ 7,000
				SUBTOTAL:	**$ 155,100**
		CONTINGENCY		30%	$ 46,600
				SUBTOTAL:	**$ 201,700**
		ENG/SURVEY		20%	$ 40,400
				SUBTOTAL:	**$ 242,100**
				Estimated Project Total:	**$ 242,100**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 9 — **Phase: Rehab**

Project Name: **Lower Boone Lift Station Condition Rehabilitation**

Project Description:

Bypass pumping and add new pump connection to existing discharge pipe. Install a new 10ft tall 4" SS vent and a wet well aerator.

Vicinity Map

Project Drivers:

One of the pumps has a corroded connection to its discharge piping, causing effluent to spray out. Layer of FOG/debris in wet well; crews break this up with water sprinkler. No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation. No proper ventilation. Yard sprinkler used in attempt to soften surface foam.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Bypass Pumping	1	LS	$ 15,000	$ 15,000
2	New Pump Connection to Existing Discharge Pipe	1	EA	$ 8,400	$ 8,400
3	Core Existing Wet Well Manhole Wall (8")	1	LS	$ 1,500	$ 1,500
4	Install New 10ft Tall, 4" SS Vent	1	EA	$ 7,000	$ 7,000
5	Install Wet Well Aerator	1	EA	$ 30,300	$ 30,300
				SUBTOTAL:	**$ 62,200**
		CONTINGENCY		30%	$ 18,700
				SUBTOTAL:	**$ 80,900**
		ENG/SURVEY		20%	$ 16,200
				SUBTOTAL:	**$ 97,100**
				Estimated Project Total:	**$ 97,100**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 10 — **Phase: Rehab**

Project Name: Old Burnet Lift Station Condition Rehabilitation

Project Description:

Remove an existing 4" HDPE vent; cap and install a new 10 ft tall 6" SS vent.

Project Drivers:

No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Remove Existing 4" HDPE Vent; Cap	1	LS	$ 2,000	$ 2,000
2	Core Existing Wet Well Top Slab (10")	1	EA	$ 1,500	$ 1,500
3	Install New 10ft Tall, 6" SS Vent	1	EA	$ 8,000	$ 8,000
4	Install Wet Well Aerator	1	EA	$ 30,300	$ 30,300
				SUBTOTAL:	**$ 41,800**
		CONTINGENCY		30%	$ 12,600
				SUBTOTAL:	**$ 54,400**
		ENG/SURVEY		20%	$ 10,900
				SUBTOTAL:	**$ 65,300**
				Estimated Project Total:	**$ 65,300**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 11 — **Phase: Rehab**

Project Name: **Destination Way Lift Station Condition Rehabilitation**

Project Description:

Replace an existing 4" swing check valve, 4" gate valve, 1" air release valve, 4" C-900 PVC Discharge piping, 4" ductile iron discharge piping, and an existing valve vault access hatch. Remove an existing 4" HDPE Vent; cap, and install a new 10 ft tall 6" SS vent.

Project Drivers:

Wet well discharge piping showing major corrosion. Unable to assess valve vault; crew could not get valve vault hatch open while on site. No odor control at the site; crews indicated there is no motivation to add order control at this time. No ventilation.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Bypass Pumping	1	LS	$ 15,000	$ 15,000
2	Replace Existing 4" Swing Check Valve	2	EA	$ 5,950	$ 11,900
3	Replace Existing 4" Gate Valve	2	EA	$ 1,700	$ 3,400
4	Replace Existing 1" Air Release Valve	2	EA	$ 3,000	$ 6,000
5	Reconnect to Existing 4" C-900 PVC Discharge Piping	4	EA	$ 2,950	$ 11,800
6	Replace Existing 4" Ductile Iron Discharge Piping, FLG	18	LF	$ 138	$ 2,484
7	Replace Existing Valve Vault Access Hatch 30"x30"	1	EA	$ 4,000	$ 4,000
8	Remove Existing 4" HDPE Vent; Cap	1	LS	$ 2,000	$ 2,000
9	Core Existing Wet Well Top Slab (10")	1	EA	$ 1,500	$ 1,500
10	Install New 10ft Tall, 6" SS Vent	1	EA	$ 8,000	$ 8,000
11	Install Wet Well Aerator	1	EA	$ 30,300	$ 30,300
				SUBTOTAL:	**$ 96,400**
		CONTINGENCY		30%	$ 29,000
				SUBTOTAL:	**$ 125,400**
		ENG/SURVEY		20%	$ 25,100
				SUBTOTAL:	**$ 150,500**
				Estimated Project Total:	**$ 150,500**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 12 — **Phase: Rehab**

Project Name: Upper Boone Lift Station Condition Rehabilitation

Project Description:

Install a new 10ft tall 4" SS vent.

Vicinity Map

Project Drivers:

No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation. Aerator included in wet well.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Core Existing Wet Well Manhole Wall (8")	1	LS	$ 1,500	$ 1,500
2	Install New 10ft Tall, 4" SS Vent	1	EA	$ 7,000	$ 7,000
				SUBTOTAL:	**$ 8,500**
		CONTINGENCY		30%	$ 2,600
				SUBTOTAL:	**$ 11,100**
		ENG/SURVEY		20%	$ 2,300
				SUBTOTAL:	**$ 13,400**
				Estimated Project Total:	**$ 13,400**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 13 — **Phase: Rehab**

Project Name: **Veranda Walk Lift Station Condition Rehabilitation**

Project Description:

Main disconnect needs to be replaced. Address corrosion and water intrusion issues on corresponding equipment.

Project Drivers:

Main disconnect shows signs of major corrosion and should be replaced immediately. Depending on utility standards, it does not appear there is enough working space clearance Infront of the transformer and location of main disconnect. Minor signs of corrosion on hardware in ATS Signs of corrosion on generator tank and one

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	480V, 100A Service Entrance Disconnect in NEMA 3R	1	EA	$ 3,650	$ 3,650
2	Demolition	1	LS	$ 800	$ 800
				SUBTOTAL:	**$ 4,500**
		CONTINGENCY		30%	$ 1,400
				SUBTOTAL:	**$ 5,900**
		ENG/SURVEY		20%	$ 1,200
				SUBTOTAL:	**$ 7,100**
				Estimated Project Total:	**$ 7,100**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 14 — **Phase: Rehab**

Project Name: **Tessera Lift Station Condition Rehabilitation**

Project Description:

Remove Existing 4" HDPE vent; cap and install new 10ft tall 6" SS vent.

Project Drivers:

No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Remove Existing 4" HDPE Vent; Cap	1	LS	$ 2,000	$ 2,000
2	Core Existing Wet Well Top Slab (10")	1	EA	$ 1,500	$ 1,500
3	Install New 10ft Tall, 6" SS Vent	1	EA	$ 8,000	$ 8,000
				SUBTOTAL:	**$ 11,500**
		CONTINGENCY		30%	$ 3,500
				SUBTOTAL:	**$ 15,000**
		ENG/SURVEY		20%	$ 3,000
				SUBTOTAL:	**$ 18,000**
				Estimated Project Total:	**$ 18,000**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 15 — **Phase: Rehab**

Project Name: **Alfalfa Lift Station Condition Rehabilitation**

Project Description:

Remove an existing 6" HDPE vent; cap and install a new 10 ft tall 8" SS vent.

Project Drivers:

No odor control at the site; crews indicated there is no motivation to add order control at this time. No proper ventilation. Aerator installed in wet well.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Remove Existing 6" HDPE Vent; Cap	1	LS	$ 2,000	$ 2,000
2	Core Existing Wet Well Top Slab (12")	1	EA	$ 1,500	$ 1,500
3	Install New 10ft Tall, 8" SS Vent	1	EA	$ 9,000	$ 9,000
4	Install Wet Well Aerator	1	EA	$ 30,300	$ 30,300
				SUBTOTAL:	**$ 42,800**
		CONTINGENCY		30%	$ 12,900
				SUBTOTAL:	**$ 55,700**
		ENG/SURVEY		20%	$ 11,200
				SUBTOTAL:	**$ 66,900**
				Estimated Project Total:	**$ 66,900**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 16 — **Phase: Rehab**

Project Name: **Driving Range Lift Station Condition Rehabilitation**

Project Description:

Remove debris and clear site. Replace existing vinyl coated chain link fence and 15ft ornamental access gate

Project Drivers:

Site has miscellaneous equipment/debris near site fence. Fence is in poor condition with barbed wire knocked down in some areas. Fence enveloped by vegetation in multiple areas. Non-Automatic motorized gate - key pad. No cameras. Motorized gate chain shows signs of major corrosion.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Remove Debris/Clear Site	1	LS	$ 4,000	$ 4,000
2	Replace Existing Vinyl Coated Chain Link Fence	360	LF	$ 94	$ 33,840
3	Replace Existing 15-foot Ornamental, Motorized Access Gate	1	EA	$ 18,000	$ 18,000
				SUBTOTAL:	**$ 55,900**
		CONTINGENCY		30%	$ 16,800
				SUBTOTAL:	**$ 72,700**
		ENG/SURVEY		20%	$ 14,600
				SUBTOTAL:	**$ 87,300**
				Estimated Project Total:	**$ 87,300**

Comments:

City of Lago Vista

Lift Station Rehabilitation Cost Estimate — **Date: 10/20/22**

Construction Project Number: 17 — **Phase: Rehab**

Project Name: **The Cove Lift Station Condition Rehabilitation**

Project Description:

Remove debris and clear site. Remove then replace existing fence by the vegetation.

Project Drivers:

Landscaping hazard within site. Fence enveloped by vegetation, affecting fence integrity. Manual gate, no security cameras or access controls.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Remove Debris/Clear Site	1	LS	$ 4,000	$ 4,000
2	Remove and Replace Existing Fence by Vegetation	60	LF	$ 94	$ 5,640
				SUBTOTAL:	**$ 9,700**
		CONTINGENCY		30%	$ 3,000
				SUBTOTAL:	**$ 12,700**
		ENG/SURVEY		20%	$ 2,600
				SUBTOTAL:	**$ 15,300**
				Estimated Project Total:	**$ 15,300**

APPENDIX C
Detailed Wastewater CIP Cost Sheets

City of Lago Vista
CIP Cost Summary

Project Number	Project Name	Cost
Short Term Projects		
1	WWTP Expansion	$ 16,519,800
2	WWTP Effluent Pond Improvements	$ 2,514,400
3	24-inch Lakefront Drive Gravity Main Replacement	$ 1,467,000
4	Parliament Cove Gravity Main Replacement - Segment 1	$ 3,455,300
5	Patriot Drive 15-inch Gravity Main	$ 1,194,400
6	Highland Lake Drive 12-inch Gravity Main	$ 631,400
7	Twisting Trail Pressure Main Relief 18-inch Gravity Main	$ 2,134,800
8	High Drive/Outpost Trace Gravity Main	$ 1,953,300
9	Parliament Cove Gravity Main Replacement - Segment 2	$ 1,644,800
10	Tessera Pressure Main Replacement	$ 3,627,500
11	Miscellaneous Pressure Main Capacity Replacement	$ 3,209,100
12	New Bar K Lift Station	$ 1,997,400
13	New 17th Lift Station	$ 1,510,000
	Short Term Total	**$ 41,859,200**
Intermediate Projects		
14	Patriot Drive Pressure Main Replacement	$ 812,600
15	Lower Boone Drive Pressure Main Replacement	$ 428,000
16	Rockwood Drive Pressure Main Replacement	$ 394,000
17	Bar K Ranch Road Pressure Main Replacement	$ 787,300
18	High Drive Lift Station Improvements and New Force Main	$ 3,829,700
19	Tessera Lift Station Improvements	$ 384,300
	Intermediate Total	**$ 6,635,900**
Long Term Projects		
20	New Influent WWTP Lift Station	$ 7,808,400
21	New Driving Range Lift Station and 16-inch Force Main	$ 6,575,100
22	National Drive 18-inch Gravity Main	$ 3,080,000
23	New Veranda Walk Lift Station and 12-inch Force Main	$ 4,383,200
24	Bar K Lift Station Expansion	$ 183,900
25	Timber Trail to Bar K Lift Station Gravity Main	$ 4,921,400
26	Lohman Ford Road to 17th Hole Lift Station Gravity Main	$ 5,251,900
27	Truman Lift Station Replacement Pumps	$ 180,900
28	Growth Zone 1 Buildout Pressure Main Replacement	$ 1,877,700
29	Growth Zone 2 Buildout Pressure Main Replacement	$ 811,100
30	Growth Zone 3 Buildout Pressure Main Replacement	$ 4,002,400
31	Growth Zone 4 Buildout Pressure Main Replacement	$ 578,800
32	Growth Zone 5 Buildout Pressure Main Replacement	$ 572,400
33	Growth Zone 7 Buildout Pressure Main Replacement	$ 903,000
34	Growth Zone 8 Buildout Pressure Main Replacement	$ 1,256,700
	Long Term Total	**$ 42,386,900**
	CIP Total	**$ 90,882,000**

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 1 — **Phase:** Short

Project Name: WWTP Expansion

Project Description:

This project expands the existing wastewater treatment plant's annual average daily flow capacity from 1.0 MGD to 1.5 MGD and peak 2-hour peak flow discharge to 6.0 MGD. In the expansion, the effluent quality is to remain as Type 2 discharge per TAC Chapter 217. This cost estimate is inclusive of project contingency, basic engineering cost, as well as construction inspection and services costs. The improvements to the WWTP are an estimate based on the assumption that some existing process units and structures are suitable for use. Condition and potential structural damage to existing process units may result in higher cost estimates for the WWTP expansion. In addition to treatment plant improvements, 3 - 1,500 gpm pumps are recommended to fill the one existing blank slot in the influent wet well and replace the 2 existing 600 gpm pumps.

Project Drivers:

This project is needed as the City is approaching 75% of the permitted average daily flow. The City will need to be in design of a WWTP expansion once a 3-month average daily flow reaches 90% of the permitted effluent flow rate.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	WWTP Expansion	1	LS	$ 10,000,000	$ 10,000,000
2	New 1,500 GPM Pumps - WWTP Influent LS	3	EA	$ 350,000	$ 1,050,000
				SUBTOTAL:	**$ 11,050,000**
		CONTINGENCY		30%	$ 3,315,000
				SUBTOTAL:	**$ 14,365,000**
		ENG/SURVEY		15%	$ 2,154,800
				SUBTOTAL:	**$ 16,519,800**
				Estimated Project Total:	**$ 16,519,800**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 2 — **Phase:** Short

Project Name: WWTP Effluent Pond Improvements

Project Description:

This project consists of repair to the Effluent Pond No. 17 and improvements to the Effluent Pond No. 2. Improvements to the ponds will consist of an expansion in storage capacity at Pond No. 2, rehabilitation of the concrete basin at Pond No. 17, and the replacement of a new HDPE and geotextile liner at Pond No. 17.

Project Drivers:

Cracks in the liner of Pond No. 17 are cause for replacement. While dewatered, inspection of the concrete and underdrain system will justify any potential need for additional rehabilitation efforts. Improvements to Pond No. 2's storage capacity will provide the excess capacity to serve as bypass storage when Effluent Pond No. 17 is being repaired as well as bypass storage for any future cleaning and maintenance required at Pond No. 17.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Effluent Pond No. 2 Improvements	1	LS	$ 760,540	$ 760,540
2	Effluent Pond No. 17 Repair	1	LS	$ 801,080	$ 801,080
				SUBTOTAL:	**$ 1,561,700**
		CONTINGENCY		40%	$ 624,700
				SUBTOTAL:	**$ 2,186,400**
		ENG/SURVEY		15%	$ 328,000
				SUBTOTAL:	**$ 2,514,400**
				Estimated Project Total:	**$ 2,514,400**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 3 — **Phase:** Short

Project Name: 24-inch Lakefront Drive Gravity Main Replacement

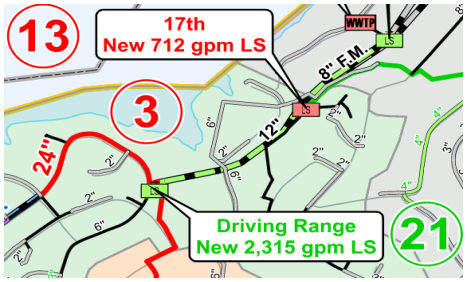
Project Description:

This project includes a 24-inch gravity sewer line beginning at Arrowhead Point and ending at the existing Driving Range LS.

Project Drivers:

The proposed gravity main is needed to relieve existing capacity deficiencies as determined by the existing system analysis. The existing 8-inch has significant grade, however the main undersized to receive flow from High Drive LS and has a history of sanitary sewer overflows along Lakefront Drive. This main will be sized to accommodate buildout flows from Growth Zone 1 as well as some flows redirected from Growth Zone 2.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Pipe 8- 16 feet deep	1,813	LF	$ 528	$ 957,106
2	60" Diameter Manhole	4	EA	$ 6,000	$ 24,000
				SUBTOTAL:	**$ 981,200**
		CONTINGENCY		30%	$ 294,400
				SUBTOTAL:	**$ 1,275,600**
		ENG/SURVEY		15%	$ 191,400
				SUBTOTAL:	**$ 1,467,000**
				Estimated Project Total:	**$ 1,467,000**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 4 — **Phase:** Short

Project Name: Parliament Cove Gravity Main Replacement - Segment 1

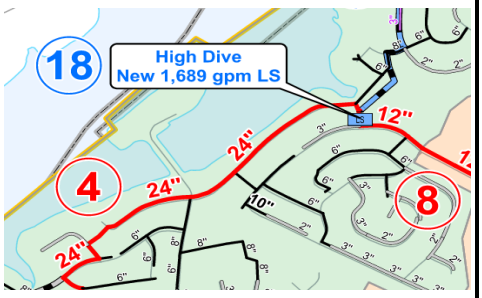
Project Description:

This project consists of a 24-inch gravity sewer line to replace an existing 12-inch sewer along Parliament Cove, ending at the existing High Drive LS.

Project Drivers:

The existing 12-inch sewer main along Parliament Cove has a history of sanitary sewer overflows. The overflows are due in part to the sewer main being undersized and also in part to a low-lying manhole. The increased size of sewer main will increase the conveyance capacity in the pipe and relieve the area of localized capacity constraints identified in the existing system analysis. This project will be sized for buildout flows in Growth Zone 1.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Pipe > 16 feet deep	649	LF	$ 576	$ 373,939
2	24" Pipe 8- 16 feet deep	1,899	LF	$ 528	$ 1,002,408
3	24" Pipe < 8 feet deep	1,556	LF	$ 480	$ 746,928
4	60" Diameter Manhole	7	EA	$ 6,000	$ 42,000
5	Asphalt Pavement Repair	1,459	LF	$ 100	$ 145,900
				SUBTOTAL:	**$ 2,311,200**
		CONTINGENCY		30%	$ 693,400
				SUBTOTAL:	**$ 3,004,600**
		ENG/SURVEY		15%	$ 450,700
				SUBTOTAL:	**$ 3,455,300**
				Estimated Project Total:	**$ 3,455,300**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 5 — **Phase:** Short

Project Name: Patriot Drive 15-inch Gravity Main

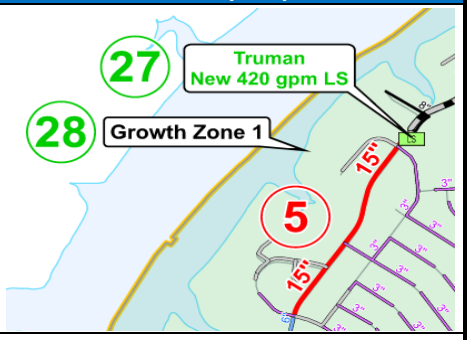
Project Description:

This project includes a 15-inch gravity sewer line beginning at Redbird Drive and Patriot Drive and ending at the existing Truman LS.

Project Drivers:

The proposed gravity main relieves existing capacity deficiencies, as determined by the existing system analysis, and is sized to accommodate buildout flows from part of Growth Zone 1.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Pipe 8- 16 feet deep	2,002	LF	$ 330	$ 660,759
2	15" Pipe < 8 feet deep	315	LF	$ 300	$ 94,620
3	60" Diameter Manhole	4	EA	$ 6,000	$ 24,000
4	Asphalt Pavement Repair	195	LF	$ 100	$ 19,500
				SUBTOTAL:	**$ 798,900**
		CONTINGENCY		30%	$ 239,700
				SUBTOTAL:	**$ 1,038,600**
		ENG/SURVEY		15%	$ 155,800
				SUBTOTAL:	**$ 1,194,400**
				Estimated Project Total:	**$ 1,194,400**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 6 — **Phase:** Short

Project Name: Highland Lake Drive 12-inch Gravity Main

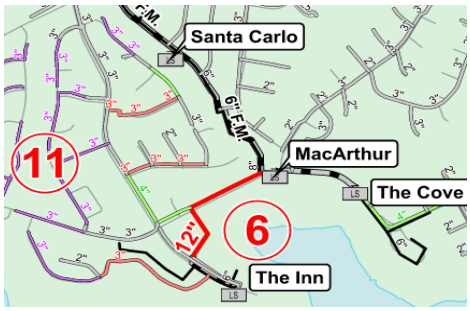
Project Description:

This project includes a 12-inch gravity sewer line that receives flow from The Inn LS and directs flow to the MacArthur LS.

Project Drivers:

The proposed gravity main increases the conveyance capacity to MacArthur LS and relieves existing capacity deficiencies, as determined by the existing system analysis. The existing 10-inch and 6-inch gravity main on Highland Lake Drive are low lying, with little excess ground cover. As such, the risk of sanitary sewer overflows are high in the event of minor surcharge. Sewer flow can be contained within the pipe if the pipe size is increased.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe > 16 feet deep	161	LF	$ 288	$ 46,397
2	12" Pipe < 8 feet deep	1,429	LF	$ 240	$ 342,960
3	60" Diameter Manhole	3	EA	$ 6,000	$ 18,000
4	Asphalt Pavement Repair	149	LF	$ 100	$ 14,900
				SUBTOTAL:	**$ 422,300**
		CONTINGENCY		30%	$ 126,700
				SUBTOTAL:	**$ 549,000**
		ENG/SURVEY		15%	$ 82,400
				SUBTOTAL:	**$ 631,400**
				Estimated Project Total:	**$ 631,400**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 7 — **Phase:** Short

Project Name: Twisting Trail Pressure Main Relief 18-inch Gravity Main

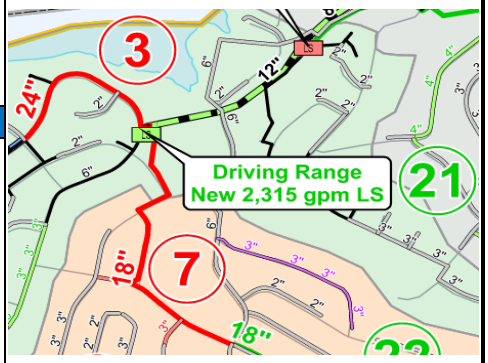
Project Description:

This project includes an 18-inch gravity sewer line beginning at Twisting Trail and National Drive and ending at the existing Driving Range LS.

Project Drivers:

The proposed gravity main is needed to relieve existing capacity deficiencies in the low-pressure sewer mains along Twisting Trail as determined by the existing system analysis. This main will be sized to accommodate buildout flows from part of Growth Zone 2 and all of Growth Zone 4 to be serviced by a future extension of the 18-inch sewer line along National Drive (Project #22).

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	21" Pipe > 16 feet deep	744	LF	$ 504	$ 375,026
2	18" Pipe > 16 feet deep	307	LF	$ 432	$ 132,667
3	18" Pipe 8- 16 feet deep	1,902	LF	$ 396	$ 752,994
4	60" Diameter Manhole	5	EA	$ 6,000	$ 30,000
5	Asphalt Pavement Repair	1,372	LF	$ 100	$ 137,200
				SUBTOTAL:	**$ 1,427,900**
		CONTINGENCY		30%	$ 428,400
				SUBTOTAL:	**$ 1,856,300**
		ENG/SURVEY		15%	$ 278,500
				SUBTOTAL:	**$ 2,134,800**
				Estimated Project Total:	**$ 2,134,800**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**
Construction Project Number: 8 — **Phase:** Short
Project Name: High Drive/Outpost Trace Gravity Main

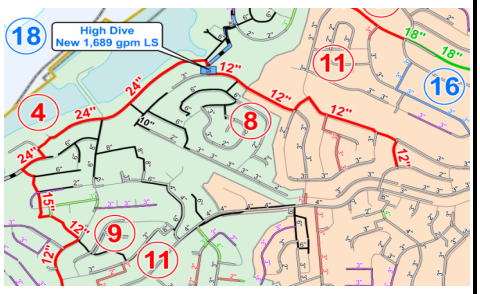
Project Description:

This project includes a 12-inch gravity sewer line beginning at Outpost Trace and Oak Dale Drive and ending at the existing High Drive LS.

Project Drivers:

The proposed gravity main redirects flow to relieve existing capacity deficiencies in the downstream low-pressure sewer mains as determined by the existing system analysis. This main will be sized to accommodate buildout flows from part of Growth Zone 2.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	24" Pipe 8- 16 feet deep	16	LF	$ 528	$ 8,395
2	12" Pipe > 16 feet deep	1,144	LF	$ 288	$ 329,357
3	12" Pipe 8- 16 feet deep	3,212	LF	$ 264	$ 847,994
4	60" Diameter Manhole	7	EA	$ 6,000	$ 42,000
5	Asphalt Pavement Repair	787	LF	$ 100	$ 78,700
				SUBTOTAL:	**$ 1,306,500**
		CONTINGENCY		30%	$ 392,000
				SUBTOTAL:	**$ 1,698,500**
		ENG/SURVEY		15%	$ 254,800
				SUBTOTAL:	**$ 1,953,300**
				Estimated Project Total:	**$ 1,953,300**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 9 — **Phase:** Short

Project Name: Parliament Cove Gravity Main Replacement - Segment 2

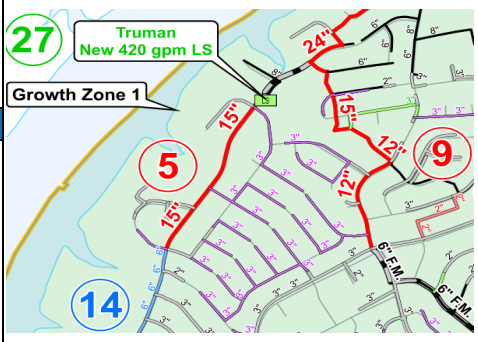
Project Description:

This project includes segments of 15-inch and 12-inch gravity sewer lines beginning at American Drive and Boggy Ford Road and ending at the upstream end of Project #4.

Project Drivers:

The proposed gravity mains receive flow from the buildout of the lower portion of Growth Zone 1. The need for this project was determined from the existing system analysis and will be sized for buildout flows. This project is dependent upon the construction of Project #4.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	15" Pipe 8- 16 feet deep	1,214	LF	$ 330	$ 400,488
2	12" Pipe 8- 16 feet deep	1,984	LF	$ 264	$ 523,697
3	60" Diameter Manhole	5	EA	$ 6,000	$ 30,000
4	Asphalt Pavement Repair	1,459	LF	$ 100	$ 145,900
				SUBTOTAL:	**$ 1,100,100**
		CONTINGENCY		30%	$ 330,100
				SUBTOTAL:	**$ 1,430,200**
		ENG/SURVEY		15%	$ 214,600
				SUBTOTAL:	**$ 1,644,800**
				Estimated Project Total:	**$ 1,644,800**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 10 — **Phase:** Short

Project Name: Tessera Pressure Main Replacement

Project Description:

This project line item is a package of short segments of low-pressure wastewater lines in the collection system of the Tessera development to improve capacity.

Project Drivers:

The projects consist of upsizing sewer lines ranging from 2-inch to 3-inch throughout the development. The recommendation to replace pressure pipes with larger diameter pipes is to reduce maximum velocities in a maximum pump-on scenario.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	12" Pipe 8- 16 feet deep	201	LF	$ 264	$ 53,038
2	8" Pipe < 8 feet deep	353	LF	$ 160	$ 56,544
3	8" Force Main < 8 feet deep	322	LF	$ 144	$ 46,368
4	4" Force Main < 8 feet deep	2,041	LF	$ 72	$ 146,930
5	3" Force Main < 8 feet deep	13,560	LF	$ 54	$ 732,245
6	60" Diameter Manhole	3	EA	$ 6,000	$ 18,000
7	Asphalt Pavement Repair	13,732	LF	$ 100	$ 1,373,200
				SUBTOTAL:	**$ 2,426,400**
		CONTINGENCY		30%	$ 728,000
				SUBTOTAL:	**$ 3,154,400**
		ENG/SURVEY		15%	$ 473,200
				SUBTOTAL:	**$ 3,627,600**
				Estimated Project Total:	**$ 3,627,600**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 11 — **Phase:** Short

Project Name: Miscellaneous Pressure Main Capacity Replacement

Project Description:

This project line item is a package of short segments of low-pressure wastewater lines in various parts of the collection system to improve capacity.

Project Drivers:

The projects consist of sewer lines ranging in size from 2-inch to 6-inch throughout the service area. The recommended pressure main replacements are to keep velocities below 6 ft/s under maximum use conditions.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	6" Force Main < 8 feet deep	593	LF	$ 108	$ 64,066
2	4" Force Main < 8 feet deep	1,792	LF	$ 72	$ 129,038
3	3" Force Main < 8 feet deep	9,289	LF	$ 54	$ 501,628
4	2" Force Main < 8 feet deep	2,090	LF	$ 36	$ 75,236
5	Asphalt Pavement Repair	13,765	LF	$ 100	$ 1,376,470
				SUBTOTAL:	**$ 2,146,500**
		CONTINGENCY		30%	$ 644,000
				SUBTOTAL:	**$ 2,790,500**
		ENG/SURVEY		15%	$ 418,600
				SUBTOTAL:	**$ 3,209,100**
				Estimated Project Total:	**$ 3,209,100**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 12 — **Phase:** Short

Project Name: New Bar K Lift Station

Project Description:

This project includes a new wet well at the existing Bar K location and improves the pumping capacity to 850 gpm. Additional capacity is required to accommodate future flows.

Project Drivers:

This project is intended to increase the pumping capacity to accommodate growth in Growth Zones 6, 7 and 8.

Vicinity Map

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 850 GPM Lift Station - Bar K LS	1	LS	$ 1,336,000	$ 1,336,000
				SUBTOTAL:	**$ 1,336,000**
		CONTINGENCY		30%	$ 400,800
				SUBTOTAL:	**$ 1,736,800**
		ENG/SURVEY		15%	$ 260,600
				SUBTOTAL:	**$ 1,997,400**
				Estimated Project Total:	**$ 1,997,400**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 13 — **Phase:** Short

Project Name: New 17th Lift Station

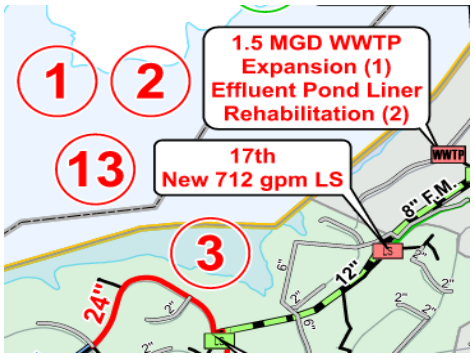
Project Description:

This project includes a new wet well at the existing 17th hole lift station location and improves the pumping capacity to 712 gpm.

Project Drivers:

Additional capacity is required to accommodate future flows. This project is dependent upon growth in Growth Zone 6.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 712 GPM Lift Station - 17th LS	1	LS	$ 1,010,000	$ 1,010,000
				SUBTOTAL:	**$ 1,010,000**
		CONTINGENCY		30%	$ 303,000
				SUBTOTAL:	**$ 1,313,000**
		ENG/SURVEY		15%	$ 197,000
				SUBTOTAL:	**$ 1,510,000**
				Estimated Project Total:	**$ 1,510,000**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**
Construction Project Number: 14 — **Phase: Medium**

Project Name: Patriot Drive Pressure Main Replacement

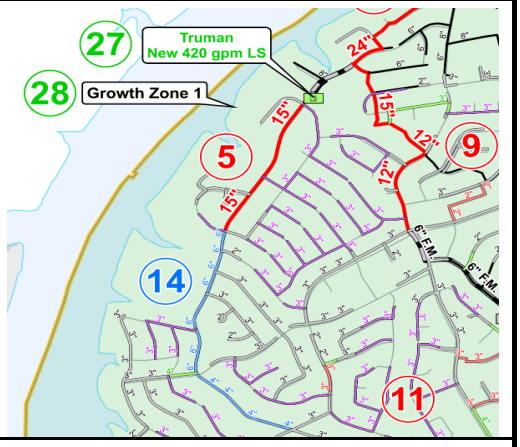
Project Description:

This project includes a 6-inch low-pressure sewer main beginning at Redbird Drive and Blue Jay Boulevard and ties into the proposed 15-inch gravity main of Project #9.

Project Drivers:

The proposed pressure main accommodates buildout flows as a result from growth in Growth Zone 1. A gravity main could not be installed in place of the proposed pressure main due to the ground topography.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	6" Force Main < 8 feet deep	2,141	LF	$ 108	$ 231,271
2	4" Force Main < 8 feet deep	1,530	LF	$ 72	$ 110,146
3	Asphalt Pavement Repair	2,020	LF	$ 100	$ 202,000
				SUBTOTAL:	**$ 543,500**
				CONTINGENCY 30%	$ 163,100
				SUBTOTAL:	**$ 706,600**
				ENG/SURVEY 15%	$ 106,000
				SUBTOTAL:	**$ 812,600**
				Estimated Project Total:	**$ 812,600**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 15 — **Phase:** Medium

Project Name: Lower Boone Drive Pressure Main Replacement

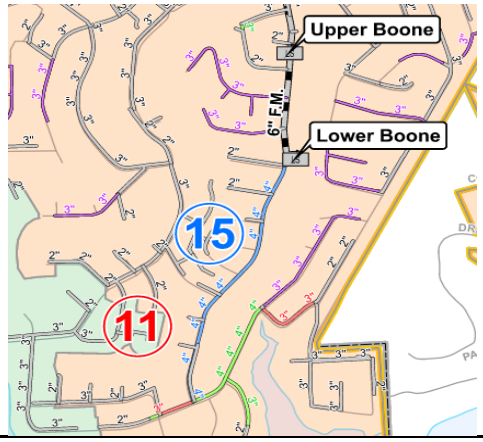
Project Description:

This project includes a 4-inch low-pressure sewer main beginning at Boone Drive and Continental Drive and ties into the existing Lower Boone LS.

Project Drivers:

The proposed pressure main accommodates buildout flows in the Lower Boone LS service area. A gravity main could not be installed in place of the proposed pressure main due to the ground topography.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	4" Force Main < 8 feet deep	3,046	LF	$ 72	$ 219,290
2	Asphalt Pavement Repair	669	LF	$ 100	$ 66,900
				SUBTOTAL:	**$ 286,200**
			CONTINGENCY	30%	$ 85,900
				SUBTOTAL:	**$ 372,100**
			ENG/SURVEY	15%	$ 55,900
				SUBTOTAL:	**$ 428,000**
				Estimated Project Total:	**$ 428,000**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 16 — **Phase:** Medium

Project Name: Rockwood Drive Pressure Main Replacement

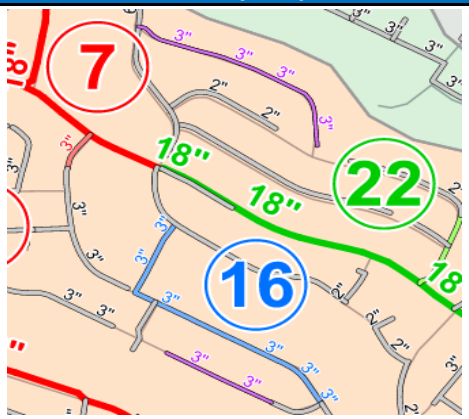
Project Description:

This project includes a 3-inch low-pressure sewer main beginning at Boone Drive and Continental Drive and ties into the existing Lower Boone LS. A gravity main could not be installed in place of the proposed pressure main due to the ground topography.

Project Drivers:

The proposed pressure main accommodates buildout flows in the Lower Boone LS service area.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	3" Force Main < 8 feet deep	2,078	LF	$ 54	$ 112,234
2	Asphalt Pavement Repair	1,512	LF	$ 100	$ 151,200
				SUBTOTAL:	**$ 263,500**
		CONTINGENCY		30%	$ 79,100
				SUBTOTAL:	**$ 342,600**
		ENG/SURVEY		15%	$ 51,400
				SUBTOTAL:	**$ 394,000**
				Estimated Project Total:	**$ 394,000**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 17 — **Phase:** Medium

Project Name: Bar K Ranch Road Pressure Main Replacement

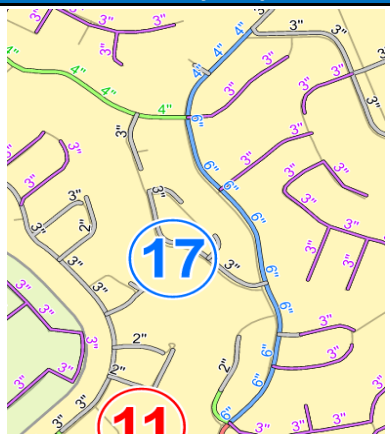
Project Description:

This project includes 6-inch and 4-inch low-pressure sewer mains along Bar K Ranch Road. A gravity main could not be installed in place of the proposed pressure main due to the ground topography.

Project Drivers:

The proposed pressure main project accommodates buildout flows generated from Growth Zone 8 and will be needed as more customers begin to populate the area.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	6" Force Main < 8 feet deep	2,947	LF	$ 108	$ 318,254
2	4" Force Main < 8 feet deep	945	LF	$ 72	$ 68,018
3	Asphalt Pavement Repair	1,403	LF	$ 100	$ 140,300
				SUBTOTAL:	**$ 526,600**
		CONTINGENCY		30%	$ 158,000
				SUBTOTAL:	**$ 684,600**
		ENG/SURVEY		15%	$ 102,700
				SUBTOTAL:	**$ 787,300**
				Estimated Project Total:	**$ 787,300**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 18 — **Phase:** Medium

Project Name: High Drive Lift Station Improvements and New Force Main

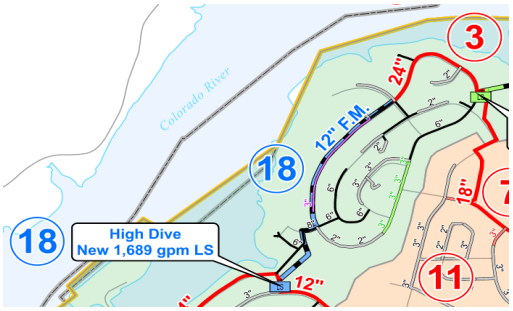
Project Description:

This project includes a new lift station at the existing High Drive LS location to improve the pumping capacity to 1,689 gpm and replace the existing force main with a 12-inch force main.

Project Drivers:

The design flow rate will accommodate projected buildout flow
This project is dependent upon growth in Growth Zones 1 and 2.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 1,689 GPM Lift Station - High Drive LS	1	LS	$ 1,797,000	$ 1,797,000
2	12" Force Main < 8 feet deep	3,214	LF	$ 216	$ 694,224
3	Asphalt Pavement Repair	703	LF	$ 100	$ 70,300
				SUBTOTAL:	**$ 2,561,600**
		CONTINGENCY		30%	$ 768,500
				SUBTOTAL:	**$ 3,330,100**
		ENG/SURVEY		15%	$ 499,600
				SUBTOTAL:	**$ 3,829,700**
				Estimated Project Total:	**$ 3,829,700**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 19 — **Phase:** Medium

Project Name: Tessera Lift Station Improvements

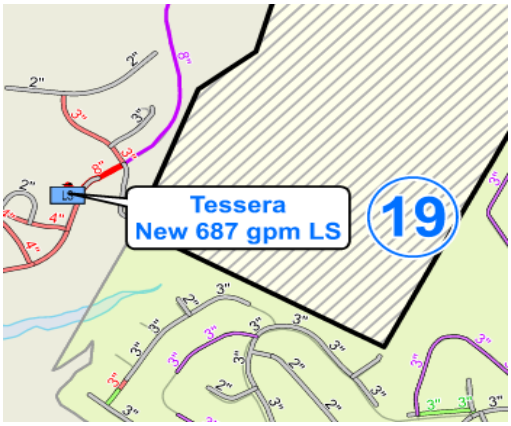
Project Description:

This project includes a replacement of pumps at the existing Tessera LS to improve the pumping capacity to 687 gpm.

Project Drivers:

A force main improvement from the Tessera LS is currently under design and will provide adequate capacity for the future flows from the lift station The design flow rate will accommodate projected buildout flow This project is dependent upon the buildout of the Tessera development. The projected capacity of this lift station will be dependent upon request for wastewater service connection within the ETJ, should an expansion of the ETJ and CCN be considered.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 687 GPM Pumps - Tessera LS	2	EA	$ 128,500	$ 257,000
				SUBTOTAL:	**$ 257,000**
		CONTINGENCY		30%	$ 77,100
				SUBTOTAL:	**$ 334,100**
		ENG/SURVEY		15%	$ 50,200
				SUBTOTAL:	**$ 384,300**
				Estimated Project Total:	**$ 384,300**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**
Construction Project Number: 20 — **Phase: Buildout**

Project Name: New Influent WWTP Lift Station

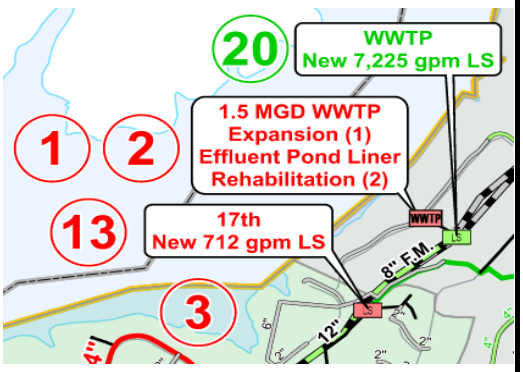
Project Description:

This project consists of a new 7,225 gpm influent lift station at the existing WWTP.

Project Drivers:

A newly constructed wet well, pumps, and piping are required to accommodate future projected buildout peak wet weather flows.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 7,225 GPM WWTP Influent LS	1	LS	$ 5,223,000	$ 5,223,000
				SUBTOTAL:	**$ 5,223,000**
		CONTINGENCY		30%	$ 1,566,900
				SUBTOTAL:	**$ 6,789,900**
		ENG/SURVEY		15%	$ 1,018,500
				SUBTOTAL:	**$ 7,808,400**
				Estimated Project Total:	**$ 7,808,400**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 21 — **Phase:** Buildout

Project Name: New Driving Range Lift Station and 16-inch Force Main

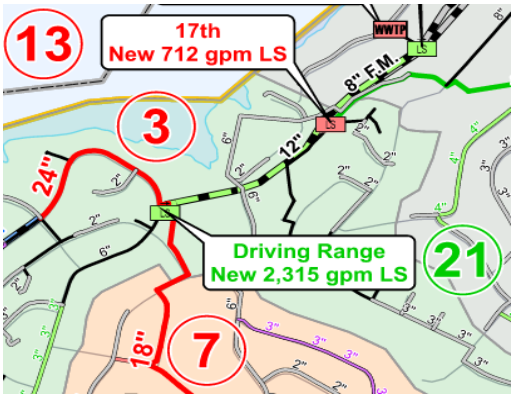
Project Description:

This project consists of a new 2,315 gpm Driving Range LS and associated 16-inch force main.

Project Drivers:

This project is required to accommodate buildout of Growth Zones 1, 2, and 4.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 2,315 GPM Lift Station - Driving Range LS	1	LS	$ 3,582,000	$ 3,582,000
2	16" Force Main < 8 feet deep	2,833	LF	$ 288	$ 815,904
				SUBTOTAL:	**$ 4,398,000**
		CONTINGENCY		30%	$ 1,319,400
				SUBTOTAL:	**$ 5,717,400**
		ENG/SURVEY		15%	$ 857,700
				SUBTOTAL:	**$ 6,575,100**
				Estimated Project Total:	**$ 6,575,100**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 22 — **Phase:** Buildout

Project Name: National Drive 18-inch Gravity Main

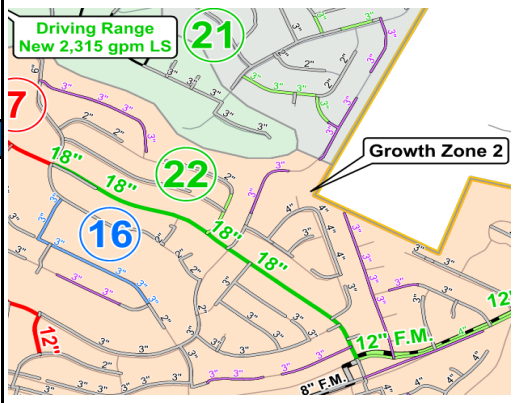
Project Description:

This project includes segments of 18-inch and 12-inch gravity sewer lines beginning at Boggy Ford Road and connects to the upstream end of the proposed 18-inch sewer main of Project #7.

Project Drivers:

This project is dependent upon the buildout of the proposed Winn Ranch as well as the buildout of Growth Zone 4.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	18" Pipe > 16 feet deep	444	LF	$ 432	$ 191,678
2	18" Pipe 8- 16 feet deep	3,358	LF	$ 396	$ 1,329,847
3	18" Pipe < 8 feet deep	479	LF	$ 360	$ 172,404
4	3" Force Main < 8 feet deep	592	LF	$ 54	$ 31,957
5	60" Diameter Manhole	7	EA	$ 6,000	$ 42,000
6	Asphalt Pavement Repair	2,922	LF	$ 100	$ 292,200
				SUBTOTAL:	**$ 2,060,100**
			CONTINGENCY	30%	$ 618,100
				SUBTOTAL:	**$ 2,678,200**
			ENG/SURVEY	15%	$ 401,800
				SUBTOTAL:	**$ 3,080,000**
				Estimated Project Total:	**$ 3,080,000**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 23 — **Phase:** Buildout

Project Name: New Veranda Walk Lift Station and 12-inch Force Main

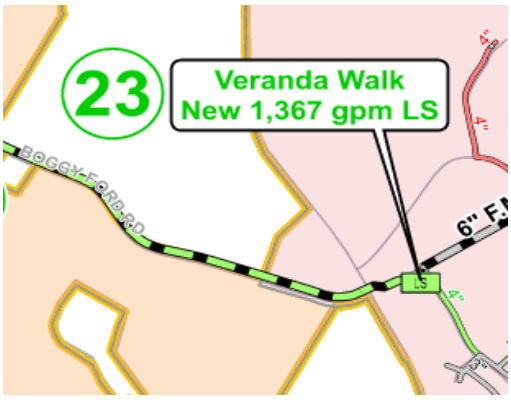
Project Description:

This project consists of a new 1,367 gpm Veranda Walk LS and associated 12-inch force main. The proposed 12-inch force mains disconnects local low-pressure sewer connections, so additional 3-inch and 4-inch pressure pipe will be required to reconnect existing pressure sewer customers.

Project Drivers:

This project is dependent upon the buildout of the Winn Ranch development as well as Growth Zone 4. It was assumed the Winn Ranch development sewer customers would be served by a low-pressure sewer system. Should the development be served by a gravity sewer system, the future capacity of the proposed Veranda Walk improvement should be increased to accommodate additional foul flow from wet weather events.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 1,367 GPM Veranda Walk Lift Station	1	LS	$ 1,355,000	$ 1,355,000
2	12" Force Main < 8 feet deep	5,774	LF	$ 216	$ 1,247,206
3	4" Force Main < 8 feet deep	1,773	LF	$ 72	$ 127,649
4	3" Force Main < 8 feet deep	419	LF	$ 54	$ 22,599
5	Asphalt Pavement Repair	1,793	LF	$ 100	$ 179,300
				SUBTOTAL:	**$ 2,931,800**
		CONTINGENCY		30%	$ 879,600
				SUBTOTAL:	**$ 3,811,400**
		ENG/SURVEY		15%	$ 571,800
				SUBTOTAL:	**$ 4,383,200**
				Estimated Project Total:	**$ 4,383,200**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate	**June 9, 2023**
Construction Project Number: 24	**Phase: Buildout**
Project Name:	**Bar K Lift Station Expansion**

Project Description:

This project consists of adding an additional pump at the Bar K lift station in the empty pump slot created as a part of Project #12.

Project Drivers:

This lift station expansion is necessary to accommodate peak flows generated from the buildout of Growth Zones 7 and 8.

Vicinity Map

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 850 GPM Pump - Bar K Expansion	1	EA	$ 123,000	$ 123,000
				SUBTOTAL:	**$ 123,000**
		CONTINGENCY		30%	$ 36,900
				SUBTOTAL:	**$ 159,900**
		ENG/SURVEY		15%	$ 24,000
				SUBTOTAL:	**$ 183,900**
				Estimated Project Total:	**$ 183,900**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 25 — **Phase:** Buildout

Project Name: Timber Trail to Bar K Lift Station Gravity Main

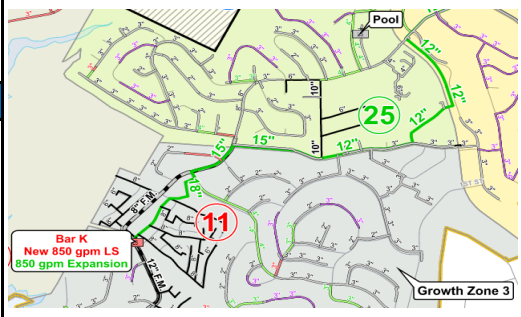
Project Description:

This project includes segments of 18-inch, 15-inch, and 12-inch gravity sewer lines beginning near Bar K Ranch Road and FM 1431 and connects to the improved Bar K LS of Project #12.

Project Drivers:

This project is largely dependent upon the buildout of Growth Zone 8. This project may be split into two segments, should Growth Zone 7 build out quicker than Growth Zone 8.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	18" Pipe 8- 16 feet deep	1,715	LF	$ 396	$ 679,259
2	15" Pipe 8- 16 feet deep	2,468	LF	$ 330	$ 814,341
3	12" Pipe > 16 feet deep	508	LF	$ 288	$ 146,160
4	12" Pipe 8- 16 feet deep	4,890	LF	$ 264	$ 1,290,828
5	8" Force Main < 8 feet deep	475	LF	$ 144	$ 68,443
6	Asphalt Pavement Repair	2,927	LF	$ 100	$ 292,700
				SUBTOTAL:	**$ 3,291,800**
		CONTINGENCY		30%	$ 987,600
				SUBTOTAL:	**$ 4,279,400**
		ENG/SURVEY		15%	$ 642,000
				SUBTOTAL:	**$ 4,921,400**
				Estimated Project Total:	**$ 4,921,400**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 26 — **Phase:** Buildout

Project Name: Lohman Ford Road to 17th Hole Lift Station Gravity Main

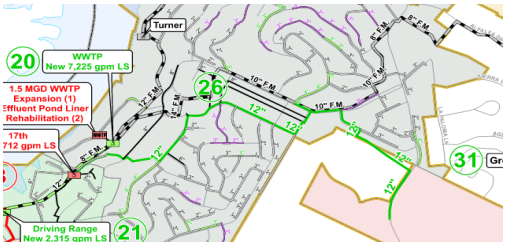
Project Description:

This project includes segments of 18-inch and 12-inch gravity sewer lines beginning at Lohmans Ford Road and ending at the 17th.

Project Drivers:

This project is dependent upon the buildout of the proposed Villas at Keegans Crossing as well as the development of the 140-acre parcel across the street from the proposed development.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	18" Pipe 8- 16 feet deep	828	LF	$ 396	$ 327,730
2	12" Pipe > 16 feet deep	2,710	LF	$ 288	$ 780,509
3	12" Pipe 8- 16 feet deep	6,605	LF	$ 264	$ 1,743,641
4	12" Pipe < 8 feet deep	226	LF	$ 240	$ 54,120
5	16" Force Main < 8 feet deep	1,047	LF	$ 288	$ 301,507
6	60" Diameter Manhole	14	EA	$ 6,000	$ 84,000
7	Asphalt Pavement Repair	2,213	LF	$ 100	$ 221,300
				SUBTOTAL:	**$ 3,512,900**
		CONTINGENCY		30%	$ 1,053,900
				SUBTOTAL:	**$ 4,566,800**
		ENG/SURVEY		15%	$ 685,100
				SUBTOTAL:	**$ 5,251,900**
				Estimated Project Total:	**$ 5,251,900**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 27 — **Phase:** Buildout

Project Name: Truman Lift Station Replacement Pumps

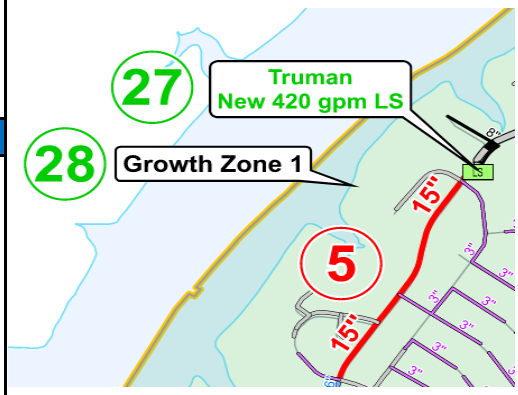
Project Description:

This project consists of the replacement pumps at Truman LS to bring the capacity of the lift station to 420 gpm.

Project Drivers:

This improvement is necessary as peak flows increase in the buildout planning period. Considerations for improvements to the wet well and piping should be made upon replacement of the pumps as the condition of the components may deteriorate until this project is required and may necessitate replacement.

Vicinity Map



Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	New 420 GPM Pumps - Truman LS	2	EA	$ 60,500	$ 121,000
				SUBTOTAL:	**$ 121,000**
				CONTINGENCY 30%	$ 36,300
				SUBTOTAL:	**$ 157,300**
				ENG/SURVEY 15%	$ 23,600
				SUBTOTAL:	**$ 180,900**
				Estimated Project Total:	**$ 180,900**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 28 — **Phase:** Buildout

Project Name: Growth Zone 1 Buildout Pressure Main Replacement

Project Description:

This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 1.

Project Drivers:

The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	4" Force Main < 8 feet deep	3,495	LF	$ 72	$ 251,669
2	3" Force Main < 8 feet deep	4,200	LF	$ 54	$ 226,784
3	2" Force Main < 8 feet deep	58	LF	$ 36	$ 2,095
4	Asphalt Pavement Repair	7,753	LF	$ 100	$ 775,330
				SUBTOTAL:	**$ 1,255,900**
		CONTINGENCY		30%	$ 376,800
				SUBTOTAL:	**$ 1,632,700**
		ENG/SURVEY		15%	$ 245,000
				SUBTOTAL:	**$ 1,877,700**
				Estimated Project Total:	**$ 1,877,700**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate	**June 9, 2023**
Construction Project Number: 29	**Phase: Buildout**
Project Name:	**Growth Zone 2 Buildout Pressure Main Replacement**

Project Description:

This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 2.

Project Drivers:

The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	4" Force Main < 8 feet deep	1,443	LF	$ 72	$ 103,903
2	3" Force Main < 8 feet deep	1,911	LF	$ 54	$ 103,189
3	Asphalt Pavement Repair	3,354	LF	$ 100	$ 335,400
				SUBTOTAL:	**$ 542,500**
		CONTINGENCY		30%	$ 162,800
				SUBTOTAL:	**$ 705,300**
		ENG/SURVEY		15%	$ 105,800
				SUBTOTAL:	**$ 811,100**
				Estimated Project Total:	**$ 811,100**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 30 — **Phase:** Buildout

Project Name: Growth Zone 3 Buildout Pressure Main Replacement

Project Description:

This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 3.

Project Drivers:

The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	8" Pipe 8- 16 feet deep	382	LF	$ 176	$ 67,162
2	4" Force Main < 8 feet deep	6,738	LF	$ 72	$ 485,122
3	3" Force Main < 8 feet deep	9,096	LF	$ 54	$ 491,189
4	60" Diameter Manhole	2	EA	$ 6,000	$ 12,000
5	Asphalt Pavement Repair	16,216	LF	$ 100	$ 1,621,550
				SUBTOTAL:	**$ 2,677,100**
		CONTINGENCY		30%	$ 803,200
				SUBTOTAL:	**$ 3,480,300**
		ENG/SURVEY		15%	$ 522,100
				SUBTOTAL:	**$ 4,002,400**
				Estimated Project Total:	**$ 4,002,400**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 31 — **Phase:** Buildout

Project Name: Growth Zone 4 Buildout Pressure Main Replacement

Project Description:

This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 4.

Project Drivers:

The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	4" Force Main < 8 feet deep	2,250	LF	$ 72	$ 162,022
2	Asphalt Pavement Repair	2,250	LF	$ 100	$ 225,030
				SUBTOTAL:	**$ 387,100**
		CONTINGENCY		30%	$ 116,200
				SUBTOTAL:	**$ 503,300**
		ENG/SURVEY		15%	$ 75,500
				SUBTOTAL:	**$ 578,800**
				Estimated Project Total:	**$ 578,800**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 32 — **Phase:** Buildout

Project Name: Growth Zone 5 Buildout Pressure Main Replacement

Project Description:

This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 5.

Project Drivers:

The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	3" Force Main < 8 feet deep	2,486	LF	$ 54	$ 134,217
2	Asphalt Pavement Repair	2,486	LF	$ 100	$ 248,550
				SUBTOTAL:	**$ 382,800**
		CONTINGENCY		30%	$ 114,900
				SUBTOTAL:	**$ 497,700**
		ENG/SURVEY		15%	$ 74,700
				SUBTOTAL:	**$ 572,400**
				Estimated Project Total:	**$ 572,400**

Comments:

City of Lago Vista

Capital Improvement Cost Estimate — **June 9, 2023**

Construction Project Number: 33 — **Phase:** Buildout

Project Name: Growth Zone 7 Buildout Pressure Main Replacement

Project Description:

This project consists of various segments of existing pressure mains that need to be upsized with the buildout of parcels within Growth Zone 7.

Project Drivers:

The timing of the pressure main replacement is dependent upon the development of pre-platted parcels upstream of the identified areas.

Opinion of Probable Construction Cost

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	4" Force Main < 8 feet deep	2,841	LF	$ 72	$ 204,566
2	3" Force Main < 8 feet deep	748	LF	$ 54	$ 40,403
3	Asphalt Pavement Repair	3,589	LF	$ 100	$ 358,940
				SUBTOTAL:	**$ 604,000**
		CONTINGENCY		30%	$ 181,200
				SUBTOTAL:	**$ 785,200**
		ENG/SURVEY		15%	$ 117,800
				SUBTOTAL:	**$ 903,000**
				Estimated Project Total:	**$ 903,000**

Comments: