ASSET MANAGEMENT PLAN

MUNICIPAL WASTEWATER SYSTEM

November 2023

Prepared For:

City of Walis, TX

STATE OF TEXAS
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Acronyms/Abbreviations

ADF	average daily flow
AMPSS	Asset Management Plan for Small Systems
BOD	biological oxygen demand
CCTV	closed circuit television
City	Water Control & Improvement City No. 2
City	City of Wallis
COF	consequence of failure
City	Colorado County Water Control & Improvement City No. 2
DIP	ductile iron pipe
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FRP	fiberglass reinforced plastic
ft	feet
GIS	geographic information system
gpd	gallons per day
gpm	gallons per minute
HP	horsepower
HR Green	HR Green, Inc.
I&I	infiltration/inflow
kW	kilowatt
LF	linear feet
LOF	likelihood of failure
LS	lift station, lump sum
MACP	Manhole Assessment and Certification Program
MGD	million gallons per day
MH	manhole
NASSCO	National Association of Sewer Service Companies
OPC	opinion of probable cost
PVC	polyvinyl chloride
SCADA	supervisory control and data acquisition
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
VCP	vitrified clay pipe
WCID	Water Control & Improvement City
WRRDA	Water Resources Reform and Development Act
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

ES. 1 Background Information

HR Green, Inc. (HR Green) was authorized by the Texas Water Development Board (TWDB) to provide asset management services for the wastewater system in the City of Walis, Texas (City). This asset management plan (AMP) evaluates the condition of the City's sanitary sewer system and provides a comprehensive plan to manage the sanitary sewer system assets in accordance with the City of Walis.

ES. 2 Statement of Objectives and Report Organization

The objective of this AMP is to develop an inventory of key components of the sanitary sewer collection and treatment system and prioritize improvements according to asset condition and criticality within the system. The following items were established as the project requirements:

- Conduct a system evaluation including asset identification, location, and estimate service life;
- Develop a sanitary sewer collection and treatment asset inventory;
- Prioritize asset improvements based on asset condition and criticality.
- Develop a comprehensive plan for managing the wastewater system improvements based on the City's current and future budgets.
- Develop an implementation plan, including a schedule for implementing and updating this asset management plan; and
- Identify critical assets, evaluate their ability to function in adverse weather or prolonged electrical grid outages, and develop recommendations for emergency preparedness and operations.

The organization of this AMP is based on the Texas Commission on Environmental Quality (TCEQ) Managing Small Domestic Wastewater Systems (RG-530, January 2018). This report is organized to include:

- An asset inventory of the collection system, lift stations, and treatment facility (**Section 2**).
- A comprehensive plan for asset improvements and improvement schedule (**Section 3**).
- Budget Planning Strategies for maintaining the system assets including funding assistance and other sources of funding, Energy Assessment, and Public Participation Programs (**Section 4**).
- An energy and sustainability assessment (**Section 5**).
- Recommendations for system resiliency, weatherization, and emergency preparedness (**Section 7**).
- AMP Summary and Recommendations in **Section 9**.

ES. 3 Methodology and Evaluations

Geographic Information Systems (GIS) data collection methods were utilized to create the asset inventory. Location data for each asset collected during field investigations utilizing a global positioning system (GPS) was imported into a GIS map. This GIS map also contains all available record information on the collection system acquired by HR Green during site investigation. Access to the asset map is via the ESRI (Environmental Systems Research Institute) ArcGIS Online Dashboard (Dashboard or GIS Platform). The GIS Platform is the working platform that allows HR Green to add and edit geographic information. The ArcGIS Dashboard (GIS Platform) is an interactive viewport of the geographic information available to the City to view system components hosted by HR Green and its servers.

The GIS Platform allows the City to view the current condition of each asset and edit asset conditions, as needed, and data is stored on the cloud and accessible from different devices, such as desktops or mobile devices. The ESRI platform contains a variety of software and applications that cater to users involved in planning, management, operations, and maintenance. Under the ESRI platform, they can utilize their applications for planning, and in the field during daily operation and maintenance.

The sanitary sewer system in the City is categorized into three components:

1. The Collection System (sanitary manholes, sewer gravity lines, forcemains),
2. Sanitary Sewer Lift Stations (LS), and
3. Wastewater treatment plant (WWTP).

Using this asset inventory developed by HR Green, the City's sanitary sewer system was rated based on Condition and Criticality. Improvement recommendations to the sanitary system are based on the condition of the asset. The following improvements are recommended and further detailed in the report.

Condition Rating is based on age, operability, present condition, etc. The Criticality Score is defined as how critical the asset is to the overall function of the wastewater system. It is a function of the level of service the asset provides to the City, and the City may be significantly impacted by the failure of the asset. In a simplistic example, the failure of an overhead site lighting may not be as critical to the City as a failure of a pump that keeps untreated wastewater flowing from homes to the WWTP, therefore the pump would have a higher Criticality Score than the site lighting.

ES 3.1 COLLECTION SYSTEM

The collection system includes manholes, gravity lines, and force mains.

Sanitary Sewer Manholes

Each manhole in the collection system was evaluated for its present condition by the HRG field team with at least one staff containing National Association of Sewer Service Companies (NASSCO) certification. Depending on the condition of the manhole, improvements could include complete replacement, rehabilitation, or preventative maintenance inspections depending on the condition of the manhole. HR Green assessed manhole conditions based on NASSCO rating standards as detailed in **Section 2.1**. The condition assessment for the manholes used in this report is based on NASSCO Manhole Assessment Condition (MACP) grading system (Bad, Poor, Fair, Good, and Excellent) and was converted to a numerical prioritization rating from 1(Excellent) through 5(Bad). Within the extent of this report and project, a Condition Rating of 1 is considered Excellent Condition and Condition Rating of 5 is considered Bad Condition. A total of 159 manholes were evaluated by HR Green, as summarized in **Table ES-1**. Associated costs are detailed in **Section 3.2**.

TABLE ES-1 SANITARY MANHOLE ASSETS SUMMARY IMPROVEMENTS

CONDITION RATING	CONDITION DESCRIPTION	MANHOLE QUANTITY	IMPROVEMENT TYPE
1	EXCELLENT	0	Preventative - Regular Inspection (every five years)
2	GOOD	7	Preventative - Regular Inspection (every five years)
3	FAIR	101	Preventative - Regular Inspection (every three years)
4	POOR	29	Replace or Rehabilitation (within 1-2 year)
5	BAD	2	Replace or Rehabilitation (within 1-2 year)
NO ACCESS/ NOT FOUND	NO ACCESS OR NOT FOUND	20	Complete Inspection
TOTAL		**159**	

Sanitary Sewer Gravity Lines and Force Mains

The collection system gravity sewers and force mains were not directly inspected in the field, but were inferred based on findings in record drawings, observations at manhole and lift stations, and City discussion. **Section 2.1** describes the methodology for evaluating the sewer lines and the results.

It should be noted that sanitary sewer line inlets and outlets were assessed, and the pipe sizes and material were observed at each manhole. The gravity flow direction and sewer paths were confirmed or re-oriented based on the record maps provided by the City. The condition grades for the sanitary sewer lines were assigned a numerical prioritization rating from 1 (Excellent) through 5 (Bad) based on the location and material of the pipe. Sewer line asset condition is summarized in **Table ES-2**.

TABLE ES-2 SANITARY GRAVITY LINE ASSETS SUMMARY IMPROVEMENTS

Grade	Description	Percentage of Total Sanitary Sewer System
1 – Excellent	The sanitary main has been replaced in the last year.	0% (0 LF)
2 – Good	The pipe is PVC and outside designated areas High-Risk Zone 1, 2, or 3[1].	30% (19,647 LF)
3 – Fair	The pipe is PVC and within designated areas High-Risk Zone 1, 2, or 3[1].	30% (19,397 LF)
4 – Poor	The pipe is VCP or unknown and outside designated areas High-Risk Zone 1,2, or 3[1].	20% (12,727 LF)
5 – Bad	The pipe is VCP or unknown material and within designated areas High-Risk Zone 1,2, or 3[1].	20% (13,034 LF)
	Total	**100% (64,805 LF)**

[1] The High-Risk Zones are shown in **Figure 2-4**

ES 3.2 LIFT STATIONS

Walis has six (6) lift stations (LS); each one was evaluated for rehabilitation and improvements. The mechanical, electrical, and structural assets were ranked based on condition and criticality as detailed in **Section 2.2**. A detailed breakdown of LS improvements is discussed in **Section 3.2**.

ES 3.3 WASTEWATER TREATMENT PLANT (WWTP)

Walis has one (1) WWTP that was evaluated for rehabilitation and improvements. The WWTP systems and equipment were ranked based on condition and criticality as detailed in **Section 2.3.**

The WWTP was evaluated during the site visit by an engineer accompanied by the City operator in February 2023. The WWTP was evaluated based on apparent condition during the site visit. An asset inventory was generated for the WWTP for future use for operation and maintenance.

ES. 4 Recommendations

Recommended improvements are based on the Priority Rating formula as described in this report. Priority improvements are described in **Section 3** and summarized as follows:

- Replace Poor and Bad rated manholes.
- Replace the vitrified clay pipe (VCP) as indicated in **Section 3.2.2.**
- Improvements to LS Nos. 2, 3, 4, and 6, including pump replacement and structural rehabilitation.
- WWTP improvements to structures for the Influent System (wet well), Primary System (Imhoff tanks), and Secondary System (trickling filters) as indicated in **Section 3.2.4.**

However, based on the available funding (**Section 4**), the improvement schedule is slightly modified as shown in **Table ES-3.**

This plan should be updated at least every 5 years to address changes in the City's needs and system conditions. The comprehensive plan associated with the AMP in **Section 3** should be used as a baseline for future implementation plans. Improvements mentioned in this AMP can be built upon in future plans, or if improvements roll over 5 years, that can be transferred from this AMP to the future implementation plans.

As part of this TWDB program, there is a one-year follow up with the City on the implementation of this AMP. **Table ES-2** is provided as a tool to monitor progress on the implementation of the AMP. The checklist consists of tasks that the City Staff can implement during the one-year timeline. Towards the end of the one-year timeline, this checklist will be used to gauge the progress the City has made utilizing the information in this AMP.

HR Green recommends routinely updating the City's GIS database through the Dashboard/GIS Platform as the City continues to grow its sanitary sewer assets. This will promote organization of the City's sewer infrastructure during future maintenance and capital improvement planning.

TABLE ES-3 RECOMMENDED CHECKLIST FOR AMP IMPLEMENTATION

Immediate Improvements (within the next year)			
			Recommended Tasks
	Collection System		
			City Staff utilizing ArcGIS to update data and record improvements
			City has ArcGIS information available to the public to view on their website
			City Staff utilizing ArcGIS to maintain a Regular MH inspection program
			City replaced Bad and Poor Condition MHs (15 Manholes)
			City located Manholes Not Found and identified solutions for Manholes No Access (11 Manholes)
			City in process of CCTV inspections on sanitary sewer lines within the High-Risk Zones as mentioned in this document.
			City begins an Inflow & Infiltration study to measure how much additional flow the WWTP is receiving due to I&I
	Lift Stations		
			City completes Pump Replacement at LS No. 3 (2 pumps) and LS No. 6 (1 pump). Capacity assessment is completed at LS Nos. 2, 3, 4, and 6.
			City identified rehabilitation for structural improvements at LS Nos. 2, 3, and 4.
	Wastewater Treatment Plant		
			City addresses concrete basin structure improvements at Primary, Secondary, and Influent system at WWTP (Imhoff Tanks 1 and 2 and Trickling Filters 1 and 2).

TABLE ES-3 RECOMMENDED CHECKLIST FOR AMP IMPLEMENTATION (CONT'D)

Short Term Improvements (within the next 5 years)			
			Recommended Tasks
	Collection System		
			City utilizing ArcGIS to maintain a Regular MH inspection program for Excellent, Good, and Fair manholes.
			City completes CCTV inspections on remaining sanitary sewer lines.
			City begins rehabilitation and replacement of VCP lines within the High-Risk Zones.
			City Staff utilizing GIS platform to update data and record improvements
	Lift Stations		
			City completes Pump Replacement at LS No. 4 (2 pumps), ideally at year 3.
			City completes structural improvements at LS Nos. 2, 3, and 4. City starts evaluation for additional improvements outlined in this report for the LS.
			City Staff re-inspecting all LS for any necessary improvements (Year 5).
	Wastewater Treatment Plant		
			City addresses Influent system improvements at WWTP (Pumps, ARVs, and valves).
			City addresses lower priority assets at WWTP.
Other Improvements (within the next 10 years)			
			Recommended Tasks
	Collection System		
			City begins rehabilitation/replacement of VCP lines outside the High-Risk Zones.
			City Staff utilizing GIS platform to update data and record improvements.
	Lift Stations		
			City addresses lower priority assets improvements at each LS.
			City Staff re-inspecting all LS for any necessary improvements (every 5 years).
	Wastewater Treatment Plant		
			City addresses lower priority assets at WWTP and re-evaluated the WWTP capacities.
			City addresses lower priority assets at WWTP.

1.0 INTRODUCTION

1.1 Background

The city of Walis (City), located in Austin County, Texas, has a population of approximately 1,292 (Census 2020) and encompasses approximately 1.5 square miles. The City's sanitary sewer system is divided into three components: (1) the collection system (includes manholes, gravity sewer lines, forcemains); (2) lift stations (LS), and (3) the wastewater treatment plant (WWTP).

The collection system consists of gravity lines and associated manholes that carry wastewater flow to five (5) LS. There is one on-site LS at the WWTP facility. The WWTP is located at the northeast portion of Walis and is permitted to treat an average daily flow of 0.498 million gallons per day (MGD) and a 2-hour peak of 1.5 MGD. The last major improvement of the WWTP was completed in 1985. The City currently has a third-party licensed operator that operates the five LS and WWTP. The City maintains the collection system.

1.2 Purpose and Methodology

Asset management can help get the most value out of assets that make up the water system by prioritizing repairs and budgeting for equipment replacement. Within a wastewater system, an "asset" includes treatment facility, facilities/building, equipment, manholes, and pipes. The purposes of the asset management plan (AMP) is to create an updated inventory, evaluation, and define improvements of key components in the sanitary sewer collection system and establish an asset management routine. The asset improvements are prioritized according to condition and criticality (i.e., the role the asset provides within the wastewater system). The methodology is generalized as follows:

- Conduct a current state analysis (asset ID, condition rank, asset information, location, and service life) for the collection system; system evaluation including asset identification, condition, location, and service life.
- Conduct a current state analysis for the WWTP; equipment and asset inventory.
- Prioritize asset improvements based on asset condition and criticality.
- Develop a comprehensive plan for improving the wastewater system based on the city's current and future budgets; and
- Develop an implementation plan, including a time schedule for implementing and updating the asset management plan. As part of the implementation plan, the GIS Dashboard will be used to assist in future operation and maintenance of the wastewater system.

This methodology is based on the Texas Commission on Environmental Quality (TCEQ) Managing Small Domestic Wastewater Systems (RG-530, January 2018).

1.3 Geographic Information Systems

This AMP report is only a part of the deliverable package provided to the City. HR Green will also provide the City with an ESRI account to allow access to an interactive web application where the City can view and evaluate detailed wastewater system assets through the ESRI ArcGIS Dashboard.

Through the Dashboard, the City can view its sanitary sewer system, as well as the current condition of each asset in its system. The GIS information is stored online so the data uploaded in the field during maintenance can be seen immediately on the Dashboard via a computer or smartphone. An associated ESRI ArcGIS mobile application will allow City staff to update the Dashboard in the field during daily operation and maintenance, such as adding additional assets, updating the model numbers, re-evaluating the asset condition, tracking work orders, and uploading field photos. HR Green recommends routinely updating the City's GIS asset inventory and characterization through the Dashboard as the City continues to improve its sanitary sewer assets. By continually updating the asset inventory and condition, the City will eventually be able to manage its existing system through one GIS platform. As part of the AMP, HR Green will provide training to the City staff to utilize the ArcGIS Dashboard for future asset inventory and management needs.

1.4 Limitations of Analysis

Assets were inspected and identified over a week-long period in February 2023. HR Green completed field visits to the City of Walis to collect data, inspect and field verify system assets. In addition, HR Green had discussions with the city operators about the existing state of their equipment. A certified National Association of Sewer Service Companies (NASSCO) inspector evaluated manhole condition. NASSCO is a North American trade organization established to set industry standards for the assessment, maintenance and rehabilitation of underground infrastructure. The manhole inspection protocol is based on a condensed version of the standardized protocol from the NASSCO Manhole Assessment and Certification Program (MACP) to gather information to document critical defects, determine condition of the manhole, and provide the specific information needed to recommend corrective action.

Sanitary pipe conditions were assessed visually based on engineering judgement of the field verified pipe material at the inlet and outlet in the manhole, and size of the pipe. Sanitary pipe locations and elevations were measured at pipe inverts during manhole inspection. No in-depth inspection regarding smoke testing

or CCTV were part of this scope. Sanitary service lines and clean-outs were not inspected or located as part of this scope. All sewer evaluations were based on desktop evaluation of record drawings and discussions with the City.

HR Green completed data collection at the WWTP by using construction record drawings and the TPDES discharge permit in conjunction with site visits and discussions with the Operator.

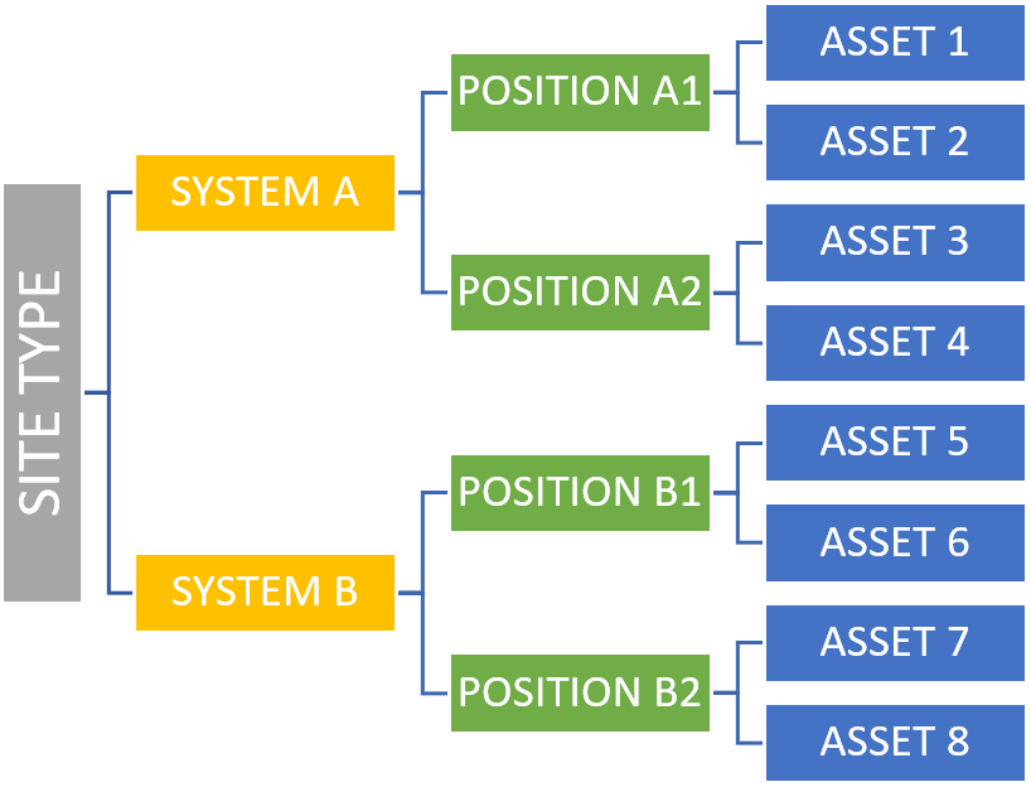
2.0 ASSET INVENTORY AND CONDITION

This section describes the current state of the existing sanitary sewer collection system, LSs, and WWTP. Data collection of assets in the wastewater system was completed by reviewing the record sewer maps provided by the City and field visit evaluations in February 2023. Records of assets were compiled into the ArcGIS database. Record maps were used as a preliminary template to find the general location of manholes throughout the City, and using GIS, the locations were verified or updated to highly accuracy coordinates. A Trimble R2 GPS unit measured location and elevation to centimeter-grade accuracy. The ESRI Field Maps mobile application was used for data entry in the field. Information entered in the field was then uploaded to the online cloud-based server, where the remote HR Green project team accessed and edited the data on their desktop as needed. In addition to using the GPS unit, HR Green performed manhole condition inspections based on a condensed NASSCO Manhole Assessment and Certification Program (MACP) inspection procedure.

For Facility-Type assets such as lift stations and the WWTP, the assets were hierarchically organized based on the common Structure “Site Type > System > Position > Asset”. An inventory of the assets at the facilities was developed as this asset registry/hierarchy and verified and updated by field data collected during site visits. An example of the hierarchy structure used in this assessment is depicted in **Figure 2-1**.

The condition assessment of each asset is based on the extent of deterioration that impacts the ability of the asset to perform its original function. Within the extent of this report and project, rating of 1 is considered in Excellent Condition and rate of 5 is considered Bad Condition.

Figure 2-1 Typical Asset Hierarchy Structure for Facilities

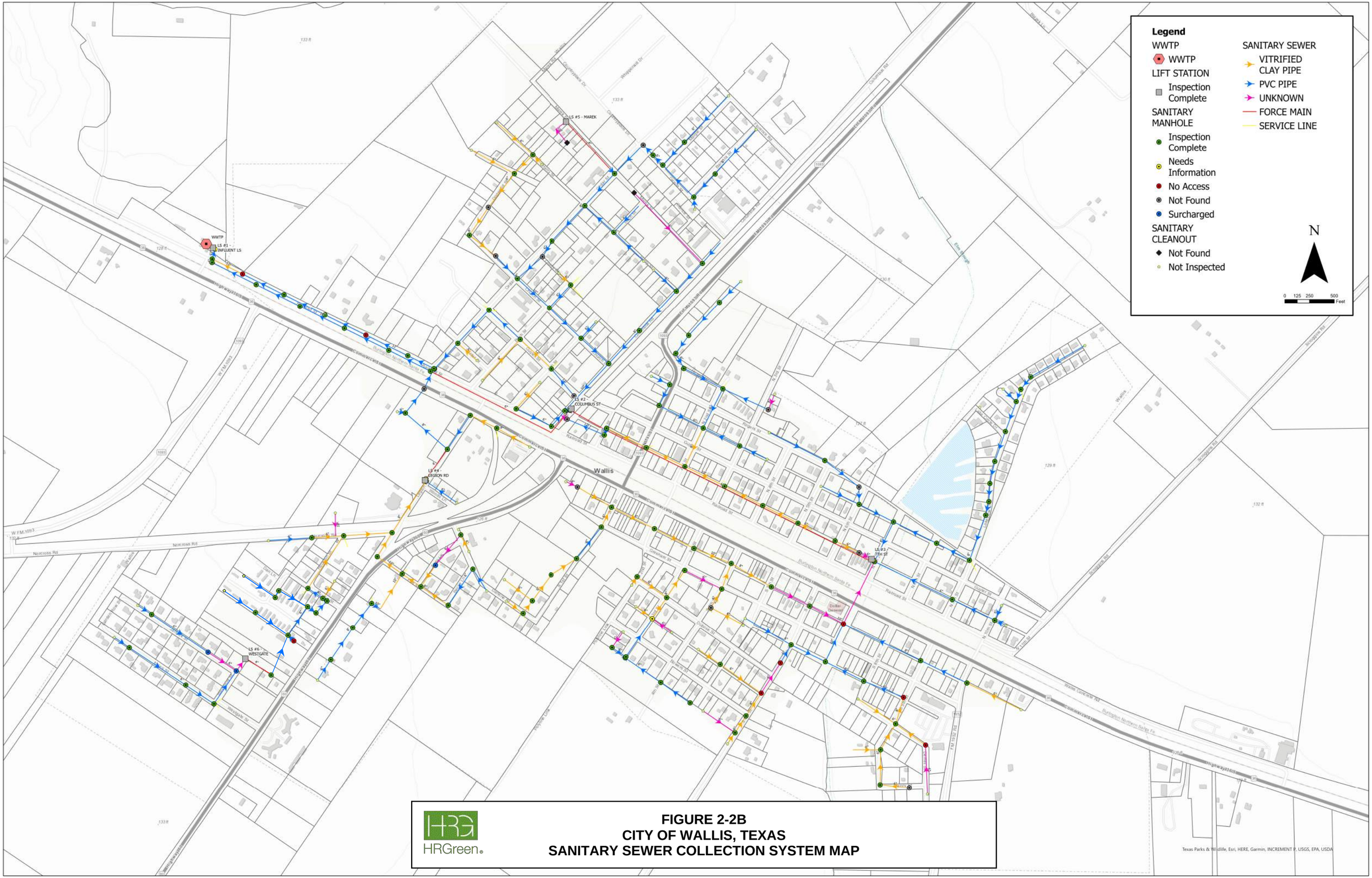


2.1 Collection System (Sanitary Manholes and Gravity Mains)

There is a total of approximately 64,800 LF of sanitary sewer line and 159 manholes in the City of Walis as shown in **Figure 2-2**. There is a major railroad right of way (ROW) and State Highway TX-36 that runs east-west and divides the City. The sanitary system generally flows to the northwest towards the WWTP site, into the on-site LS. There are two sanitary sewer crossings that gravity flow from the south side of the City to the north side as shown on the map.

FIGURE 2-2
CITY OF WALLIS, TEXAS
SANITARY SEWER COLLECTION SYSTEM MAP

HRGreen



HRGreen

FIGURE 2-2B
CITY OF WALLIS, TEXAS
SANITARY SEWER COLLECTION SYSTEM MAP

2.1.1 DATA COLLECTION

HR Green performed manhole condition inspections based on a condensed NASSCO MACP inspection procedure. For each manhole the following was recorded: size, type, depth; material of construction; condition of the manhole cover, frame, joints, and overall condition; visible evidence of inflow and infiltration (I&I); and any other notes related to the manhole or location. The flows in and out of the manhole were observed. Photographs of the manhole location and interior condition were collected and are in the Dashboard. The summary of manhole material type within the City sanitary sewer collection system is shown in **Table 2-1.**

TABLE 2-1 SANITARY SEWER MANHOLE MATERIAL SUMMARY

MANHOLE MATERIAL	QUANTITY
Brick	50 (31%)
Precast Concrete	81 (50%)
Fiberglass Reinforced	7 (4%)
Unknown	25 (15%)
TOTAL	**163**

There are approximately 64,800 LF of sanitary gravity mains within the City's collection system. The characteristics of this system are shown in **Table 2-4**. It should be noted that sanitary sewer pipes were not excavated or visually inspected via camera due to the scope within this project. All condition ratings and assumptions were based on the information available at the desktop study-level or from discussions with the City. Similar to the sanitary sewer pipes, force mains, service lines, and clean outs were not evaluated within this project scope.

TABLE 2-2 SANITARY SEWER SYSTEM GRAVITY MAINS PIPE MATERIAL AND SIZE

EXISTING PIPE SIZES, ORGANIZED BY PIPE MATERIAL	QUANTITY (FT)	PERCENT OF TOTAL
Polyvinyl Chloride (PVC)	**39,044**	**60.2%**
4"	176	
6"	21,521	
8"	9,947	
10"	3,680	
12"	3,721	
Vitrified Clay Pipe (VCP)	**19,929**	**30.8%**
6"	9,567	
8"	5,677	
10"	3,741	
12"	944	
Not Known (Unconfirmed)	**5,833**	**9.0%**
6"	3,499	
8"	113	
10"	1,792	
12"	65	
Unknown Size	363	
Total	**64,805**	**100%**

2.1.2 ASSET ASSESSMENT

Manholes

The condition assessment for the manholes used in this report is similar to the NASSCO MACP grading system (Bad, Poor, Fair, Good, and Excellent) and was converted to a numerical prioritization rating from 1 through 5, as shown in **Table 2-2**. Final rating determination of manhole was based on the condition of individual components within the manhole. The useful life of the manholes was based on the inspection of the manhole and engineering judgement of the typical manhole infrastructure life cycle. Inspection of the manhole included examining the individual components within the manhole that showed signs of deterioration. **Table 2-2** shows the grading and the estimated remaining useful life of typical manhole infrastructure. The estimated remaining useful life of a manhole is based on a typical maximum design life expectancy of 10-30 years for brick manholes and 50-100 years for a concrete manhole.

TABLE 2-3 CONDITION ASSESSMENT GRADING SYSTEM FOR MANHOLES

GRADE	DESCRIPTION	ESTIMATED REMAINING USEFUL LIFE
1 – Excellent	Minor Defects. Acceptable structural condition, no visible infiltration or corrosion, cover and seal in excellent condition.	> 50 Years
2 - Good	Structure that have not begun to deteriorate. Acceptable structural condition, little visible infiltration or corrosion, cover and seal in good condition.	> 20 years
3 – Fair	Moderate defects that will continue to deteriorate. Acceptable structural condition, some visible infiltration or corrosion, cover and seal in fair condition.	10 – 20 years
4 – Poor	Severe defects that will become 1-Bad defects within the foreseeable future. Cracks or fractures visible in chimneys, significant visible infiltration, roots, or corrosion, cover and/or seal in poor condition.	5 – 10 years
5 – Bad	Structurally unsound, brick manholes missing bricks/mortar, safety hazard (i.e., no manhole cover), significant visible infiltration or corrosion, cover and/or seal broken or in bad condition.	< 5 years

These parameters were used to assess the manholes within the City; a summary of the manhole conditions are shown in **Table 2-3**. **Figure 2-3** shows the overall manhole condition in the collection system. The full manhole inventory, material, and associated condition grades can also be found in **Appendix A**.

TABLE 2-4 SANITARY SEWER MANHOLE CONDITION SUMMARY

CONDITION RATING	CONDITION DESCRIPTION	MANHOLE QUANTITY	PERCENT (%) OF TOTAL SYSTEM
1	EXCELLENT	0	0%
2	GOOD	7	4.4%
3	FAIR	101*	63.5%
4	POOR	29	18.2%
5	BAD	2	1.3%
No Access	NO ACCESS AT TIME OF INSPECTION DUE TO LOCATION, BURIED, OR BARRIER FROM A COMMERICAL/ RESIDENTIAL PROPERTY	8	5.0%
Not Found/ Does Note Exist	NOT FOUND OR NOTED BY CITY STAFF, THEY MAY NOT EXIST.	12	7.5%
TOTAL		**159**	100%

*Note that there are (4) manholes that were considered the old wet well as part of existing the lift stations or WWTP and now are denoted as manholes in the collection system. However, these manholes were evaluated as part of the lift station and WWTP assessment.

LS #5 - MAREK ST

LS #1 - INFLUENT LS

WWTP

LS #2 - COLUMBUS ST

LS #4 - LEGION RD

LS #6 - WESTGATE

LS #3 - 7TH ST

Wallis

Highway 36 S

Commerce St

FM 1093 Rd

Elm Slough

Norcross Rd

Highway 60

Railroad St

Burlington Northern San Fe

Wallis Concrete Rd

Schoggins Rd

FM 1952 Rd

Polyline Link

Legend

- WWTP
- LIFT STATION
- 2 - GOOD CONDITION
- 3 - FAIR CONDITION
- 4 - POOR CONDITION
- 5 - BAD CONDITION
- NOT FOUND/NO ACCESS MANHOLE
- SANITARY GRAVITY MAIN
- SANITARY FORCE MAIN

FEMA FLOODPLAIN

- 1% Annual Chance Flood Hazard

N

0 500 1,000 Feet

HRGreen

FIGURE 2-3
CITY OF WALLIS, TEXAS
OVERALL SANITARY MANHOLE CONDITION MAP

Sanitary Sewer Collection Pipes

Sanitary sewer gravity lines were inventoried based on the information collected at each manhole. Inlet and outlet pipe invert elevations at each manhole were measured to get the depths and sizes of the pipes. Pipe materials were visually verified at each manhole and were assumed to be the same size and materials between manholes.

City staff reported an aging sanitary sewer system consisting of mainly vitrified clay pipes (VCP) and polyvinyl chloride (PVC). The typical design life expectancy of VCP is 50-100 years according to the National Clay Pipe Institute. In many municipalities, VCP in sanitary systems are recommended to be replaced as it is prone to cracking at the joints which allow intrusion from roots and contributes to I&I. Sanitary sewer condition was rated based on location and material properties. Similar to the manholes, the condition grades for the sanitary sewer lines are assigned a numerical prioritization rating from 1 through 5 based on the location and material of the pipe, where a rating of 1 is considered in Excellent Condition and rate of 5 is considered Bad condition.

For the sanitary sewer assessment, the pipes are prioritized primarily based on pipe material and location of the pipe within “High-Risk Zones”. The High-Risk Zones are shown in **Figure 2-4**. High-Risk Zones 1 and 2 are defined as areas located within the City that have clusters of poorly conditioned manholes (manholes rated as Bad or Poor as denoted in the Sanitary Manhole assessment). This is based on the assumption that poor-conditioned manholes indicated levels of surcharge, debris, or I&I can be correlated with poor-conditioned pipes. High-Risk Zone 3 is defined as the area within the FEMA defined 100-year floodplain. This is denoted a High-Risk Zone due to the likelihood that flood-prone lines and manholes are susceptible to flood risk causing or exacerbating I&I and surcharge issues. Gravity sewer pipes are typically not designed to be pressure pipes, and repeated surcharging can cause additional strain on the pipes.

HIGH-RISK ZONE 1

HIGH-RISK ZONE 2

HIGH-RISK ZONE 3
(FLOODPLAIN)

Legend
- SANTIARY MANHOLE INSIDE HIGH-RISK ZONES
- SANTIARY MANHOLE OUTSIDE HIGH-RISK ZONES
- SANTIARY SEWER INSIDE HIGH-RISK ZONES
- SANTIARY SEWER OUTSIDE HIGH-RISK ZONES
- WWTP
- LIFT STATION
- FEMA 100-YEAR FLOODPLAIN

Feet
0 500 1,000

N

Wallis

Texas Parks & Wildlife, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA

FIGURE 2-4
CITY OF WALLIS, TEXAS
SANITARY SEWER SYSTEM HIGH-RISK ZONES

HRGreen

The summary of the gravity sewer piping system is presented in **Table 2-5.**

TABLE 2-5 CONDITION ASSESSMENT FOR GRADING SYSTEM FOR SANITARY SEWER PIPELINES

GRADE	DESCRIPTION	PERCENT OF TOTAL SYSTEM
1 – Excellent	The sanitary main has been replaced in the last year.	0% (0 LF)
2 – Good	The pipe is PVC and outside designated areas High-Risk Zone 1, 2, or 3[1].	30% (19,647 LF)
3 – Fair	The pipe is PVC and within designated areas High-Risk Zone 1, 2, or 3[1].	30% (19,397 LF)
4 – Poor	The pipe is VCP or unknown and outside designated areas High-Risk Zone 1,2, or 3[1].	20% (12,727 LF)
5 – Bad	The pipe is VCP or unknown material and within designated areas High-Risk Zone 1,2, or 3[1].	20% (13,034 LF)
	Total	**100% (64,805 LF)**

[1] The High-Risk Zones are shown in **Figure 2-4**

The detailed sewer pipe system including the material, length, and size can also be found in **Appendix B**.

2.2 Lift Stations

The City has five (5) LS within the collection system and one (1) LS on-site within the WWTP facility. The total of six (6) LS in the City were evaluated to determine general condition, safety issues, and visible structural, mechanical, and electrical issues in order to determine overall asset condition and useful life. All the lift stations (except for the on-site WWTP station) are duplex systems, with one duty pump and one back-up pump.

2.2.1 DATA COLLECTION

Data collection of assets was completed with site visits during February 2023, review of maintenance records, and discussions with the operators. **Figure 2-5** shows the LS service area within the City's collection system. The condition of each asset was based on visual inspection and engineering judgement and discussions with the operator. The following **Table 2-6** summarizes each LS with general recommendations provided based on the site assessment. Detailed assessments and descriptions are included in **Appendix C.**

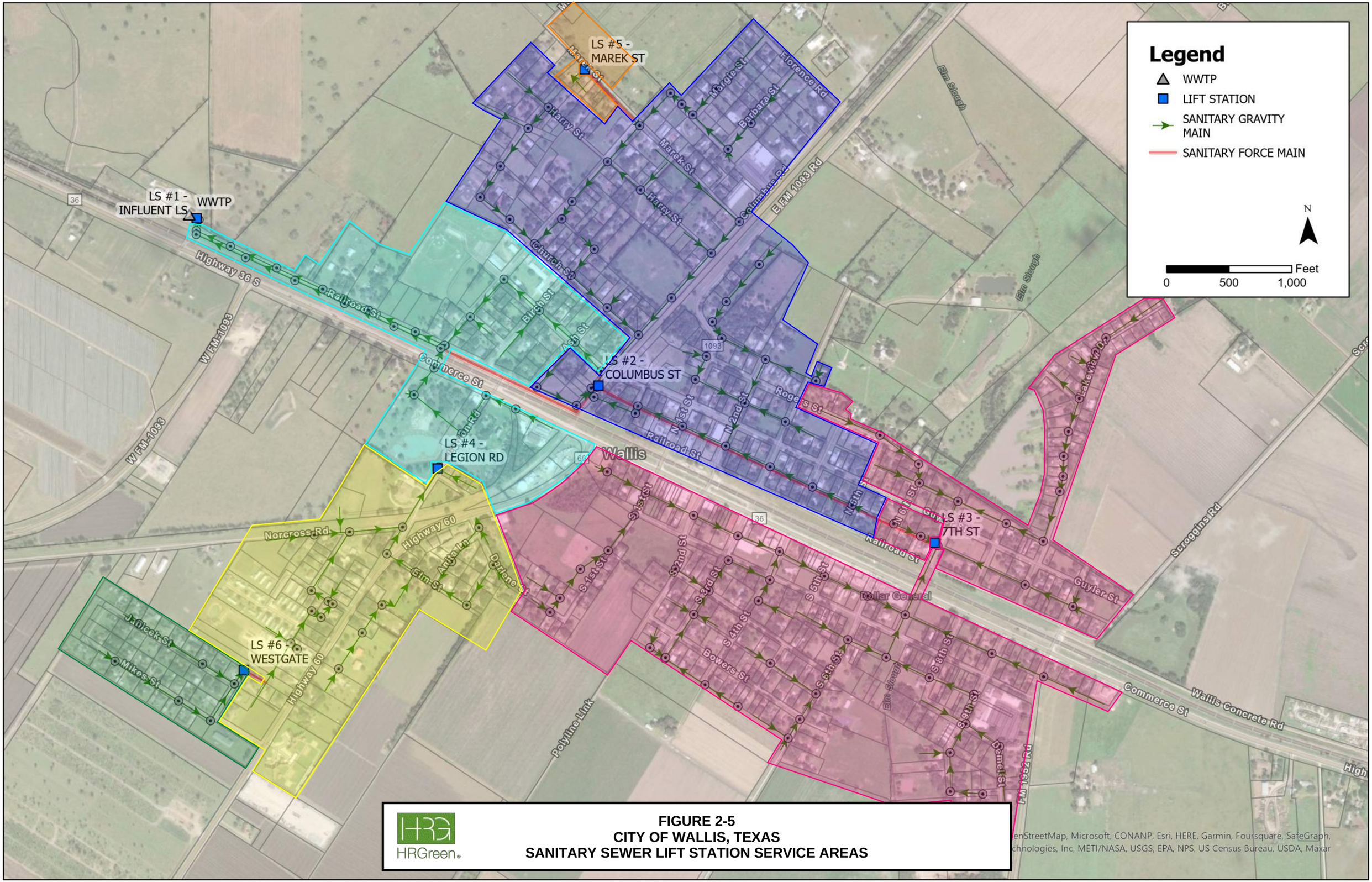


FIGURE 2-5
CITY OF WALLIS, TEXAS
SANITARY SEWER LIFT STATION SERVICE AREAS

HRGreen

TABLE 2-6 SANITARY SEWER LIFT STATION SUMMARY

LIFT STATION NAME	FORCEMAIN SIZE (INCH)	FORCEMAIN DISCHARGE	GENERAL NOTES[1]	GENERAL RECOMMENDATIONS
LS #1– INFLUENT LS	4" (Pump 1, 2) 8" (Pump 3, 4)	Headworks (Imhoff Tank #1,2,3)	This LS receives flow from the entire collection system and pumps to the headworks of the WWTP.	• Rehabilitate Pump No. 4. • Provide overhead canopy over pump area to for weather protection. • Replace ARVs on header piping. • Replace 4" Check Valves.
LS #2 – COLUMBUS ST	6" (Pump 1,2)	MH160	This LS receives flow from LS#3 and areas north of FM1093 and south of Rogers Street.	• Rehabilitate wet well structure and collector manhole. • Replace suction and discharge pipe and relocate discharge pipe outside of wet well.
LS #3 – 7TH ST	6" (Pump 1,2)	MH156 (OLD WET WELL AT LS #2)	This LS receives flow from the northeast area of the City including the Lakeview neighborhood and south of HWY 36, in the southeast area of the City.	• Rehabilitate wet well structure and collector manhole. • Evaluate pump station capacity and solutions for rags. • Replace suction and discharge pipe and relocate discharge pipe outside of wet well.
LS #4 – LEGION ROAD	4" (Pump 1,2)	MH54	This LS receives flow from the south of HWY 36, in the southwest area of the City.	• Rehabilitate wet well structure and collector manhole. • Evaluate pump station solutions for rags. • Evaluate pump on/off levels. • Replace suction and discharge pipe and relocate discharge pipe outside of wet well.
LS #5 – MAREK STREET	4" (Pump 1,2)	MH10	This LS receives flow from the empty trailer park lots and some homes south on Marek Street. This LS receives minimal flows.	• Evaluate pump on/off levels. • Add site light. • Provide overhead canopy over pump area to for weather protection.
LS #6 – WESTGATE ST	4" (Pump 1,2)	MH145	This LS receives flow from the Westgate community on the far southwest side of the City.	• Rehabilitate wet well structure. • Repair pump that is offline. • Evaluate pump station capacity and solutions for ragging issues. • Provide overhead canopy over pump area to for weather protection.

[1]A detailed LS assessment along with field notes and photos of each lift station can be found in **Appendix C**

2.2.2 ASSET ASSESSMENT

The condition assessment of LS assets is based on the extent of deterioration that impacts the ability of the asset to perform its original function. The condition assessment of assets at the LS is based on a numerical rating from 1 (excellent) through 5 (bad) scale. During investigation, assets with redundancies were recorded. **Table 2-7** outlines the description of each grade. Detailed site photos of each LS can be viewed in **Appendix C.**

TABLE 2-7 CONDITION ASSESSMENT GRADING SYSTEM FOR LIFT STATIONS

GRADE	DESCRIPTION
1 – Excellent	Asset is determined to be like new, fully operable, well maintained, and performs consistently at or above current standards. Little wear shown and no further action required.
2 - Good	Asset is sound and well maintained but may be showing some signs of wear. Delivers full efficiency with little or no performance deterioration. Virtually all maintenance is planned (preventive). At worst, only minor repair might be needed in the near term.
3 – Fair	Asset functions but requires a sustained high level of maintenance to remain operational. Shows substantial wear and is likely to cause significant performance deterioration in the near term. Near -term scheduled rehabilitation or replacement needed.
4 – Poor	Very near end of physical useful life. Substantial ongoing maintenance with short, recurrent maintenance levels required to keep the asset in operation. Unplanned corrective maintenance is common. Renewal (refurbishment or replacement) is expected in near term.
5 – Bad	Effective useful life exceeded and/or excessive maintenance cost incurred. A high risk of breakdown or imminent failure with serious impact on performance. No additional life expectancy; immediate replacement or rehabilitation needed.

Determination of Useful Life

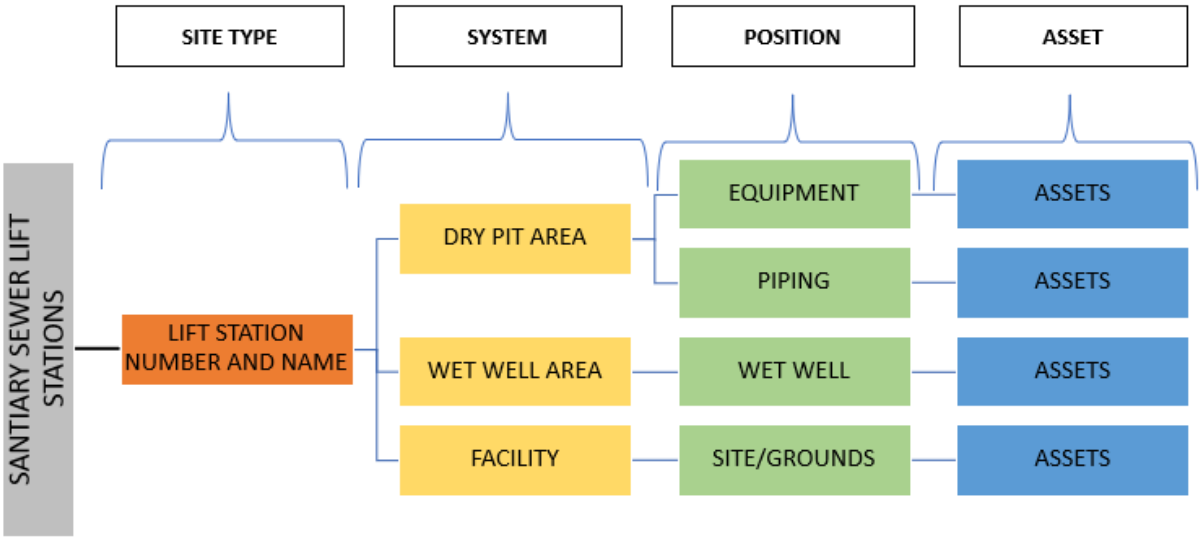
The useful life of the components in the LS was based on engineering judgement of the infrastructure life cycle of typical LS components according to various sources. The LS components include pumps, structures, piping, electrical and mechanical equipment, and housing structures. **Table 2-8** outlines the useful life of general components in a lift station.

TABLE 2-8 ESTIMATED USEFUL LIFE OF LIFT STATION COMPONENTS

Component Type	Description of Useful Life
Mechanical	Examples include pumps and valves; 5-10 years for pumps if well maintained; 35 – 40 years for valves if well maintained.
Structural	Examples include concrete wet wells, valve boxes, and awnings; concrete structures have the ability to last > 50 years if routinely inspected and repaired of minor defects as soon as found.
Electrical	Examples include LS controls and electrical conduits; 10 – 12 years of useful life if properly housed and maintained. Typically, would be replaced at the same time as associated mechanical equipment.
Piping	Examples include inlet and discharge piping; piping can last > 50 years depending on material and well maintained

For lift stations, the assets were hierarchically organized based on the common Structure "Site Type > System > Position > Asset". An inventory of the assets at the facilities was developed as this asset registry/hierarchy and verified and updated by field data collected during site visits. A diagram of the organization of each Lift Station is depicted in **Figure 2-6.**

Figure 2-6 Lift Station General Hierarchy Structure



An inventory and condition rating of lift stations within the City of Walis is summarized in **Table 2-9**. The rating was determined by visual inspection of each component, engineering judgement, and discussions with the operator. A detailed assessment and photos can be found in **Appendix C**.

Table 2-9
Lift Station Asset Inventory and Condition Rating

SITE TYPE	SYSTEM	POSITION	ASSET NO.	ASSET	ASSET ID	CLASS	CONDITION RATING	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/ SIZE
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	3	10" DISCHARGE PIPE	LC3	PIPE	4	DI	-	10"
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	4	12" INFLUENT PIPE	LC4	PIPE	4	DI	-	12"
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	1	6" SUCTION PIPE	LC1	PIPE	4	DI	-	6"
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	2	6" SUCTION PIPE	LC2	PIPE	4	DI	-	6"
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	14	AIR VALVE	LC14	VALVE	2	-	-	-
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	20	ALARM	LC20	EQUIPMENT	3	Visual Strobe	-	-
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	6	COLLECTOR MANHOLE	LC6	STRUCTURE	4	Concrete	-	-
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	17	CONCRETE SLAB	LC17	GENERAL	2	Concrete	-	-
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	5	CONCRETE STRUCTURE	LC5	STRUCTURE	4	Concrete	-	-
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	ENCLOSURE	9	ENCLOSURE STRUCTURE	LC9	STRUCTURE	2	Fiberglass	-	-
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	8	FLOATS	LC8	MECHANICAL	3	Mercury	-	
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	15	GENERAL PIPING	LC15	PIPE	2	DI	-	
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	18	GENERATOR	LC18	EQUIPMENT	1	Cummins	-	-
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	19	LIGHT POLE	LC19	GENERAL	3	-	-	-
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	12	LIQUID LEVEL FLOAT PANEL	LC12	ELECTRICAL	3	-	-	-
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	10	PUMP 1	LC10	MECHANICAL	3	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	GORMAN RUPP B0154DLF2UD	15 HP
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	11	PUMP 2	LC11	MECHANICAL	3	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	GORMAN RUPP B0154DLF2UD	15 HP
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	13	PUMP CONTROL PANEL	LC13	ELECTRICAL	3	-	-	-
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	16	VENT PIPE	LC16	PIPE	2	DI	-	-
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	7	WELL COVER	LC7	GENERAL	3	Cast Iron	-	24"
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	24	12" INFLUENT PIPE	LT4	PIPE	4	DI	-	12"
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	23	6" DISCHARGE PIPE	LT3	PIPE	4	DI	-	6"
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	21	6" SUCTION PIPE	LT1	PIPE	4	DI	-	6"
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	22	6" SUCTION PIPE	LT2	PIPE	4	DI	-	6"
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	34	AIR VALVE	LT14	VALVE	2	-	-	-
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	40	ALARM	LT20	EQUIPMENT	3	Visual Strobe	-	-
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	26	COLLECTOR MANHOLE	LT6	STRUCTURE	4	Concrete	-	-
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	37	CONCRETE SLAB	LT17	GENERAL	2	Concrete	-	-
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	25	CONCRETE STRUCTURE	LT5	STRUCTURE	4	Concrete	-	-
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	ENCLOSURE	29	ENCLOSURE STRUCTURE	LT9	STRUCTURE	2	Fiberglass	-	-
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	28	FLOATS	LT8	MECHANICAL	3	Mercury	-	
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	36	GENERAL PIPING	LT16	PIPE	2	DI	-	6"
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	38	GENERATOR	LT18	EQUIPMENT	1	Cummins	-	-
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	39	LIGHT POLE	LT19	GENERAL	3	-	-	-
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	32	LIQUID LEVEL FLOAT PANEL	LT12	ELECTRICAL	3	-	-	-
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	30	PUMP 1	LT10	MECHANICAL	4	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	GORMAN RUPP B0154DLF2UD	15 HP
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	31	PUMP 2	LT11	MECHANICAL	4	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	GORMAN RUPP B0154DLF2UD	15 HP
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	33	PUMP CONTROL PANEL	LT13	ELECTRICAL	3	-	-	-
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	35	VENT PIPE	LT15	PIPE	2	DI	-	-
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	27	WELL COVER	LT7	GENERAL	3	Cast Iron	-	24"

Table 2-9
Lift Station Asset Inventory and Condition Rating

SITE TYPE	SYSTEM	POSITION	ASSET NO.	ASSET	ASSET ID	CLASS	CONDITION RATING	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/ SIZE
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	44	12" INFLUENT PIPE	LL4	PIPE	4	DI	-	12"
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	43	4" DISCHARGE PIPE	LL3	PIPE	4	DI	-	4"
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	41	4" SUCTION PIPE	LL1	PIPE	4	DI	-	4"
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	42	4" SUCTION PIPE	LL2	PIPE	4	DI	-	4"
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	45	6" INFLUENT PIPE	LL5	PIPE	4	PVC	-	6"
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	55	AIR VALVE	LL15	VALVE	3	-	-	-
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	61	ALARM	LL21	EQUIPMENT	3	Strobe Visual	-	-
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	47	COLLECTOR MANHOLE	LL7	STRUCTURE	4	Concrete	-	-
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	58	CONCRETE SLAB	LL18	GENERAL	2	Concrete	-	-
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	46	CONCRETE STRUCTURE	LL6	STRUCTURE	4	Concrete	-	-
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	ENCLOSURE	50	ENCLOSURE STRUCTURE	LL10	STRUCTURE	2	Fiberglass	-	
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	49	FLOATS	LL9	MECHANICAL	3	Mercury	-	-
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	56	GENERAL PIPING	LL16	PIPE	3	DI	-	4"
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	59	GENERATOR	LL19	EQUIPMENT	1	Cummins	-	-
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	60	LIGHT POLE	LL20	GENERAL	3	-	-	-
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	53	LIQUID LEVEL FLOAT PANEL	LL13	ELECTRICAL	3	-	-	-
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	51	PUMP 1	LL11	MECHANICAL	4	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	B0034DCF2AA	3 HP
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	52	PUMP 2	LL12	MECHANICAL	4	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	B0034DCF2AA	3 HP
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	54	PUMP CONTROL PANEL	LL14	ELECTRICAL	3	-	-	-
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	57	VENT PIPE	LL17	PIPE	3	DI	-	-
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	48	WELL COVER	LL8	GENERAL	4	Cast Iron	-	24"
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	64	12" INFLUENT PIPE	LM3	PIPE	3	DI	-	12"
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	65	12" INFLUENT PIPE	LM4	PIPE	3	DI	-	12"
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	74	4" CHECK VALVE 1	LM13	VALVE	2	Swing	-	4"
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	75	4" CHECK VALVE 2	LM14	VALVE	2	Swing	-	4"
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	76	4" DISCHARGE PIPE	LM15	PIPE	2	DI	-	4"
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	62	4" SUCTION PIPE	LM1	PIPE	3	DI	-	4"
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	63	4" SUCTION PIPE	LM2	PIPE	3	DI	-	4"
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	66	6" INFLUENT PIPE	LM5	PIPE	3	DI	-	6"
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	81	ALARM	LM20	EQUIPMENT	3	Strobe Visual	-	-
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	78	CONCRETE SLAB	LM17	GENERAL	2	Concrete	-	-
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	67	CONCRETE STRUCTURE	LM6	STRUCTURE	3	Concrete	-	-
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	69	FLOATS	LM8	MECHANICAL	3	Mercury	-	-
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	82	GATE & FENCE	LM21	GENERAL	2	Wood	-	6'
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	77	GENERAL PIPING	LM16	PIPE	3	DI	-	4"
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	79	GENERATOR	LM18	EQUIPMENT	1	Gillette	-	-
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	83	HOSE BIB	LM22	EQUIPMENT	2	-	-	-
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	80	LIGHT POLE	LM19	GENERAL	3	-	-	-
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	72	LIQUID LEVEL FLOAT PANEL	LM11	ELECTRICAL	3	-	-	-
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	70	PUMP 1	LM9	MECHANICAL	2	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T3A3-B	5 HP
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	71	PUMP 2	LM10	MECHANICAL	2	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T3A3-B	5 HP
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	73	PUMP CONTROL PANEL	LM12	ELECTRICAL	3	-	-	-
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	68	WELL COVER	LM7	STRUCTURE	3	Cast Iron	-	24"

Table 2-9
Lift Station Asset Inventory and Condition Rating

SITE TYPE	SYSTEM	POSITION	ASSET NO.	ASSET	ASSET ID	CLASS	CONDITION RATING	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/ SIZE
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	84	3" SUCTION PIPE	LW1	PIPE	3	PVC	-	3"
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	85	3" SUCTION PIPE	LW2	PIPE	3	PVC	-	3"
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	94	4" CHECK VALVE 1	LW11	VALVE	4	Swing	-	4"
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	95	4" CHECK VALVE 2	LW12	VALVE	3	Swing	-	4"
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	96	4" DISCHARGE PIPE	LW13	PIPE	3	PVC	-	4"
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	86	6" INFLUENT PIPE	LW3	PIPE	3	DIP	-	6"
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	100	ALARM	LW17	EQUIPMENT	3	Strobe Visual	-	-
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	87	CONCRETE STRUCTURE	LW4	STRUCTURE	3	Concrete	-	-
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	89	FLOATS	LW6	MECHANICAL	3	Mercury	-	-
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	101	GATE & FENCE	LW18	GENERAL	2	Wood	-	6'
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	97	GENERAL PIPING	LW14	PIPE	3	PVC	-	4"
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	98	GENERATOR	LW15	EQUIPMENT	2	Gillette	-	-
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	99	LIGHT POLE	LW16	GENERAL	3	-	-	-
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	92	LIQUID LEVEL FLOAT PANEL	LW9	ELECTRICAL	3	-	-	-
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	90	PUMP 1	LW7	MECHANICAL	4	HYDROMATIC SELF-PRIMING	20MP	3 HP
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	91	PUMP 2	LW8	MECHANICAL	3	HYDROMATIC SELF-PRIMING	20MP	3 HP
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	93	PUMP CONTROL PANEL	LW10	ELECTRICAL	3	-	-	-
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	88	WELL COVER	LW5	GENERAL	3	Steel	-	5'

GENERAL NOTES
1. Note lengths of piping, underground or buried yard piping and valves not evaluated or inventoried unless described below. Plumbing pipe and pipe <3" were not evaluated unless described below.
2. Valve exercise not performed.
3. Pumps and Associated Motors were accessed as one item.
4. Note that LS enclosures were not removed to access general piping and valves within the enclosure, therefore, conditions as listed below are based on visual evalution and st
5. "-" indicates unknown or not applicable.

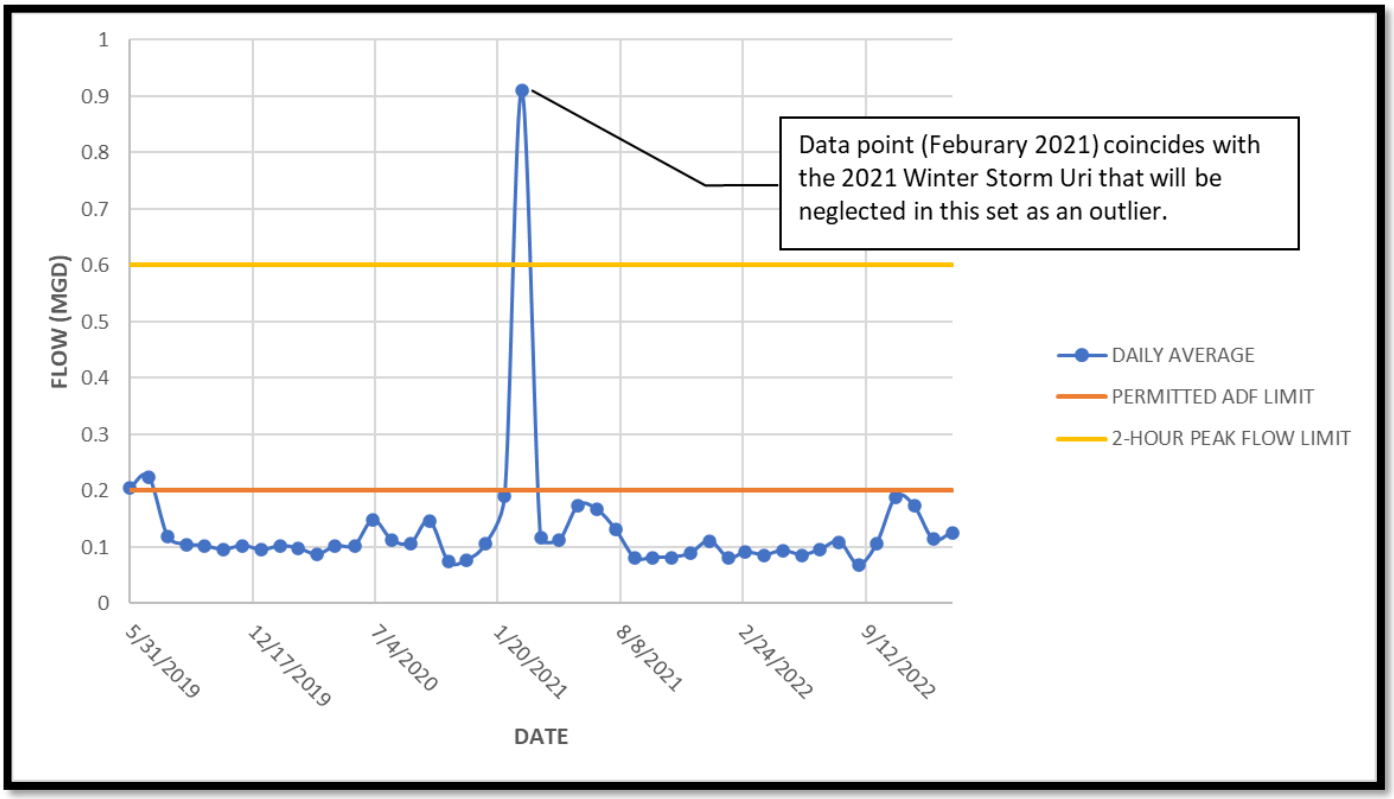
2.3 Wastewater Treatment Plant

The City of Walis operates a WWTP located in the northwest part of the City collection system at 17403 Railroad Street, Walis, Texas 77485 within Austin County. A gravel road provides access to the WWTP from Railroad Street. Access to the WWTP is secured with a metal swing gate and 6-ft tall chain linked fence topped with 3 strands of barbed wire.

Based on the current WWTP discharge permit, in its current phase, the WWTP is permitted to treat and discharge an average daily flow (ADF) of 0.2 million gallons per day (MGD) and 2-hour peak flow not to exceed 416 gpm (0.6 MGD). At its final phase, the WWTP is permitted to treat and discharge an average daily flow (ADF) of 0.498 million gallons per day (MGD) and 2-hour peak flow not to exceed 1,042 gpm (1.5 MGD). The Texas Pollutant Discharge Elimination System (TPDES) permit was issued in June 2019 and expires in June 2024.

Figure 2-7 shows the ADF monthly discharge at the WWTP from the past four (4) years (approximately July 2019 – January 2023). This data shows the WWTP flows averaging approximately 0.110 – 0.150 MGD. Based discussions with the City and the current WWTP permit issued June 26, 2019, the WWTP is currently in interim phase and the daily average flow shall not exceed 0.2 MGD, with final phase being 0.498 MGD. Therefore, the current WWTP is operating, on average, at approximately 65% of its permitted capacity at its current phase (0.2 MGD).

Figure 2-7 WWTP Historical Treated Discharge Flow (June 2019 – January 2023)

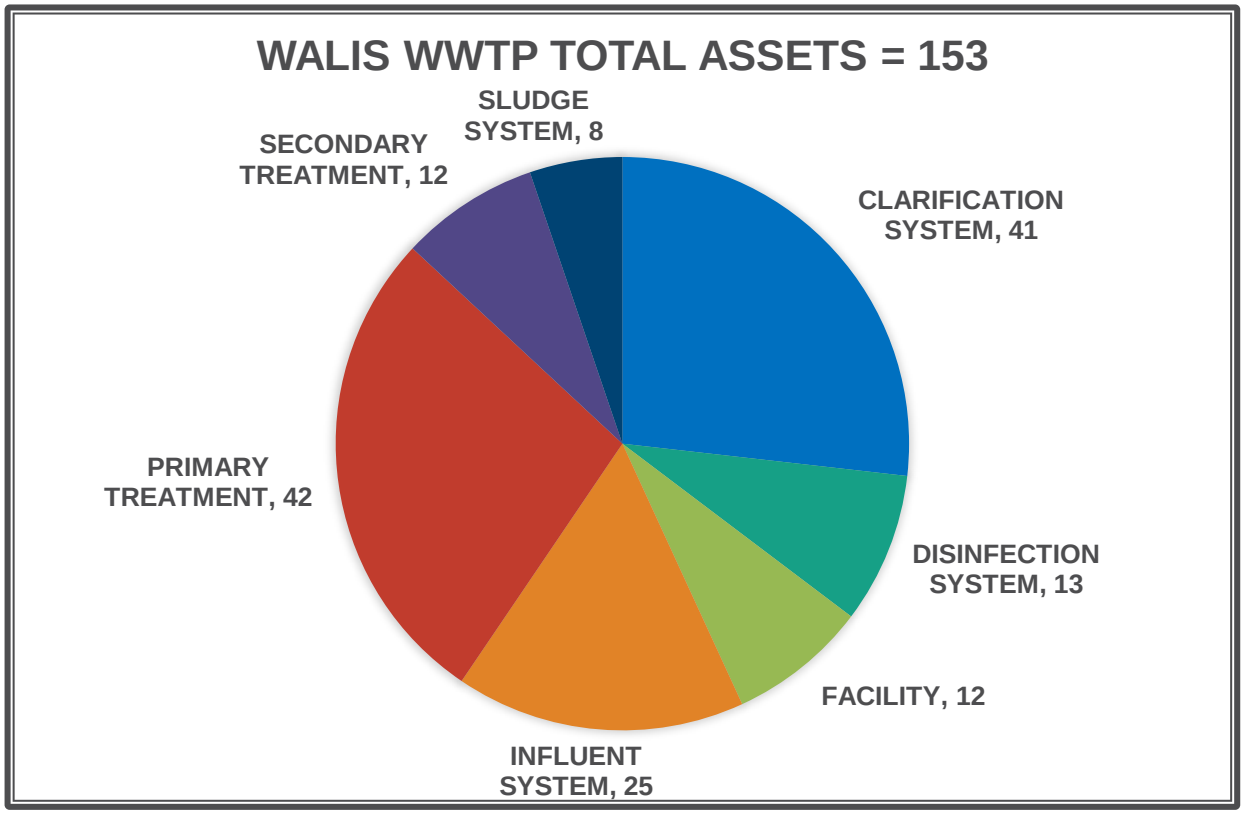


2.3.1 DATA COLLECTION

Data collection of assets was completed by site visits supplemented by WWTP construction drawings review of the TPDES permit, and discussions with the plant operator and City staff. Asset inventory and condition assessment were based existing field found assets, using construction drawings as a reference for location of equipment. The condition of each asset was based on visual inspection and engineering judgement and discussions with the operators. Permitted effluent limits including BOD, TSS, NO_3-N, and E-coli are not part of the asset evaluation.

An Asset ID was assigned to each asset to clarify similar asset types, or assets located in the same area or vicinity. **Figure 2-8** shows the breakdown of the WWTP assets by treatment system. **Figure 2-11** is a supplementary layout showing the asset physical locations of select assets in relation to the asset inventory table for the WWTP and WWTP asset photos. There are a total of 153 assets within the WWTP (not all assets are shown in **Figure 2-11**).

Figure 2-8 Wastewater Treatment Plant System Number of Assets



ASSET INVENTORY LEGEND

INFLUENT SYSTEM
1. LIFT STATION

PRIMARY TREATMENT
2. HEADWORKS
3. IMHOFF TANK 1
4. IMHOFF TANK 2
5. IMHOFF TANK 3
6. SPLITTER BOX

SECONDARY TREATMENT
7. TRICKLING FILTER 1
8. TRICKLING FILTER 2

CLARIFICATION SYSTEM
9. CLARIFIER 1
10. CLARIFIER 2
11. RECIRCULATION PUMP AREA
12. RETURN SLUDGE AREA
13. SCUM AREA

DISINFECTION SYSTEM
14. CHLORINATOR BUILDING
15. CHLORINE CONTACT BASIN 1
16. CHLORINE CONTACT BASIN 2

DEWATERING SYSTEM
17. SLUDGE DRYING BED AREA

FACILITY
18. EFFLUENT BOX
19. GENERATOR
20. OFFICE & LAB BUILDING

HRGreen

FIGURE 2-9
CITY OF WALLIS, TEXAS
WASTEWATER TREATMENT PLANT SYSTEM AREAS

2.3.2 ASSET ASSESSMENT

The condition rating was determined by visual inspection of each component and engineering judgement, reviewing construction drawings, and discussions with the operator. Details of the assets at the WWTP can be found in **Appendix D**.

For the WWTP, the assets were hierarchically organized based on the common Structure "Site Type > System > Position > Asset". An inventory of the assets at the WWTP was developed as this asset registry/hierarchy and verified and updated by field data collected during site visits. A diagram of the organization of the facility is depicted in **Figure 2-10.** The system location and areas are shown in the site layout as shown in **Figure 2-9.**

The condition assessment of each asset is based on the extent of deterioration that impacts the ability of the asset to perform its original function. The numerical rating from 1 through 5, where a 1 is rated as in excellent condition in which the effective life is exceeded and poses a high risk of breakdown or imminent failure with serious impact on performance. During investigation, assets with redundancies were recorded. Examples of redundancies include the availability of additional valves or pumps. An asset inventory and condition rating of the City WWTP is summarized in **Table 2-11**.

Determination of Useful Life

The useful life of the components at the WWTP was based on engineering judgement of the infrastructure life cycle. The TCEQ Managing Small Domestic Wastewater Systems (RG-530). provides a guide to the useful life span of components at a WWTP tabulated in **Table 2-10.** This table was used as reference to determine the useful life of assets found at the WWTP.

Figure 2-10 Wastewater Treatment Plant General Hierarchy Structure

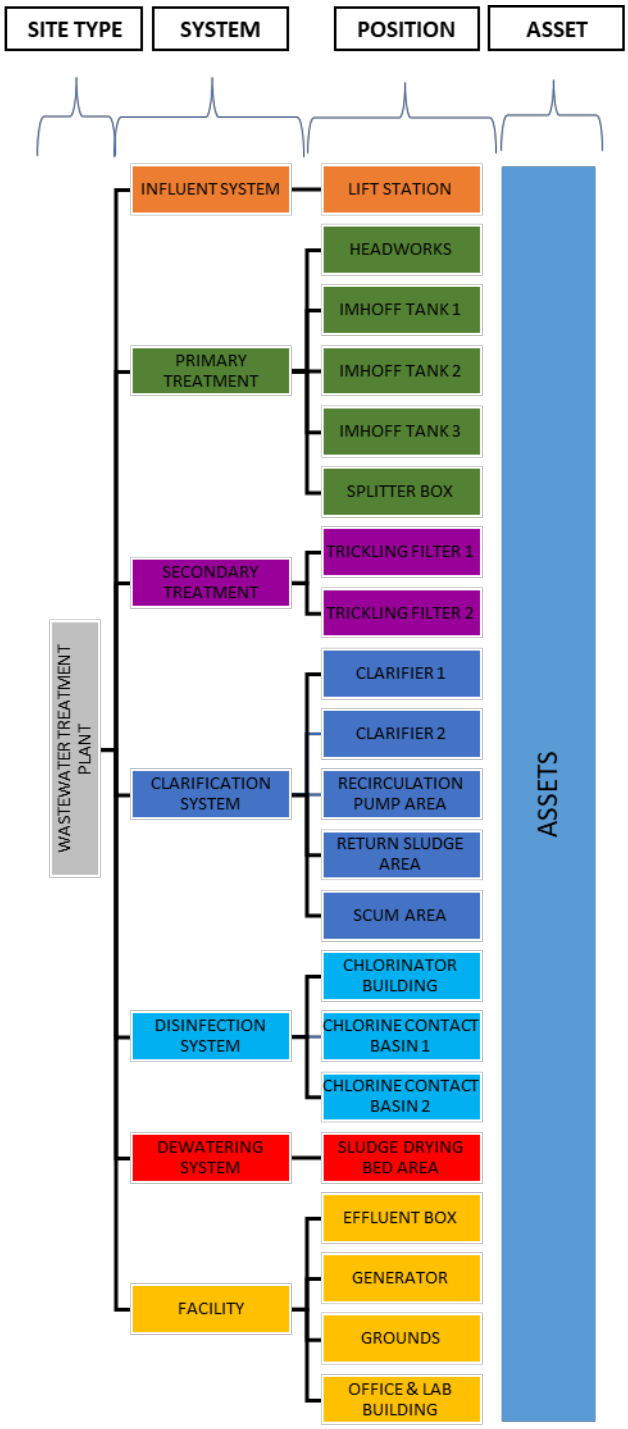


TABLE 2-10 ESTIMATED USEFUL LIFE OF WWTP ASSETS

Asset Type	Estimated Useful Life (years)
Buildings	~30
Chlorination equipment	5 to 7
Computers	~5
Collection pipes	40 to 50
Conveyors	10 to 15
Electrical systems	15 to 20
Fencing	10 to 20
Generators	15 to 20
Lab and monitoring equipment	7 to 10
Landscaping and grading equipment	30 to 40
Meters	7 to 10
Office furniture and supplies	~10
Other treatment equipment	8 to 12
Pond transfer pipes	30 to 40
Screening systems	10 to 20
Sewer pumps	5 to 10
Storage cylinders	~5
Storage tanks, chemical	25 to 30
Tools and shop equipment	10 to 15
Transportation equipment	~10
Valves	35 to 40
Weirs	20 to 25

Reference: TCEQ RG-530

Table 2-11
WWTP Asset Inventory and Condition Rating

SYSTEM	POSITION	ASSET	ASSET ID	CLASS	STATUS	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/SIZE
INFLUENT SYSTEM	LIFT STATION	INFLUENT PUMP 1	L1	MECHANICAL	ACTIVE	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T6A3-B	220GPM @ 37-FT, MOTOR 7.5HP
INFLUENT SYSTEM	LIFT STATION	INFLUENT PUMP 2	L2	MECHANICAL	ACTIVE	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T6A3-B	220GPM @ 37-FT, MOTOR 7.5HP
INFLUENT SYSTEM	LIFT STATION	INFLUENT PUMP 3	L3	MECHANICAL	ACTIVE	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T6A3-B	660GPM @ 33-FT, MOTOR 15HP
INFLUENT SYSTEM	LIFT STATION	INFLUENT PUMP 4	L4	MECHANICAL	ACTIVE	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T6A3-B	660GPM @ 33-FT, MOTOR 15HP
INFLUENT SYSTEM	LIFT STATION	DISCONNECT SWITCH 1	L5	ELECTRICAL	ACTIVE	UNKNOWN	-	-
INFLUENT SYSTEM	LIFT STATION	DISCONNECT SWITCH 2	L6	ELECTRICAL	ACTIVE	UNKNOWN	-	-
INFLUENT SYSTEM	LIFT STATION	DISCONNECT SWITCH 3	L7	ELECTRICAL	ACTIVE	UNKNOWN	-	-
INFLUENT SYSTEM	LIFT STATION	DISCONNECT SWITCH 4	L8	ELECTRICAL	ACTIVE	UNKNOWN	-	-
INFLUENT SYSTEM	LIFT STATION	4" CHECK VALVE 1	L9	VALVE	ACTIVE	SWING CHECK	-	4"
INFLUENT SYSTEM	LIFT STATION	4" CHECK VALVE 2	L10	VALVE	ACTIVE	SWING CHECK	-	4"
INFLUENT SYSTEM	LIFT STATION	6" CHECK VALVE 3	L11	VALVE	ACTIVE	SWING CHECK	-	6"
INFLUENT SYSTEM	LIFT STATION	6" CHECK VALVE 4	L12	VALVE	ACTIVE	SWING CHECK	-	6"
INFLUENT SYSTEM	LIFT STATION	4" DISCHARGE VALVE 1	L13	VALVE	ACTIVE	PLUG	-	4"
INFLUENT SYSTEM	LIFT STATION	4" DISCHARGE VALVE 2	L14	VALVE	ACTIVE	PLUG	-	4"
INFLUENT SYSTEM	LIFT STATION	6" DISCHARGE VALVE 3	L15	VALVE	ACTIVE	PLUG	-	6"
INFLUENT SYSTEM	LIFT STATION	6" DISCHARGE VALVE 4	L16	VALVE	ACTIVE	PLUG	-	6"
INFLUENT SYSTEM	LIFT STATION	4" DISCHARGE VALVE 5	L17	VALVE	ACTIVE	PLUG	-	4"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 1	L18	VALVE	ACTIVE	GORMAN-RUPP	AUTOMATI C ARV GRP3-07	1"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 2	L19	VALVE	ACTIVE	GORMAN-RUPP	AUTOMATI C ARV GRP3-08	1"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 3	L20	VALVE	ACTIVE	GORMAN-RUPP	AUTOMATI C ARV GRP3-09	1"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 4	L21	VALVE	ACTIVE	GORMAN-RUPP	AUTOMATI C ARV GRP3-10	1"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 5	L22	VALVE	ACTIVE	UNKNOWN	UNKNOWN	UNKNOWN
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 6	L23	VALVE	ACTIVE	UNKNOWN	UNKNOWN	UNKNOWN
INFLUENT SYSTEM	LIFT STATION	WET WELL STRUCTURE	L24	STRUCTURE	ACTIVE	CONCRETE	WET WELL	24'-10" x 8'-0" x 16'-0" (L x W x D)
INFLUENT SYSTEM	LIFT STATION	SWITCH PANEL AND ALARM	L25	ELECTRICAL	ACTIVE	UNKNOWN	UNKNOWN	-
PRIMARY TREATMENT	HEADWORKS	BAR SCREEN 1	P1	SCREEN	ACTIVE	MANUAL	COARSE	1 - 3/8" OPENING
PRIMARY TREATMENT	HEADWORKS	BAR SCREEN 2	P2	SCREEN	ACTIVE	MANUAL	COARSE	1 - 3/8" OPENING
PRIMARY TREATMENT	HEADWORKS	BAR SCREEN 3 (IMHOFF 1)	P3	SCREEN	ACTIVE	MANUAL	COARSE	1 - 3/8" OPENING
PRIMARY TREATMENT	HEADWORKS	SLIDE WEIR GATE 1	P4	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.5'x4.0'
PRIMARY TREATMENT	HEADWORKS	SLIDE WEIR GATE 2	P5	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.5'x4.0'
PRIMARY TREATMENT	HEADWORKS	SLIDE WEIR GATE 3	P6	GATE	INACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	2.0'x4.0'
PRIMARY TREATMENT	HEADWORKS	SLIDE WEIR GATE 4 (IMHOFF 1)	P7	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	2.0'x4.0'
PRIMARY TREATMENT	HEADWORKS	4" SLUDGE VALVE	P8	VALVE	ACTIVE	PLUG	-	4"
PRIMARY TREATMENT	HEADWORKS	BASIN STRUCTURE	P9	STRUCTURE	ACTIVE	CONCRETE	-	10.75'x7'x4' D
PRIMARY TREATMENT	IMHOFF TANK 2	GAS VENT CHANNELS	P10	STRUCTURE	ACTIVE	CONCRETE	-	(3) 1.7x36.8x26'D
PRIMARY TREATMENT	IMHOFF TANK 2	SETTLING CHANNELS	P11	STRUCTURE	ACTIVE	CONCRETE	-	(2) 6.5x36.8x11'D
PRIMARY TREATMENT	IMHOFF TANK 2	WALKWAY GRATING	P12	GENERAL	ACTIVE	GALVANIZED STEEL/FRP	-	480 SF
PRIMARY TREATMENT	IMHOFF TANK 2	HAND RAILS	P13	GENERAL	ACTIVE	ALUMINUM	-	300
PRIMARY TREATMENT	IMHOFF TANK 2	STAIRS	P14	GENERAL	ACTIVE	GALVANIZED STEEL	-	29'
PRIMARY TREATMENT	IMHOFF TANK 2	8" SLUDGE VALVE	P15	VALVE	ACTIVE	PLUG	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 2	8" SLUDGE VALVE	P16	VALVE	ACTIVE	PLUG	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 2	10" EFFLUENT VALVE	P17	VALVE	ACTIVE	GATE	-	10"
PRIMARY TREATMENT	IMHOFF TANK 2	BASIN STRUCTURE	P18	STRUCTURE	ACTIVE	CONCRETE	-	36.8'x19.8'x 26' D
PRIMARY TREATMENT	IMHOFF TANK 3	GAS VENT CHANNELS	P19	STRUCTURE	ACTIVE	CONCRETE	-	(3) 1.7x36.8x26'D
PRIMARY TREATMENT	IMHOFF TANK 3	SETTLING CHANNELS	P20	STRUCTURE	ACTIVE	CONCRETE	-	(2) 6.5x36.8x11'D
PRIMARY TREATMENT	IMHOFF TANK 3	WALKWAY GRATING	P21	GENERAL	ACTIVE	GALVANIZED STEEL	-	480 SF
PRIMARY TREATMENT	IMHOFF TANK 3	HAND RAILS	P22	GENERAL	ACTIVE	ALUMINUM	-	300
PRIMARY TREATMENT	IMHOFF TANK 3	8" SLUDGE VALVE	P23	VALVE	ACTIVE	PLUG	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 3	8" SLUDGE VALVE	P24	VALVE	ACTIVE	PLUG	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 3	10" EFFLUENT VALVE	P25	VALVE	ACTIVE	GATE	-	10"
PRIMARY TREATMENT	IMHOFF TANK 3	BASIN STRUCTURE	P26	STRUCTURE	ACTIVE	CONCRETE	-	36.8'x19.8'x 26' D
PRIMARY TREATMENT	IMHOFF TANK 1	GAS VENT CHANNELS	P27	STRUCTURE	ACTIVE	CONCRETE	-	(2) 30'x1.7x 23.5' D
PRIMARY TREATMENT	IMHOFF TANK 1	SETTLING CHANNELS	P28	STRUCTURE	ACTIVE	CONCRETE	-	(1) 30'x8.75x 16' D
PRIMARY TREATMENT	IMHOFF TANK 1	WALKWAY GRATING	P29	GENERAL	ACTIVE	GALVANIZED STEEL	-	80 SF
PRIMARY TREATMENT	IMHOFF TANK 1	HAND RAILS	P30	GENERAL	ACTIVE	ALUMINUM	-	180 LF
PRIMARY TREATMENT	IMHOFF TANK 1	8" SLUDGE VALVE & CLEANOUT	P31	VALVE	ACTIVE	UNKNOWN	UNDERGROUND	8"

Table 2-11
WWTP Asset Inventory and Condition Rating

SYSTEM	POSITION	ASSET	ASSET ID	CLASS	STATUS	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/SIZE
PRIMARY TREATMENT	IMHOFF TANK 1	8" SLUDGE VALVE & CLEANOUT	P32	VALVE	ACTIVE	UNKNOWN	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 1	8" SLUDGE VALVE & CLEANOUT	P33	VALVE	ACTIVE	UNKNOWN	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 1	8" SLUDGE VALVE & CLEANOUT	P34	VALVE	ACTIVE	UNKNOWN	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 1	BASIN STRUCTURE	P35	STRUCTURE	ACTIVE	CONCRETE	-	30'x12'x 23.5' D
PRIMARY TREATMENT	SPLITTER BOX	SLIDE GATE 1	P36	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.7'x4.75'
PRIMARY TREATMENT	SPLITTER BOX	SLIDE GATE 2	P37	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.7'x4.75'
PRIMARY TREATMENT	SPLITTER BOX	SLIDE GATE 3	P38	GATE	INACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.7'x4.75'
PRIMARY TREATMENT	SPLITTER BOX	TRASH DROP CHUTE	P39	GENERAL	ACTIVE	PVC	-	8"
PRIMARY TREATMENT	SPLITTER BOX	METAL WALKWAY GRATING	P40	GENERAL	ACTIVE	GALVANIZED STEEL	-	25 SF
PRIMARY TREATMENT	SPLITTER BOX	HAND RAILS	P41	GENERAL	ACTIVE	ALUMINUM	-	20 LF
PRIMARY TREATMENT	SPLITTER BOX	BASIN STRUCTURE	P42	STRUCTURE	ACTIVE	CONCRETE	-	7'x7'x4.25' D
SECONDARY TREATMENT	TRICKLING FILTER 1	FILTER DRIVE MECHANISM	S1	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 1	SPREADER ARM	S2	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 1	FILTER MEDIA	S3	MECHANICAL	ACTIVE	ROCK MEDIA	-	-
SECONDARY TREATMENT	TRICKLING FILTER 1	LADDER	S4	GENERAL	ACTIVE	METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 1	BASIN STRUCTURE	S5	STRUCTURE	ACTIVE	CONCRETE	-	24' diameter x 12' height
SECONDARY TREATMENT	TRICKLING FILTER 2	FILTER DRIVE MECHANISM	S6	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	SPREADER ARM	S7	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	14" VENT PIPE	S8	GENERAL	ACTIVE	DIP	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	14" VENT PIPE	S9	GENERAL	ACTIVE	DIP	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	FILTER MEDIA	S10	MECHANICAL	ACTIVE	ROCK MEDIA	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	LADDER	S11	GENERAL	ACTIVE	METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	BASIN STRUCTURE	S12	STRUCTURE	ACTIVE	CONCRETE	-	24' diameter x 12' height
CLARIFICATION SYSTEM	CLARIFIER 1	DRIVE MECHANISM	C1	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	SKIMMER ARMS	C2	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	SWITCH PANEL AND ALARM	C3	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	WEIRS	C4	MECHANICAL	ACTIVE	SHARP CRESTED	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	METAL WALKWAY GRATING	C5	GENERAL	ACTIVE	GALVANIZED STEEL	-	170 SF
CLARIFICATION SYSTEM	CLARIFIER 1	HAND RAILS	C6	GENERAL	ACTIVE	ALUMINUM	-	100 LF
CLARIFICATION SYSTEM	CLARIFIER 1	BASIN STRUCTURE	C7	STRUCTURE	ACTIVE	CONCRETE	-	24' diameter x 15' height
CLARIFICATION SYSTEM	CLARIFIER 2	DRIVE MECHANISM	C8	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
CLARIFICATION SYSTEM	CLARIFIER 2	SKIMMER ARMS	C9	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	SWITCH PANEL AND ALARM	C10	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	CLARIFIER 2	WEIRS	C11	MECHANICAL	ACTIVE	SHARP CRESTED	-	-
CLARIFICATION SYSTEM	CLARIFIER 2	METAL WALKWAY GRATING	C12	GENERAL	ACTIVE	GALVANIZED STEEL	-	170 SF
CLARIFICATION SYSTEM	CLARIFIER 2	HAND RAILS	C13	GENERAL	ACTIVE	ALUMINUM	-	100 LF
CLARIFICATION SYSTEM	CLARIFIER 2	BASIN STRUCTURE	C14	STRUCTURE	ACTIVE	CONCRETE	-	24' diameter x 15' height
CLARIFICATION SYSTEM	SCUM AREA	SCUM PUMP 1	C15	MECHANICAL	ACTIVE	-	-	3HP
CLARIFICATION SYSTEM	SCUM AREA	SCUM PUMP 2	C16	MECHANICAL	ACTIVE	-	-	3HP
CLARIFICATION SYSTEM	SCUM AREA	4" SUCTION VALVE 1	C17	VALVE	ACTIVE	GATE	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" SUCTION VALVE 2	C18	VALVE	ACTIVE	GATE	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" SUCTION VALVE 3	C19	VALVE	ACTIVE	GATE	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" DISCHARGE VALVE 1	C20	VALVE	ACTIVE	PLUG	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" DISCHARGE VALVE 2	C21	VALVE	ACTIVE	PLUG	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" CHECK VALVE 1	C22	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" CHECK VALVE 2	C23	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	SCUM AREA	LADDER	C24	VALVE	ACTIVE	METAL	-	-
CLARIFICATION SYSTEM	SCUM AREA	BASIN STRUCTURE	C25	STRUCTURE	ACTIVE	CONCRETE	-	11'x6.4'x5.3'
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	RECIRCULATION PUMP 1	C26	MECHANICAL	ACTIVE	-	-	7.5HP
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	RECIRCULATION PUMP 2	C27	MECHANICAL	ACTIVE	-	-	7.5HP
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	6" CHECK VALVE 1	C28	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	6" CHECK VALVE 2	C29	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	6" DISCHARGE VALVE 1	C30	VALVE	ACTIVE	PLUG	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	6" DISCHARGE VALVE 2	C31	VALVE	ACTIVE	PLUG	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	AIR RELEASE VALVE	C32	VALVE	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	DISCONNECT SWITCH 1	C33	ELECTRICAL	ACTIVE	-	-	-

Table 2-11
WWTP Asset Inventory and Condition Rating

SYSTEM	POSITION	ASSET	ASSET ID	CLASS	STATUS	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/SIZE
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	DISCONNECT SWITCH 2	C34	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	RETURN SLUDGE PUMP 1	C35	MECHANICAL	ACTIVE	-	-	10HP
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	RETURN SLUDGE PUMP 2	C36	MECHANICAL	ACTIVE	-	-	10HP
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	4" CHECK VALVE 1	C37	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	4" CHECK VALVE 2	C38	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	DISCONNECT SWITCH 1	C39	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	DISCONNECT SWITCH 2	C40	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	BASIN STRUCTURE	C41	STRUCTURE	ACTIVE	CONCRETE	WET WELL	4' diameter x 15.4' depth
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	WOODEN BAFFLES	D1	GENERAL	ACTIVE	WOOD	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	6" DRAIN VALVE	D2	VALVE	ACTIVE	GATE	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	6" DRAIN VALVE	D3	VALVE	ACTIVE	GATE	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	6" DRAIN VALVE	D4	VALVE	ACTIVE	GATE	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	HAND RAILS	D5	GENERAL	ACTIVE	ALUMINUM	-	50 LF
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	BASIN STRUCTURE	D6	STRUCTURE	ACTIVE	CONCRETE	-	19'x6.4'x 15' height
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 2	BAFFLES	D7	GENERAL	ACTIVE	CONCRETE	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 2	HAND RAILS	D8	GENERAL	ACTIVE	ALUMINUM	-	50 LF
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 2	BASIN STRUCTURE	D9	STRUCTURE	ACTIVE	CONCRETE	-	19'x6.4'x 15' height
DISINFECTION SYSTEM	CHLORINATOR BUILDING	CHLORINATOR SYSTEM	D10	EQUIPMENT	ACTIVE	2-SCALE	-	-
DISINFECTION SYSTEM	CHLORINATOR BUILDING	CHLORINE CYLINDER SCALES	D11	EQUIPMENT	ACTIVE	2-SCALE	-	-
DISINFECTION SYSTEM	CHLORINATOR BUILDING	LOUVRES	D12	GENERAL	ACTIVE	METAL	-	-
DISINFECTION SYSTEM	CHLORINATOR BUILDING	BUILDING STRUCTURE	D13	STRUCTURE	ACTIVE	CMU	-	-
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	SLUDGE DRYING BED 1 STRUCTURE	B1	STRUCTURE	ACTIVE	CONCRETE	-	45x25x5.2' D
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	SLUDGE DRYING BED 2 STRUCTURE	B2	STRUCTURE	ACTIVE	CONCRETE	-	45x25x5.2' D
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	SLUDGE DRYING BED 3 STRUCTURE	B3	STRUCTURE	ACTIVE	CONCRETE	-	45x25x5.2' D
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	SLUDGE DRYING BED 4 STRUCTURE	B4	STRUCTURE	ACTIVE	CONCRETE	-	45x25x5.2' D
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	8" SHEAR VALVE 1	B5	VALVE	ACTIVE	-	-	-
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	8" SHEAR VALVE 2	B6	VALVE	ACTIVE	-	-	-
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	8" SHEAR VALVE 3	B7	VALVE	ACTIVE	-	-	-
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	8" SHEAR VALVE 4	B8	VALVE	ACTIVE	-	-	-
FACILITY	OFFICE & LAB BUILDING	MCC	F1	ELECTRICAL	ACTIVE	-	-	-
FACILITY	OFFICE & LAB BUILDING	RECORDER & FLOWMETER INTERFACE	F2	EQUIPMENT	ACTIVE	CHLORINATOR MAINTAINENCE	-	-
FACILITY	OFFICE & LAB BUILDING	BUILDING STRUCTURE	F3	STRUCTURE	ACTIVE	CMU	-	-
FACILITY	EFFLUENT BOX	V-NOTCH WEIR	F4	GENERAL	ACTIVE	V-NOTCH	-	-
FACILITY	EFFLUENT BOX	FLOWMETER	F5	EQUIPMENT	ACTIVE	ULTRASONIC	-	-
FACILITY	EFFLUENT BOX	BASIN STRUCTURE	F6	STRUCTURE	ACTIVE	CONCRETE	-	10.5'x5.8'6.25'
FACILITY	CHLORINE CONTACT BASIN 1	BLOWER 1	F7	MECHANICAL	ACTIVE	Republic	HRC400	3.4HP
FACILITY	CHLORINE CONTACT BASIN 2	BLOWER 2	F8	MECHANICAL	ACTIVE	Republic	HRC400	3.4HP
FACILITY	GENERATOR	OVERHEAD CANOPY/SLAB	F9	EQUIPMENT	ACTIVE	FABRICATED METAL	-	-
FACILITY	GENERATOR	GENERATOR	F10	EQUIPMENT	ACTIVE	DIESEL GENERATOR	-	40kW
FACILITY	GROUNDS	FENCE & GATE	F11	GENERAL	ACTIVE	6' METAL CHAIN LINK	-	1200 LF
FACILITY	GROUNDS	SITE LIGHTING	F12	GENERAL	ACTIVE	-	-	-

GENERAL NOTES
1. Note lengths of piping, underground or buried yard piping and valves not evaluated or inventoried unless described below. Plumbing pipe and pipe < 3" were not evaluated unless described.
2. Valve exercises not performed.
3. Pumps and Associated Motors were accessed as one item.
4. Note that LS enclosures were not removed to access general piping and valves within the enclosure, therefore, conditions as listed below are based on visual evalution and staff discussions.
5. Anticipated costs are based primarily on general capacity or size of equipment shown in field or as-built plans. This cost does not represent all-inclusive construction costs and should only be referenced on a budgetary level. Items such as site preparation, grading, yard piping, and mobilization were not part of this study.
6. "-" indicates unknown or not applicable.

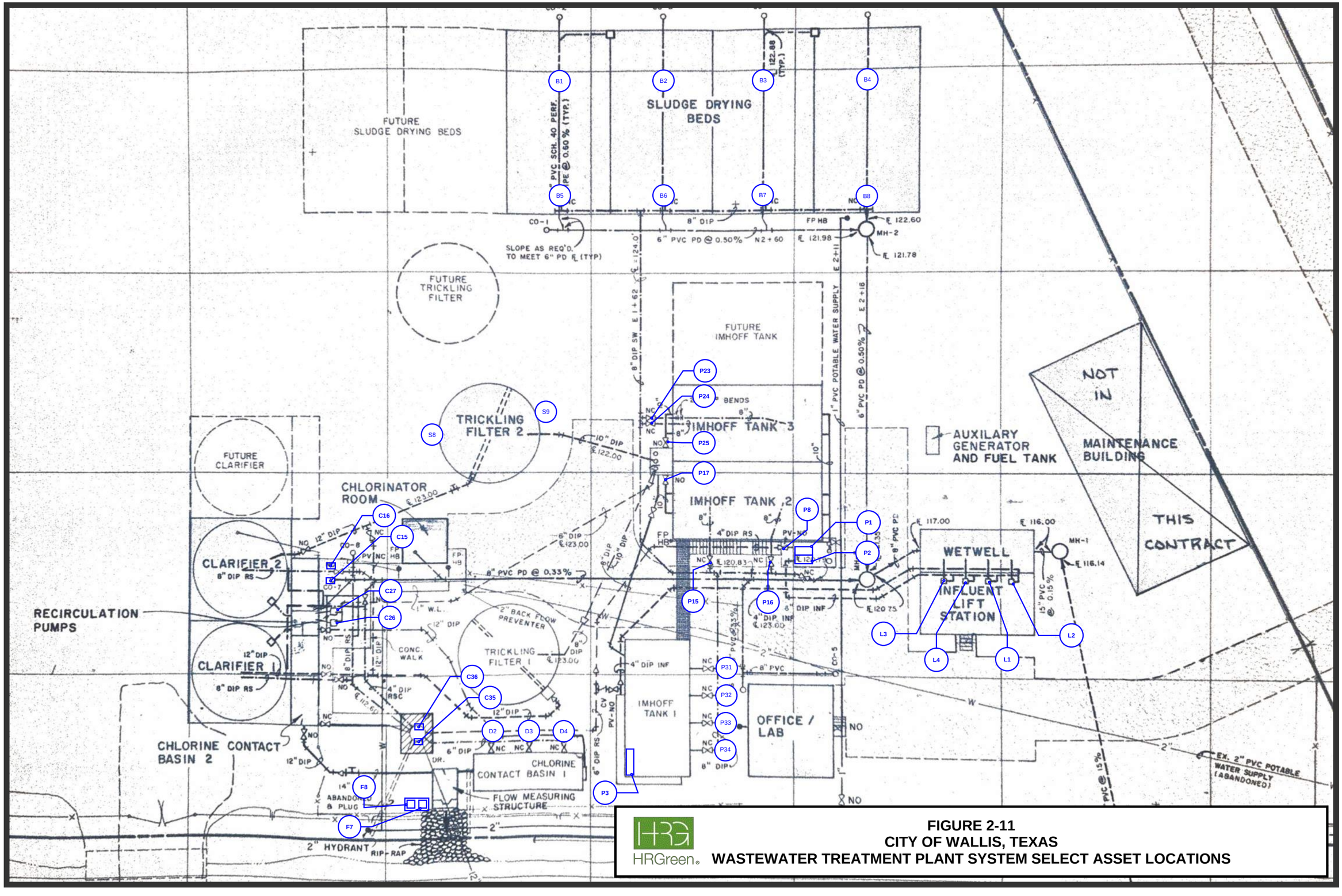


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FIGURE 2-11
CITY OF WALLIS, TEXAS
WASTEWATER TREATMENT PLANT SYSTEM SELECT ASSET LOCATIONS

3.0 COMPREHENSIVE PLANNING

3.1 Asset Prioritization

3.1.1 COLLECTION SYSTEM PRIORITIZATION

The GIS database and platform can be used to view the location of each collection system asset including manholes, pipes, and terminal cleanouts. Asset properties such as condition, sizes, and material can also be viewed in the GIS platform. It is important to note that the locations, sizes, and pipe material of every single sewer asset in the City could not be completely verified and is labeled as such.

Sanitary Manholes

Due to the deteriorating conditions, manholes in Bad, Poor, and Fair condition have a higher probability of failure and I&I. As mentioned in **Section 2,** approximately 19% of the City's manholes are in Poor or Bad Condition. It is recommended to replace the Bad and Poor Condition manholes within one (1) year. Approximately 69% of manholes are in Fair, Good, or Excellent Condition. It is recommended to re-inspect these manholes as part of a preventative maintenance routine, every 3-years for Fair Condition manholes, and every 5 years for Good or Excellent Condition manholes. It is also recommended to locate the manholes denotes as "Not Found" or "No Access" to confirm their existence and/or condition (5 % with No Access and 7.5% Not Found). For manholes without Access, it is recommended that the City review easements and work with property owners as needed to restore access to their system.

Sanitary Gravity Mains

Collection system gravity pipe condition ratings were based on two factors: (1) the location in relation to the High-Risk Zones and (2) pipe material. HR Green recommends prioritizing replacement of all Bad Condition lines (approximately 13,034 LF) as shown as VCP or unknown material in **Figure 3-1**. It is also recommended to replace the VCP pipes outside of the High-Risk Zones (denoted as Poor Condition, approximately 12,727 LF). VCP has an increased risk of I&I due to the likeliness to contain cracks.

HIGH-RISK ZONE 1

HIGH-RISK ZONE 2

HIGH-RISK ZONE 3
(FLOODPLAIN)

Legend

- SANTIARY MANHOLE
- PVC SANTIARY MAIN WITHIN HIGH-RISK ZONES
- VCP, DIP, OR UNKNOWN MATERIAL PIPE WITHIN HIGH -RISK ZONE
- WWTP
- LIFT STATION
- FEMA 100-YEAR FLOODPLAIN

Feet
0 500 1,000

N

Wallis

Texas Parks & Wildlife, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA

FIGURE 3-1
HIGH-RISK ZONE SANTIARY GRAVITY PIPE MATERIAL

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3.1.2 LIFT STATION AND WWTP PLANNING

The prioritization of facilities, including the lift stations and WWTP improvements are a function of both the Asset Condition and Asset Criticality. To prioritize assets for improvement, each asset is assigned a Criticality Rating. This rationale is similar to what is described in TCEQ "Managing Small Domestic Wastewater Systems: Asset Management" (RG-530, September 2017).

Criticality

In terms of Criticality, all assets contribute to the functionality of a system. Each asset has varying importance to the system; some assets are inherently more critical to achieving the system goal. For a municipal sanitary sewer collection system, the goal and function of the system is to convey wastewater from customers to be properly treated and discharged. More specifically, the goal of the facility lift stations is to convey the appropriate volume of wastewater to the WWTP, and the goal of the facility WWTP is to properly treat and discharge the treated wastewater to the outfall. Criticality is the measure of risk associated with an asset. Planning and maintenance should be prioritized based on Criticality to properly allocate resources. Criticality can be defined as the relationship between the Likelihood of Failure (LOF) and the Consequence of Failure (COF) as depicted in the "bow-tie" graphic below.

Likelihood of Failure (LOF) is defined as probability or likelihood that the asset can fail. The Consequence of Failure (COF) represents the impacts that the asset failure will cause to system functions. The criteria used to evaluate LOF and COF of each asset are tabulated in **Table 3-1**.

TABLE 3-1 LIKELIHOOD OF FAILURE AND CONSEQUENCE OF FAILURE DEFINITION

CRITERIA	DEFINITION	1	2	3	4	5
LIKELIHOOD OF FAILURE (LOF)						
ESTIMATED REMAINING ASSET LIFE	**The estimated remaining useful life (ERUL)**	>20 years	>5 years	>3 years	>1 year	Asset ERUL is expired
CAPACITY	**The ability of the asset to meet its intended design load.**	Exceeds/Meets Current Demand	N/A	Partial Demand Met	N/A	Inadequate to Meet Demand
RELIABLITY	**The dependability of the asset to perform its function consistently.**	Very Reliable	N/A	Occasionally Out of Service	N/A	Frequently Out of Service
OBSOLESCENCE	**The assets state of being antiquated, no longer useful or required within industry standards.**	Best Available Technology	Industry Standard Technology	Appropriate Technology	Technology Nearing Obsolesce	Technology Obsolete
REDUNDANCY[1]	**The asset has provisions of an additional or duplicate asset in the case that the asset fails.**	Fully Automated Redundancy	Partially Automated Redundancy	Manually Operated Redundancy	Spares on Hand	No Redundancy
CONSEQUENCE OF FAILURE (COF)						
LEVEL OF SERVICE REQUIRED	**The effects on City Staff effort required to restore asset back to original condition.**	No Impact	Low (< 2 FTEs[2] for < 1 Day)	Moderate (2+ FTEs for <1 Day)	High (2+ FTEs for > 1 Week)	Outsourced
PERMIT COMPLIANCE	**The effects on the ability to maintain compliance with local regulatory requirements.**	No Compliance Impact	Potential Compliance Impact	Eventual Non-Compliance Impact	Near-Term Non-Compliance Impact	Immediate Non-Compliance
HEALTH & SAFETY	**The effects on the City health & safety of staff and customers.**	No Illness/Injury Potential	Potential for Minor Illness or Injury	Potential for Moderate Illness or Injury	Potential for Major Illness or Injury	Potential for Fatality
SYSTEM DISRUPTIONS	**The effects on the functional goal of the system.**	Can be out of service ≥ 24 Hrs	Can't be out of service > 24 Hrs	Can't be out of service > 12 Hrs	Can't be out of service > 6 Hrs	Can't be out of service 1 Hour

[1] Some assets are required to have some form of redundancy by TCEQ.
[2] FTE: Full-Time Employee

HR Green rated the LOF and COF factors for each asset and utilized the following formulas to determine the Criticality Score:

Likelihood of Failure, LOF = AVERAGE ("Estimated Remaining Asset Life", "Capacity", "Reliability", "Obsolescence", and "Redundancy")

Consequence of Failure, COF = AVERAGE ("Level of Service Required", "Permit Compliance", "Health & Safety", and "System Disruption")

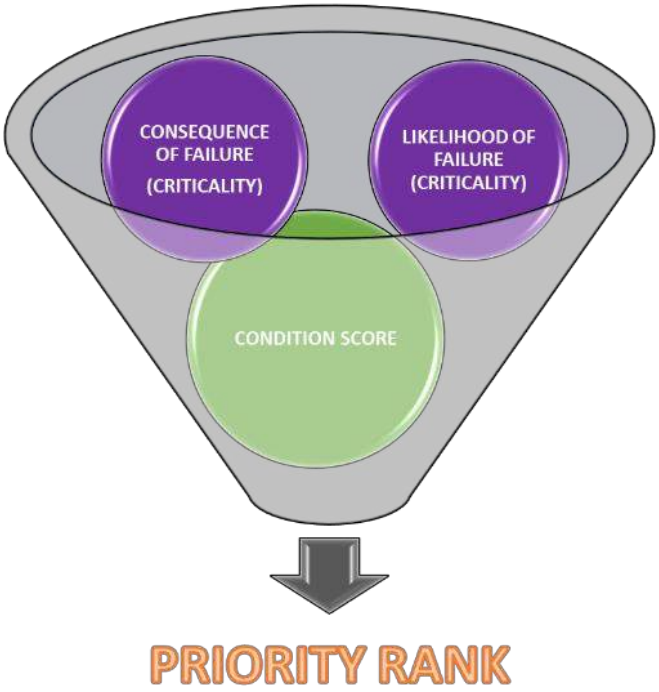
(Likelihood of Failure)×(Consequence of Failure) = CRITICALITY SCORE

Prioritization

Asset Prioritization provides a general ranking structure to justify and recommend improvements based on the criticality and condition of the asset and a standard methodology was used to obtain each asset's Priority Rating. The Condition Rating and Criticality Rating were utilized to define the Priority Rating. As described in **Section 2**, the Condition Rating for each asset was determined based on the site visit assessment. All Condition Ratings can all be found in **Appendix A, D, E** for manholes, WWTP, and lift stations, respectively.

While the Priority Rating provides the top priorities on a "per asset" basis, it is advised that construction projects consider overall systems and components (e.g., basin structure repair projects should include railing, piping, grating even if it is rated as a lower priority item). Thus, to address high priority items, there are likely some lower priority items that will be addressed at the same time. The following formula determines the Priority Value, and is also shown visually in the graphic below:

(CONDITION SCORE)$^{1.15}$ x (CRITICALITY SCORE)$^{0.5}$ = PRIORITY VALUE



Utilizing this formula, the Priority Value is normalized to the range between 1 - 5. A weighting was applied to the Condition Score and the Criticality Score, with more weight placed on the current condition of the asset (27%), as noted in **Section 2**. **Appendix D and E.** contains the tabulated calculations for Criticality Score and Priority Value, along with the description of the criticality of each wastewater system asset at the WWTP and Lift Stations.

Priority Value was aligned to a 5 (top priority to improve) to 1 (low priority to improve) ranking, based on the definitions within TCEQ RG-530. **Table 3-2** elaborates on the definition of each Priority Value. Based on the Priority Values calculated, the City is recommended to improve these items in the timeline as defined by Improvement Phase A, B, and C shown in **Table 3-3** and **Table 3-4**. The phases will assist the City with consolidating improvements in a holistic standpoint, rather than focusing strictly on Priority Values.

For the WWTP, there are many assets that are part of each system; **Table 3-4** provides an overall system rating based on the average values for each Asset Priority Value, Condition Score, and Criticality Score. This table shows the priorities of the WWTP are the Secondary Treatment, Primary Treatment, and Influent System, respectively. **Table 3-3** shows the LS priority based on individual assets.

TABLE 3-2 PHASE IMPROVEMENTS BY PRIORITY VALUE

Priority Value	Priority Value Definitions	Recommended Improvement Phase (A, B, C)[1]
5	High risk of breakdown or failure with serious impact on performance of the overall system. Replacement or rehabilitation is highly recommended. Asset is highly critical to infrastructure of system and in providing adequate treatment and maintaining compliance.	A
4	The risk of breakdown or failure is possible with a serious impact on the performance of the overall system. There may have been unplanned corrective maintenance based on the current condition.	B
3	Assets show signs of wear but function as intended or does not function as intended but may not have a major impact on the overall system performance as its Criticality Score may not be high. These items should be re-assessment within the next one to two years to consider for improvements.	B or C
2	Assets show some signs of wear but may be inconsequential to the overall system performance. At worst, only minor repair might be needed at this time. No immediate improvement action needed.	C
1	Asset is shows little wear and functions as intended. No immediate improvement action needed.	C

[1] Phase A – The City is highly recommended to plan for improvements within the next year.
Phase B – The City is recommended to plan for improvements within the two to three years.
Phase C – The City is recommended to reassess within the next five years and plan for improvements as needed.

TABLE 3-3 PRIORITY RATINGS FOR LIFE STATION ASSETS

PRIORITY RATING[1]	SITE TYPE	SYSTEM	POSITION	ASSET	ASSET ID
5	LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	PUMP 1	LT10
5	LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	PUMP 2	LT11
5	LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	PUMP 1	LW7
5	LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	PUMP 1	LL11
5	LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	PUMP 2	LL12
5	LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	CONCRETE STRUCTURE	LC5
5	LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	COLLECTOR MANHOLE	LC6
5	LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	CONCRETE STRUCTURE	LT5
5	LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	COLLECTOR MANHOLE	LT6
5	LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	CONCRETE STRUCTURE	LL6
5	LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	COLLECTOR MANHOLE	LL7
4	LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	PUMP 2	LW8
4	LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	ALARM	LC20
4	LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	ALARM	LT20
4	LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	ALARM	LL21
4	LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	ALARM	LM20
4	LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	ALARM	LW17
4	LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	4" CHECK VALVE 1	LW11
4	LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	PUMP 1	LC10
4	LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	PUMP 2	LC11

*Note that the Priority Rating provides the top priorities, but actual projects should consider overall systems and components (e.g., basin structure repair projects should include railing, piping, grating even if not rated as a high priority).

[1]Due to the extensive list of assets, for the LS only the Priorities Rated 4 and 5 are tabulated above. All rankings can be found in **Appendix E.**

TABLE 3-4 PRIORITY RATINGS FOR WWTP SYSTEMS

WWTP SYSTEM AND POSITION[1]	AVERAGE CONDITION SCORE	AVERAGE CRITICALITY RATING	AVERAGE PRIORITY VALUE[2]	Recommended Improvement Phase (A, B, C)
SECONDARY TREATMENT	**3.0**	**2.9**	**3.5**	
TRICKLING FILTER 1	3.0	3.3	3.8	**A**
TRICKLING FILTER 2	3.0	2.6	3.3	
PRIMARY TREATMENT	**2.8**	**2.1**	**2.8**	
HEADWORKS	3.1	1.8	2.8	
IMHOFF TANK 1	2.9	2.2	3.0	**A**
IMHOFF TANK 2	2.8	2.2	2.9	
IMHOFF TANK 3	2.6	2.3	2.9	
SPLITTER BOX	2.3	2.0	2.5	
INFLUENT SYSTEM	**3.2**	**1.7**	**2.8**	**B**
LIFT STATION	3.2	1.7	2.8	
CLARIFICATION SYSTEM	**2.7**	**2.1**	2.8	
CLARIFIER 1	2.5	2.6	3.0	
CLARIFIER 2	2.2	2.6	2.7	**C**
RECIRCULATION PUMP AREA	3.0	1.9	2.8	
RETURN SLUDGE AREA	2.7	2.1	2.9	
SCUM AREA	2.8	1.6	2.5	
FACILITY	**2.1**	**2.4**	**2.6**	
CHLORINE CONTACT BASIN 1	1.0	2.2	1.6	
CHLORINE CONTACT BASIN 2	3.0	2.2	3.1	
EFFLUENT BOX	2.0	3.0	2.8	**C**
GENERATOR	2.5	2.4	2.8	
GROUNDS	2.5	2.0	2.6	
OFFICE & LAB BUILDING	1.7	2.3	2.2	
DISINFECTION SYSTEM	**2.5**	**1.8**	**2.4**	
CHLORINATOR BUILDING	2.5	1.8	2.4	**C**
CHLORINE CONTACT BASIN 1	2.7	1.8	2.5	
CHLORINE CONTACT BASIN 2	2.0	1.8	2.1	
SLUDGE SYSTEM	**2.5**	**1.6**	**2.3**	**C**
SLUDGE DRYING BED AREA	2.5	1.6	2.3	

[1]The WWTP Priority Values, Condition Scores, and Criticality Scores on a System and Position Level are an average of all assets contained within the related Position/System to obtain the overall rating or score. For a full list of asset rankings in the WWTP see **Appendix D**.
[2]Average Priority Ranking = (Condition Score)$^{1.15}$ x (Criticality Score)$^{0.5}$. Note that calculated Priority Values are shown to the tenth decimal precision and therefore falls in between the definitions as shown in **Table 3-2**.
[3]Overall Priority is on a scale of 1-5, as noted in **Table 3-2**.
*Note that the Priority Rating provides the top priorities, but actual projects should consider overall systems and components (e.g., basin structure repair projects should include railing, piping, grating even if not rated as a high priority).

3.2 Recommended System Improvements

Asset Prioritization provided the general ranking structure for system improvements. This section will identify the recommended improvements based on our engineering interpretation of the Asset Prioritization ranking.

3.2.1 COLLECTION SYSTEM - MANHOLES

Improvements to the manholes include complete replacement, rehabilitation, or regular inspections and depend on the condition of the manhole. Manhole rehabilitation includes various items to restore capacity and asset life including installation of an epoxy liner or fiberglass insert to provide corrosion protection, re-sealing joints, and replacing damaged chimney, frame, and covers. Photographs of the manholes were collected as a part of the manhole assessment and can be accessed on the City GIS platform. Specific manhole photographs are visible by selecting the manhole of interest on the GIS platform and viewing the attached photo associated with the manhole.

The City is currently in the process of a major sanitary collection system improvement project through the Hurricane Harvey Floods State Mitigation CDBG-MIT Grant (No. 22-085-054-D311 CID 01). As this report was based on present condition of all assets (as of February 2023), this upcoming project may address some of the concerns or recommendations stated here. It is recommended that the City update the current asset inventory platform once the CDBG-MIT project is completed. Construction is anticipated to start in the end of 2023 and be completed by early 2025.

Based on the CDBG-MIT Grant work, the following improvements are recommended for the City's remaining manholes that were not improved as part of the grant work. **Table 3-5** shows the recommendations for manhole improvements, changes in recommendation if the entire proposed CDBG-MIT Grant project is constructed, as shown on the plans provided by the City (included in **Appendix F**), and associated opinions of probable construction (OPC) costs. It is recommended to improve the manholes in conjunction with the associated collection lines as discussed in the collection line section.

TABLE 3-5 MANHOLE IMPROVEMENT WITH CDBG-MIT GRANT COMPLETE

Asset Condition Rating	Improvement	Current No. of Manholes	No. of Manholes after CDBG-MIT Grant	OPC Cost (2023 dollars)[1]
Good or Excellent	Regular Inspection (every 5 years)	6	6	$3,000[2]
Fair	Inspection for rehabilitation (next 2 year)	105	56	$28,000[2]
Poor	Replace or rehabilitate	29	13	$122,200[3]
Bad	Replacement	2	2	$18,800
Unknown / Not Found	Identification of Location and Complete Inspection	20	11	$5,500[5]

[1]OPC costs include 25% contingency for engineering, permitting, property acquisition, or other non-construction and soft costs. Costs are based on 2023 market, and have not been escalated to account for inflation.
[2]OPC Cost is based on a budget of $200 per manhole for inspection using outside staff, this could be offset if completed by District staff employees.
[3]Although the District can opt to rehabilitate these manholes based on the "poor" condition, it is recommended to replace these manholes as existing manholes do not meet the current min. 30" diameter requirement by TCEQ. The OPC is based on a budget replacement of $9,400 per manhole.
[4]This OPC is based on the inspection of $500 per manhole, for field investigation or additional labor to locate the manhole. Note that this cost can be offset if completed by District staff employees.

Based on the manhole assessment and improvement costs, HR Green recommends the following:

- Allocating approximately $141,000 within the next year (2023-2024) to replace fifteen (15) Poor and Bad Condition manholes.
- Allocating an additional $3,000 over the next 5 years for routine manhole inspection and $5,500 to complete inspection of manholes categorized as Unknown. This can also be completed by utilizing City Staff. The City can locate and inspect the Unknown Condition manholes (total: 11) over the next year.
- Allocating $28,000 to reinspection the Fair Condition manholes over the next 2 years to determine improvements needed, which does not include the first year repairing Poor and Bad Condition manholes.

3.2.2 COLLECTION SYSTEM – COLLECTION LINES

As stated in **Section 2.1**, conditions of the existing sanitary sewer lines were not directly assessed for physical conditions, the data collected during the manhole assessment field investigations was utilized and pipe conditions were based on available data, including the location and material of the pipe relative to the High-Risk Zones. According to the GIS data, there are approximately 25,760 LF of VCP or Unknown Material ranging from sizes 6" to 12" in the collection system.

It is recommended that further assessment be completed to further refine priority improvements of the VCP and Unknown Material lines. Smoke testing and CCTV are both commonly used to assess collection lines. Smoke testing can identify general problem areas and is less expensive, but provides less data and is heavily dependent on soil and groundwater conditions. CCTV, while more expensive, provides more information about the line, including precise locations of cracks, joint failures, and areas of sag. In addition, CCTV can help identify alternative replacement strategies (i.e., pipe-bursting instead of open cut). Therefore, this report recommends only CCTV. Additional information regarding smoke testing and CCTV is included in **Appendix G.**

A review of the scope of work proposed in the CDBG-MIT Grant Project (**Appendix F**) indicates the proposed project replaces a portion of the wastewater collection system. By comparing this report's improvement recommendations with the proposed CDBG-MIT Grant Project, it was found that many identified 5-Bad and 4-Poor Condition sanitary sewer mains have been planned to be improved in proposed work. **Figure 3-2** shows the proposed areas of work based on the CDBG-MIT Project in comparison to the remaining lines within and outside the High-Risk Zones.

Table 3-6 summarizes the recommendations for the collection system gravity lines.

TABLE 3-6 COLLECTION LINE IMPROVEMENT SUMMARY

Asset Description	Recommendation	Priority Ranking	Current LF	No. of LF after CDBG-MIT Grant	OPC Cost (2023 dollars)[1,2]
Unknown (high Risk Zone)	CCTV to determine condition	1	3,678	993	$10,000
Unknown (outside of High Risk Zones)	CCTV to determine condition	1	2,155	1,329	$14,000
VCP (High Risk Zones)	Replace	1	9,357	2,677	$510,000
VCP (outside of High Risk Zones)	Replace	2	10,572	2,658	$510,000
PVC (High Risk Zones)	CCTV to determine condition	3	19,397	13,768	$138,000
PVC (outside of High-Risk Zone)	CCTV to determine condition	4	19,471	16,685	$167,000
PVC size 4-inch	Replace with 6-inch[3]	4	176	176	$34,000
		Total	**64,806**	**38,286**	**$1,383,000**

[1]OPC costs include 25% contingency for engineering, permitting, property acquisition, or other non-construction and soft costs. Costs are based on 2023 market, and have not been escalated to account for inflation.
[2]OPC Cost is based on $10/LF for CCTV and $190/LF for pipe replacement (all sizes 4"-10" for PVC) at up to7-ft depth over natural ground (further cost estimation recommended for cost of pipe replacement based on pipe material, size, location, and construction method).

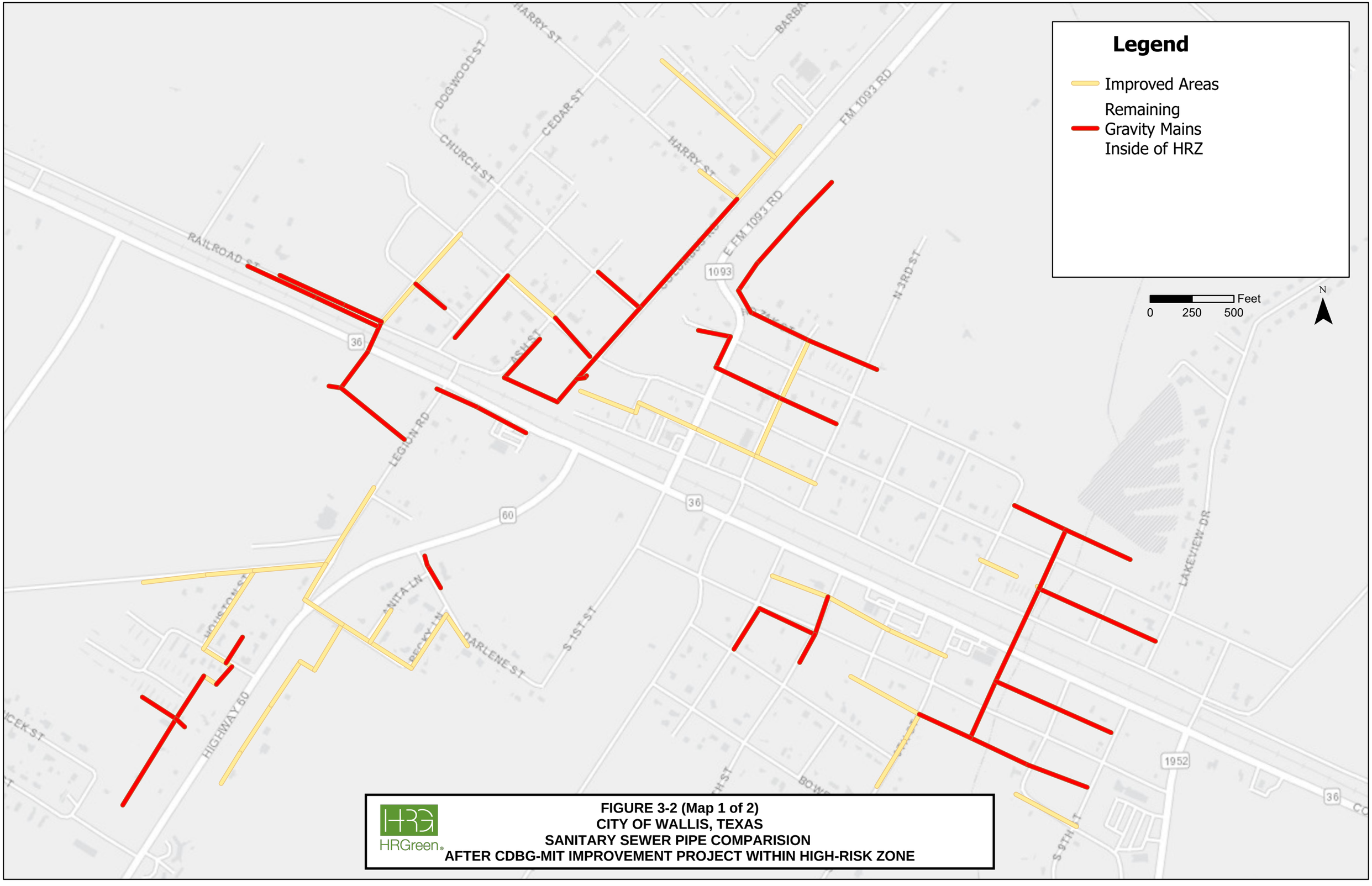


FIGURE 3-2 (Map 1 of 2)
CITY OF WALLIS, TEXAS
SANITARY SEWER PIPE COMPARISION
AFTER CDBG-MIT IMPROVEMENT PROJECT WITHIN HIGH-RISK ZONE

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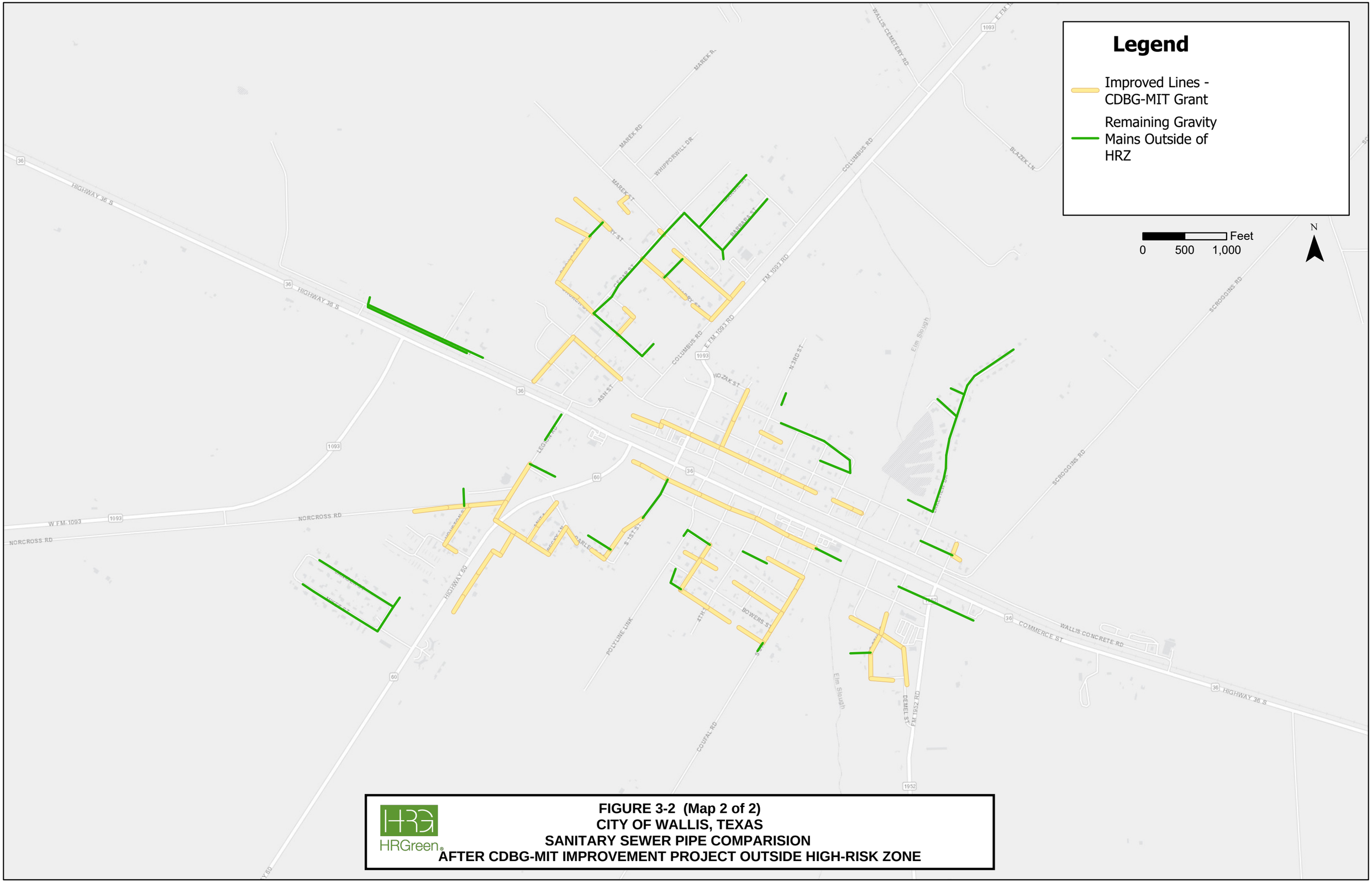

FIGURE 3-2 (Map 2 of 2)
CITY OF WALLIS, TEXAS
SANITARY SEWER PIPE COMPARISION
AFTER CDBG-MIT IMPROVEMENT PROJECT OUTSIDE HIGH-RISK ZONE

HRGreen

Based on the assessment and improvement costs, HR Green recommends the following:

- Allocating approximately $330,000 (for approximately 33,000 LF) within the next year (2023-2024) to complete CCTV on the unknown lines within the High Risk Zones and outside of the High Risk Zones.
- Allocating an additional $510,000 to replace the ~2,700 LF VCP within the High Risk Zones.
- Allocating an additional $6,800 over the next 5 years to replace the 4-inch PVC.

City Staff can report areas of I&I concern, locations of repairs, and locations of cleaning using the GIS Platform. Due to the breadth in this study of the collection system, it is recommended that further assessment including hydraulic capacity studies, flow monitoring, land surveying, CCTV, or smoke testing be completed to develop specific areas of improvement.

3.2.3 LIFT STATIONS

The six (6) lift stations were evaluated for rehabilitation and improvements. The structural, mechanical, electrical deficiencies and general operation were observed during field investigations. Photos of each lift station are included in **Appendix C**. From the asset prioritization discussed in **Section 3.1** and the highest priority improvements should include:

- Replacement and re-evaluating the capacity of LS No. 3 (7th Street) Pump 1 and Pump 2, and LS No. 6 (Westgate) Pump 1 (currently out of service).
- Replacement and re-evaluating the capacity requirements for LS No. 4 (Legion Street) Pump 1 and Pump 2.
- Rehabilitating the manhole and wet well structures at LS Nos. 2, 3, and 4.

For the pumps at LS Nos. 3, 4, and 6, staff reported the existing pumps require significant and frequent maintenance. Based on discussions, it is assumed that these issues may be the result of consistent debris/rag causing clogging and potentially under-powered to handle incoming flow (further analysis would be needed to determine pump capacity and set points). It is recommended to replace these pumps and re-evaluate their capacity and duty requirements. It is also recommended to explore alternatives to reducing ragged impellers as pump replacement may not benefit unless the ragging and debris issues are solved. Alternate solutions include chopper pumps, trash screen baskets, and/or public outreach.

For manhole and wet well structures at LS Nos. 2, 3, and 4, it is recommended to install epoxy lining, or another protective coating, within the interior of each wet well to protect from further corrosion and provide re-grouting around joints to reduce potential for infiltration. Although the structure of the manhole and wet

wells is the highest priority for improvements, there are various items that can be simultaneously improved, including:

- Replace and relocate the discharge pipes at LS Nos. 2, 3, 4 to be outside the wet well to prevent corrosion exposure. At the very minimum, pressure wash existing pipes to assess condition, and if in adequate condition, provide protective coating on pipe within the wet well to prevent deterioration.
- Replace the supports, suction pipes and float system inside the wet wells.
- Replace on all onsite manhole and well covers.

The Summary of these recommendations and associated opinions of probable construction cost are included in **Table 3-4**.

TABLE 3-7 SUMMARY OF RECOMMENDED LIFT STATION IMPROVEMENTS COSTS

Improvement Description	Opinion of Probable Construction Cost ($ 2023)	Annual Plan Description[1]
Pump Replacement at LS No. 3 (2 pumps) and LS No. 6 (1 pump)	$110,000[2]	$110,000 for the next year
Pump Replacement at LS No. 4 (2 pumps)	$20,000[3]	$10,000/year within the next 2 years
Structure Improvements (Wet Well and Manholes at LS No. 2, 3, and 4)	$102,000[4]	Allocate $102,000 for construction in 3 years (2026), i.e. $34,000 every year. Start improvements at Year 1 (2024) and end at Year 3 (2026).
Total	**$232,000**	

[1]OPC costs include 25% contingency for engineering, permitting, property acquisition, or other non-construction and soft costs. Costs are based on 2023 market, and have not been escalated to account for inflation.
[2]Costs are based on pump replacement in-kind (two 15-HP pumps at LS No. 3 and one 3-HP pump at LS No. 6).
[3]Costs are based on pump replacement in-kind (two 3-HP pump at LS No. 4).
[4]Costs are based on epoxy coating at $45/SF on the interior size of each LS and collector manhole, not including additional recommended improvements detailed above. Detailed LS design is recommended to include complete rehabilitation of each LS.

3.2.4 WASTEWATER TREATMENT PLANT

As noted in **Section 2.3**, the last 4 years of WWTP discharge data shows that the WWTP flows are averaging approximately 0.110 – 0.150 MGD. Based on the current WWTP discharge permit issued June 26, 2019 and discussion with City, the WWTP is currently in its permitted interim phase and the daily average flow shall not exceed 0.2 MGD. The Final Phase is permitted at 0.498 MGD with an Ammonia Nitrogen (NH-4) limit requirement of 9 mg/L and will require approval by TCEQ. Note the current plant is operating at approximately 65% of its permitted capacity at its current interim phase (0.2 MGD).

Based on our condition assessment of the existing WWTP, top priority improvements are found in the Secondary, Primary, and Influent System.

Primary Treatment System

- Headworks, Imhoff Tank 1, and 2 concrete basin structures show signs of cracks and exposed aggregate that must be repaired properly to prevent imminent failure.

Secondary Treatment System

- Trickling filter nos. 1 and 2 concrete basin structures show signs of major cracks and exposed aggregate that must be repaired properly to prevent imminent failure.
- The Filter arm and sprayer arm mechanism for the Trickling Filter 2 should be replaced due to frequent clogging and worn bearings.

Influent System

- The wet well structure visual inspection indicates it need to be rehabilitated but it is recommended to perform a more detailed manned entry structural inspection to determine the scale of rehabilitation.
- Pump 4 and Air-Release Valve on Pump Nos. 1-4 are in poor condition and need to be replaced. The check valves on Pump Nos. 1-2 need to be replaced as they are in poor condition.

As the top priority, it is recommended to immediately rehabilitate all concrete basin structures mentioned above (Influent, Primary Treatment, and Secondary Treatment System), followed by repairing the filter arm within the next year, and repairing all the assets in the influent system mentioned above within the next year, including the influent pump.

The Imhoff System is no longer commonly used for treating wastewater, and as noted by the City, experienced operators that understand the system, treatment process operations, and maintenance are

difficult to find, **Appendix G** contains a manual for maintenance of Imhoff Systems. Structural repairs recommended herein will require basins to be emptied and likely extensive bypassing. Further study is recommended to review the overall treatment processes related to permit requirements and projected flows.

TABLE 3-8 SUMMARY OF RECOMMENDED WWTP IMPROVEMENTS COSTS

Improvement Description	Opinion of Probable Construction Cost ($ 2023)[1]
Concrete Basin Repairs/Replacement at the Headworks, Imhoff Tank 1 and Imhoff Tank 2	$730,000
Concrete Basin Repairs/Replacement at Trickling Filter Nos. 1 and 2	$347,500
Replace filter arm and sprayer arm mechanisms at Trickling Filter No. 2	$183,800
Replace Pump 4 at the Lift Station	$70,000[2]
Replace air release valves on Pump Nos. 1-4 at the Lift Station	$15,000[2]
Replace check valves on Pump Nos. 1 and 2 at the Lift Station	$11,300[2]
Total	**$1,357,600**

[1]OPC costs include 25% contingency for engineering, permitting, property acquisition, or other non-construction and soft costs. Costs are based on 2023 market, and have not been escalated to account for inflation. Labor is included and estimated based on engineering judgement, however it is recommended to perform a detailed cost estimate prior to any improvement.
[2]Costs are based on pump replacement in-kind and valve replacement in-kind.

Other Considerations

Note the based on the record flow data, the current plant is operating at approximately 65% of its permitted capacity at its current interim phase (0.2 MGD). Note to be eligible for the Final Phase of the existing permit, the WWTP must submit to the TCEQ for approval and clearly show how the treatment system will meet the effluent limitations required on Page 2A of the existing permit, which includes an increased discharge capacity of 0.5 MGD and an Ammonia-Nitrogen limit of 9 mg/L per the passage below.

"Prior to construction of the Final phase of the treatment facilities, the permittee shall submit to the TCEQ Wastewater Permitting Section (MC 148) a summary transmittal letter in accordance with the requirements in 30 TAC §217.6(d). If requested by the Wastewater Permitting Section, the permittee shall submit plans, specifications, and a final engineering design report which comply with 30 TAC Chapter 217, Design Criteria for Domestic Wastewater Systems. The permittee shall clearly show how the treatment system will meet the effluent limitations required on Page 2A of this permit. A copy of the summary transmittal letter shall be available at the plant site for inspection by authorized representatives of the TCEQ."- Existing Discharge Permit, Other Requirements, No. 6.

Based on this information and discussions with City and stakeholders, the City may consider some of the following options:

- Renew the existing discharge permit with the intent to develop to a higher capacity Final Phase. The new permit will likely have the additional Ammonia-Nitrogen (NH3-N) limit requirement.
    - Based on a high-level capacity calculation, this will likely require additional clarifier capacity, at a minimum to meet a final phase of 0.5 MGD average, and 1.5 MGD . For the required NH3-N limit, note that Trickling Filters are designed as aerobic attached growth reactors and have been proven to be suitable for the removal of ammonia nitrogen. It is recommended to determine the NH3-N removal with the existing Trickling Filters, through sampling upstream and downstream to determine the additional treatment requirements to meet the final NH3-N limits. The Engineer of Record for the original Trickling Filter Design can confirm the assumed loading rate calculations to design the filters. Additional filter capacity and structures may be needed based on the sample results, or the City may consider a completely different NH3-N treatment process.
- Renew and amend the existing discharge permit to maintain the current interim phase of 0.2 MGD average and 0.6 MGD 2-hour peak.
    - Note the current plant is operating at approximately 65% of its permitted capacity at its current interim phase (0.2 MGD). Per Title 30 Texas Administration Code (TAC) Chapter 217, Section 305.126 states that “for any treatment plant facility in which the flow reaches 75% of the permitted average daily or annual average flow for three consecutive months, the permittee must initiate engineering and financial planning for expansion and/or upgrading of the wastewater treatment and/or collection facilities. Whenever “the average daily or annual average flow reaches 90% of the permitted average daily flow for three consecutive months, the permittee shall obtain necessary authorization from the commission to commence construction of the necessary additional treatment and/or collection facilities.” At its current growth of 65%, the City will need to consider planning for future capacity needs. This can include:
        - Existing WWTP expansion, this may require land acquisition and design of a new treatment process, in lieu of the Imhoff treatment system. As part of the City plans for modifying or adding treatment capacity, it is recommended to consider replacing the WWTP with a different treatment process than the Imhoff System in the future.
            - Constructing a new WWTP with the plan to decommission the current WWTP or adding a secondary WWTP to the City’s system.

Based on City and stakeholder discussions, if the City plans to accelerate its growth through additional development, the City needs to plan for the additional treatment capacity that will be required. Additional land would likely be needed for a new facility. Local trends for a type of conventional aeration system WWTP on a greenfield site for the existing permitted flows greatly ranges on a variety of factors and cost ranges from $5 - $30 per treated gallon of wastewater, in this instance, it is recommended for the City to plan for approximately $15 million. Note that regardless of the future plans for additional treatment capacity in the City, the City should consider maintaining the current asset infrastructure as recommended in this report as part of its final plans to meet treatment capacity and consider methods to reach Ammonia-Nitrogen discharge limits.

3.2.5 OVERALL SYSTEM RECOMMENDATION OF IMPROVEMENTS AND OPC COSTS

TABLE 3-9 SCHEDULE OF OVERALL SYSTEM IMPROVEMENTS

ID[1]	Improvements Description	FY 2024[2]	FY 2025	FY 2026	FY 2027	FY 2028
MH1	Manhole in Good or Excellent condition. Regular Inspection (every 5 years)	$3,000				$3,000
MH2	Manhole in Fair condition. Inspection for rehabilitation (next 2 year)	$14,000	$14,000			
MH3	Manhole in Poor condition. Replace or rehabilitate	$61,100	$61,100			
MH4	Manhole in Bad condition. Replacement	$9,400	$9,400			
MH5	Manhole in Unknown / not found condition. Identification of Location and Complete Inspection	$1,100	$1,100	$1,100	$1,100	$1,100
CL1	CCTV for Unknown (High Risk Zone)	$5,000	$5,000			
CL2	CCTV for Unknown (outside of High Risk Zones)	$7,000	$7,000			
CL3	Replace VCP (High Risk Zones)	$102,000	$102,000	$102,000	$102,000	$102,000
CL4	Replace VCP (outside of High Risk Zones)	$102,000	$102,000	$102,000	$102,000	$102,000
CL5	CCTV for PVC (High Risk Zones)	$69,000	$69,000			
CL6	CCTV for PVC (outside of High-Risk Zone)	$83,500	$83,500			
CL7	Replace PVC (existing size 4-inch)	$6,800	$6,800	$6,800	$6,800	$6,800
LS1	Pump Replacement at LS No. 3 (2 pumps) and LS No. 6 (1 pump)	$110,000				
LS2	Pump Replacement at LS No. 4 (2 pumps)		$20,000			
LS3	Structure Improvements (Wet Well and Manholes at LS No. 2, 3, and 4)	$34,000	$34,000	$34,000		
WW1	Concrete Basin Repairs/Replacement at the Headworks, Imhoff Tank 1 and Imhoff Tank 2	$730,000				
WW2	Concrete Basin Repairs/Replacement at Trickling Filter Nos. 1 and 2	$347,500				
WW3	Replace filter arm and sprayer arm mechanisms at Trickling Filter No. 2		$183,800			
WW4	Replace Pump 4 at the Lift Station			$70,000		
WW5	Replace air release valves on Pump Nos. 1-4 at the Lift Station			$15,000		
WW6	Replace check valves on Pump Nos. 1 and 2 at the Lift Station			$11,300		
	Total per year	***$561,150***	***$320,500***	***$424,530***	***$215,060***	***$210,500***

[1]Improvements' ID are labeled as follows: "MH" for manhole improvement, "CL" for collection line improvement, "LS" for lift station improvement, and "WW", for wastewater treatment plant improvement.
[2]OPC costs include 25% contingency for engineering, permitting, property acquisition, or other non-construction and soft costs. Costs are based on 2023 market, and have not been escalated to account for inflation.

4.0 BUDGET PLANNING STRATEGIES

4.1 Estimated Annual Budget

In order to determine financial strategies for the City, the sewer budgetary information was analyzed from 2018-2022. The City provided the list of budgets and expenditures from 2018 to 2022. From the City's budgetary data, the following clarifications are made:

- Due to how the City historically organizes its financial data, water and wastewater budgets were allocated together. For revenues, Water and Sewer sales are separated. For expenses, Water and Sewer costs are lumped together. For consistency, this report will summarize the data for water and sewer expenses together. However, this report does not consider major capital expenses relating to the Water system.
- Major capital grants and government loan program amounts are categorized as separate items outside recurring the revenues. These are considered one-time revenues with a net-zero revenue/expenditure ratio since they are dedicated to a certain scope of work.

Table 4.1 summarizes the City's water and wastewater revenue and expenditures from 2018-2022. The revenues and expenditures can be broken down into the categories as follows:

- **Revenues**
  - **Water/Sewer Sales** – This includes metered customer charges from water and wastewater use.
  - **Fees** – Fee from Garbage services, reconnections, water, and sewer taps.
  - **Other** – Sales taxes and interest income.
- **Expenses**
  - **Maintenance of Equipment** – This includes building and irrigation maintenance, inspection and service fees, sewer, sewer plant, and miscellaneous repair.
  - **Materials & Supplies** – This includes chemicals, gas & oil, machinery, meters, office equipment and miscellaneous supplies, truck and tractor, and uniforms.
  - **Salary Personnel** - This includes staff salary and benefits.
  - **Other** - This includes administrative fees, audits, minor capitol expenses, engineering, publications, telephone, travel, training and other small expenses.
  - **Utilities** - This includes electric utility bills.
  - **Contractual** - This includes expenses in third-parties reoccurring services such as engineering and monitoring testing contractors and contract labor and equipment.

TABLE 4-1 WATER AND SEWER REVENUE AND EXPENDITURES OVERVIEW

FISCAL YEAR	2018	2019	2020	2021	2022
TIME RANGE	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Revenues	$ 580,965.25	$ 586,382.33	$ 661,331.49	$622,774.37	$ 3,312,067.19
Grants or Loans	$ -	$ -	$ -	$-	$ 2,616,317.19[1]
Gross Revenues	$ 580,965.25	$ 586,382.33	$ 661,331.49	$622,774.37	$ 695,750.00
Expenses	$ 548,912.07	$ 432,423.12	$ 589,262.37	$597,443.81	$ 674,134.40
Budget Surplus (Deficit)	**$ 32,053.18**	**$ 153,959.21**	**$ 72,069.12**	**$25,330.56**	**$ 21,615.60[2]**

[1]These grants derive from the GLO and CDBG-MIT programs for Wastewater Lift Station Emergency Generators and Sanitary Sewer Improvements, respectively.

[2]The Budget Surplus for 2022 does not account for the fees and match fund requirements required for the Grant and Loans. Based on the City's account data, paying these grant fees/match fund requirements will put the budget in a deficit of $1,109.36.

From 2018–2022, the City has an average of $61,000 budget surplus for water and sewer expenditures annually.

Moreover, the average percentage of gross revenues is (+)5.0%, indicating the Water/Sewer Revenues have an average increase of 5% in the last 5 years (total). The average percentage of expenses is (+)7.5%, indicating the Water/Sewer Revenues have increased an average of 7.5% in the last 5 years. Although other funding sources may be available for the water/sewer budget and expenditures can vary year-to-year, it is typically best business practice to maintain an equal or higher average revenue percentage than the expenses. The higher increase in expenses could indicate the City has an aging system that requires many repairs. The lower revenues could indicate the City has not adjusted rates to maintain the system. These items assume that the City's revenue/expenditures are linear for future years.

4.1.1 UTILITY RATES

Based on the City's budget from 2018-2022, it is estimated that the City may have an average of $61,000 budget surplus available for water and sewer expenditures annually. Utilizing the projected rate estimates worksheet provided in TCEQ RG-530, the costs recommended in this report may require a rate increase to fund these improvements (See **Appendix H** for calculations). The current rates at the City (2023) are presented in **Table 4-2**. As shown in this report, the Water/Sewer budget expenditure growth percentage is currently trending higher than the revenue growth percentage. If this trend continues, the City may experience water/sewer budget deficits in the long-term. Revising the rate structure is an option to add additional revenue to the City. It is highly recommended for the City to perform a full rate study.

TABLE 4-2 CUSTOMER BREAKDOWN OF WATER/SEWER CHARGES (2023)

Breakdown of Water/Sewer Charges	
Water	**Sewer**
0-3,000 gallons - $24.95	0-3,000 gallons - $21.70
After 3,000 & up to 7,000 - add $2.75 per 1,000 gallons	Remainder - add $2.10 per 1,000 gallons
Remainder - add $2.95 per 1,000 gallons	Remainder - add $2.10 per 1,000 gallons

Source: City of Walis Government Website

4.1.2 WATER METERS

Water and Sewer sales are based on water meter readings and the City is in the process of establishing a smart meter conversion process, which is anticipated to be complete by 2025. Aging water meters are prone to errors and breaking. Until a broken meter is fixed or replaced, the City loses revenue because no water usage is being billed.

Currently, the City staff manually drives-by to record meter readings at each connection. Manual reading meters contribute to operation inefficiencies, whereas staff can be utilized elsewhere. Manual meter reads can also cause abnormal reading from misreads or mis-keyed information. These inefficiencies can contribute to incorrect billing and lost revenue for the City.

Smart meters replacements can mitigate these problems. These devices are typically more efficient as they can be transmitted through towers to a main center without having to manually read each meter. By replacing bad meters and converting to a smart meter system, the City may be able to minimize lost water revenue that helps increase total revenue for the Sewer Budget in the long term.

4.2 Alternative Funding Sources

There are financial assistance programs available through TWDB including the Clean Water State Revolving Fund (CWSRF). The City has familiarity with certain CDBG programs through the funding of the lift station emergency generators and the sanitary sewer improvements. The City has potential to be eligible for these funding sources depending on the project. General information on these financial assistance programs and their requirements are provided below.

- Clean Water State Revolving Fund (CWSRF) – CWSRF program is a loan assistance program through the Texas Water Development Board (TWDB) that focuses on water quality protection projects. There are 11 types of projects eligible for assistance including construction of publicly owned treatment works (POTW), nonpoint source, estuary, decentralized wastewater treatment, storm water, water conservation, watershed, energy efficiency, water reuse, security measures at

POTWs, and technical assistance. Both loans and grants (in the form of loan forgiveness) applications are available through this program.

- Community Development Block Grant (CDBG) – CDBG is a program that provides funding to various types of projects including rehabilitation of facilities, construction or improvement of public facilities such as water and sewer facilities, streets, public centers, and schools. Examples of these grants are administered through entities such as the General Land Office (GLO) or Texas Department of Agriculture (TDA) for disaster recovery or mitigation. Eligibility for the fund is based on population and must meet criteria that benefit low- and moderate-income persons. The City of Walis has been successful in acquiring funding from this source in the past and should consider this as a viable funding option for their public infrastructure.
- Sanitary Sewer Overflow Initiative - The Sanitary Sewer Overflow (SSO) Initiative is a voluntary program initiated in 2004 in an effort to address an increase in SSOs due to aging collection systems throughout the state and encourage corrective action before there is harm to human health and safety or the environment. A participating system will not be subject to formal enforcement by TCEQ for most continuing SSO violations if overflows are addressed by the SSO plan. The TCEQ may identify some facilities that are good candidates for participation during on-site compliance investigations or file-review investigations. However, municipalities may also elect to participate, and, in those cases, should contact the local regional office to discuss that option.
- Private Loans – Certain banks or credit unions offer options to borrow funds for small construction projects for City infrastructure or major equipment purchases and can offer varying interest rates, repayment plans, and incremental repurchase terms. It should be noted the loans are limited to the projects that are approved by the private entity. Depending on what the nature of the City project, the loans may not be approved by the private entities if they do not allow funding for that type of project.

5.0 ENERGY AND SUSTAINABLITY ASSESSMENT

5.1 Energy Assessment

Energy-efficiency and sustainability efforts can have a significant impact on the City's financial and environmental health. Some energy conservation strategies can include installing variable frequency drives (VFD) on pumps at lift stations. VFDs are typically considered to use less energy compared to traditional on-off pumps or blowers. Installation or addition of soft starters can lessen the impact on energy whenever equipment turns on.

Based on the system's evaluation and discussion with City staff, the City may need to increase its collection system capacity to account for population growth. As TCEQ's permit is renewed, the system shall be re-evaluated for treatment capacity and energy efficiency. If diffused air treatment is proposed to be implemented, energy usage will significantly increase. The City should focus on energy improvements for its mechanical parts and equipment's regular maintenance.

Other energy conservation efforts include reduction of I&I at manholes and sanitary sewer gravity lines. I&I through manholes and lines can add excessive influent loads downstream at the WWTP which adds unnecessary stress on the mechanical and electrical equipment. The extra influent loads would increase electrical utility costs because of the energy usage. In addition, the City's equipment service life decreases due to the excessive use of equipment to treat the influent. Efforts to reduce I&I including replacement and rehabilitation of manholes (see **Section 3.2**) and replacing sanitary lines are detailed recommendations within this report.

Initial energy conservation and sustainability efforts should include surface investigations by City Staff to confirm all manhole covers and frames are properly installed or aligned. Staff can repair surface structures immediately to prevent inflow of surface runoff. By dedicating effort to identify critical or problem locations, City staff can assist in decreasing system I&I from gravity lines. This can be accomplished by performing CCTV inspections and smoke testing in pipe segments most susceptible to pipe deterioration. In many systems, major I&I can come from the services lines (sanitary laterals) within customer properties, outside of the right-of-way. Public outreach and line inspections can help identify services laterals that are contributing to I&I.

As mentioned in **Section 3.2**, I&I issues should be gradually mitigated as the City's budget allows. Failure of an asset within the collection system can lead to increasing load and stress on the wastewater treatment

process. Other associated costs could include failing to meet state guidelines and becoming ineligible for low interest loans from grant or revolving fund opportunities.

5.2 Guidance for Energy Assessments

A full review of the energy consumption within the collection system is recommended to assess its impact on the City's budget. Improved energy efficiencies can lead to reduced operating and maintenance costs. Multiple energy conservation and assessment guides are available and have been included in **Appendix I** of this report. The following are the provided documents and recommendations of how the City can use those resources to effectively manage their system:

- EPA Energy Use Assessments at Water and Wastewater Systems Guide: This booklet contains practical directions on how to begin an assessment as well as potential steps that systems could take after an assessment is completed.
- State Energy Conservation Office (SECO) Preliminary Energy Assessment (PEA): SECO offers free Preliminary Energy Assessments (PEAs) to public entities for cost-effective energy efficiency recommendations. PEAs cover various aspects like utility bill analysis, maintenance suggestions, customized energy control, and training for building staff. The goal is to improve energy efficiency in public facilities, reducing costs and benefiting local communities and the state as a whole. The application form has been provided in the Appendix, and should be emailed to seco.forms@cpa.texas.gov.
- TCEQ Energy Audit Checklist: The survey helps identify areas for energy conservation and informs equipment upgrade decisions in alignment with the facility's asset management plan. The checklist contains questions to be answered, with more than five positive responses indicating potential for significant energy savings.

5.3 Program Implementation

HR Green recommends the City to adopt a comprehensive approach for effectively communicating the needs of the wastewater system and emphasizing the importance of sustainable operations to the governing body responsible for budget and funding decisions. Within the AMPSS program, HR Green strongly advises incorporating clear and quantifiable metrics to demonstrate the tangible benefits of sustainability, such as improved energy efficiency, cost savings, and environmental responsibility. It is important to outline the financial implications of sustainability measures, underscoring the potential for long-term savings and the adverse consequences of deferred maintenance. HR Green encourages placing a

strong emphasis on risk mitigation, the safeguarding of public health, and the enhancement of community well-being through sustainable practices.

Upon receiving this report, the City will sign the Fiscal Sustainability Plan Certification (**Appendix J**) and retain it in their records. This document will serve the purpose of demonstrating the City's commitment to water and energy conservation efforts. The City will use this signed form for TWDB loan applications, affirming their commitment to these sustainable practices and accordance to the Water Resources Reform and Development Act (WRRDA) Section 603 (d)(1)(E).

6.0 PUBLIC PARTICIPATION PROGRAMS

Proper public education or information can bring awareness to and potentially alleviate issues occurring in the collection system. Implementing public participation programs to educate the public on their effect on the sanitary sewer systems may improve the quality of wastewater coming into the treatment process. Within the collection system, fats, oils, grease (FOG) and non-flushable wipes entering the wastewater cause clogs, sewer overflows, decrease the effectiveness of pumps, decrease pipe capacity, and require additional time for cleaning to restore operations. All these effects lower the life expectancy of the City's sewer assets. Public outreach can include local school education and awareness programs, multimedia ad campaigns, flyers, mail-outs, and reminders included on mailed bills.

During the site visits, the staff noted that there are sections of the City that historically have a high volume of incompatible debris entering the collection system, leading to a "ragging problem". This includes the south downtown area, and the multi-residential area on the southwest side of the system. For the City, public participation is vital to ensuring the life of the lift station and lift station equipment are prolonged. Some guidance for public outreach is included in **Appendix K** including public notification templates and resource links.

7.0 SYSTEM RESILIENCY, WEATHERIZATION, AND EMERGENCY PREPARENESS

This section identifies assets critical to the operation of the system and determines their ability to remain functional during adverse weather or electrical outages. This section also provides recommendations related to emergency preparedness and operations.

Based on our detailed asset evaluation at the lift stations and WWTP (summarized in **Section 3.1**) the most critical assets to the operation of the system generally tend to be the structural components, the major equipment, associated controls.

The following parameters, based partly on EPA risk & resiliency assessment format, were used to determine the City's resiliency of their wastewater system throughout the timeframe of a general threat.

1. **Preparation/Resilience:** measures in place to prepare assets and operations for natural hazard.
2. **Active Response:** measures in place to mobilize crews and resources after a natural hazard for repair:
3. **Recovery:** measures in place to restore utility operations after immediate response and repair activities are initiated.

Common natural hazards/weather anticipated for the City include: flooding, hurricanes, tornadoes, droughts, and freezing. System resiliency includes additional power supply sources, system redundancy, and standard operating procedures for various risk scenarios.

Within the collection system, the critical component is the lift stations pumps and structure. Asset protection against these weather hazards can be minimized by proper protection measures before the hazard strikes and/or back-up power for electrical components during power failure. A summary of the resiliency of the City's lift stations is shown in **Table 7-1**. City Staff noted that while emergency power is provided, there are currently no alarms to alert operators when emergency power sources are in operation.

TABLE 7-1 LIFT STATION RESILIENCY SUMMARY

	Preparation/Resiliency	
Lift Station Location	**Weather Protection**	**Back-Up Power**
LS #1 (INFLUENT LS at WWTP)	Structures and electrical controls are elevated. Pumps are currently exposed to weather, City staff covers with tarps as needed.	Site contains 150kW Gas Generator with automatic switchover. Generator is exercised monthly.
LS #2 (COLUMBUS ST)	Structures and electrical controls are elevated. Pumps are protected within FRP enclosure and provided heat lamps when needed.	Site contains 35kW Natural Gas Generator with automatic switchover during power outage. Generator is exercised weekly.
LS #3 (7TH ST)	Structures and electrical controls are elevated. Pumps are protected within FRP enclosure and provided heat lamps when needed.	Site contains 35kW Natural Gas Generator with automatic switchover during power outage. Generator is exercised weekly.
LS #4 (LEGION ROAD)	Structures and electrical controls are elevated above flood elevation. Pumps are protected within FRP enclosure and provided heat lamps when needed.	Site contains 29kW Natural Gas Generator with automatic switchover during power outage. Generator is exercised weekly.
LS #5 (MAREK ST)	Structures and electrical controls are elevated. Pumps are currently exposed to weather and covered with tarps temporarily.	Site contains Natural Gas Generator with automatic switchover during power outage. Generator is exercised weekly.
LS #6 (WESTGATE ST)	Structures and electrical controls are elevated. Pumps are currently exposed to weather and covered with tarps temporarily.	Site contains Natural Gas Generator with automatic switchover during power outage. Generator is exercised weekly.

The WWTP consists of two parallel treatment trains, providing redundancy for treatment. In addition, a back-up diesel generator provides emergency power for all the processes. This generator is exercised monthly and maintained by the City's Operator. Small diameter water lines and chemical feed lines are wrapped to protect against freezing.

Overall recommendations for improving System Resiliency and Emergency Preparations include:

- Maintain Standard Operating Procedures detailing WWTP operations during emergencies. This plans should be updated annually to reflect any contact changes.
- Consider installing auto-dialers or SCADA alarms for when emergency power is in operation. Consider adding emergency contact signage at each facility in order to allow staff to be alerted by citizens as needed during emergencies.
- Coordinate with fire department for HAZMAT response in case of chlorine gas release at the WWTP.

8.0 OPERATIONS AND MAINTENANCE

The sanitary sewer map on the GIS platform was generated by looking through available City sanitary record maps provided to HR Green. The map was updated with data acquired by HR Green during site investigations in March 2023. The updated data includes material, location and invert elevation of manholes, pipe inlets, and outlets, and condition parameters. The data collection also included manhole inspections and site photos based on NASSCO standards. Access to the Dashboard is provided in association with this report. The GIS data and the Dashboard will allow the City to view and maintain an active record of its assets. Through the Dashboard, the City can conveniently view its sanitary sewer system, as well as the current condition of each asset in its system. This Dashboard shall also be used in conjunction with an ArcGIS mobile application. The GIS information is stored online so the data uploaded in the field during work orders and equipment maintenance can be seen immediately on the Dashboard. The ArcGIS mobile application will allow City staff to update the Dashboard in the field during daily operation and maintenance, such as adding additional assets, updating the model numbers, re-evaluating the asset condition, and uploading field photos. HR Green recommends routinely updating the City's GIS database through the Dashboard as the City continues to improve its sanitary sewer assets. By continually updating the Dashboard, the City will eventually be able to manage its existing system through one platform. Asset management through GIS can benefit the City through the following ways:

- Provide centimeter-grade accurate locations of City assets.
- Provide government transparency by offering the ability to share public utility information online.
- Form a foundation for future development and capital improvement planning.
- Help develop a more efficient platform for maintenance and inspections.
- Prioritize repair or replacement needs more efficiently.
- Easily generate database reports and web mapping applications.
- Ease in future data collection and assessments.
- All the above will help position the City to get funding assistance by storing and easily generating the appropriate documentation during the funding application process.

In order for the City to maintain the usefulness of this data collected as a part of this AMP, this AMP should be utilized as a base point for future AMP. We recommend updating AMP every 5 years to consolidate emerging conditions over the past 5 years. The AMP and associated Dashboard will serve as a platform to ease the transition.

Operation and maintenance quick guides are included in **Appendix G**. These guides include lists of regular maintenance activities and a list of regular operation processes. **Appendix G** includes a brief compliance manual with checklists for tracking requirements. These resources will assist operators and City Staff with overall system upkeep.

9.0 SUMMARY AND RECOMMENDATIONS

HR Green was authorized by TWDB to provide asset management services for the wastewater system in the City of Walis, Texas. This asset management report evaluates the condition of Walis's sanitary sewer system. This report is provided as a guidance document for system improvements. The report contains an asset inventory, condition assessment, comprehensive plan, and financial planning recommendation to manage the sanitary sewer system assets.

Improvement recommendations to the sanitary system are based on the condition of the asset. The prioritization of the improvements is based on the asset condition and criticality.

Asset management through GIS was incorporated into this study. A GIS map of the City sanitary sewer system was generated by HR Green. The map contains available record information and photos on the collection system along with information acquired by HR Green during site investigation. GIS data was compiled and access provided to the City via the ArcGIS Dashboard. By updating information in the City's Dashboard as the City continues to build its sanitary sewer infrastructure, the City be able to manage its existing system through one platform. This will promote organization of the City's sewer infrastructure during stages of development and capital improvement planning.

9.1 Recommendations

Recommended improvements are based on the Priority Rating formula as described in this report. Priority improvements are summarized as follows:

- Replace Poor and Bad rated manholes.
- Replace the vitrified clay pipe (VCP) as indicated in Section 3.2.2.
- Improvements to LS Nos. 2, 3, 4, and 6, including pump replacement and structural rehabilitation.
- WWTP improvements to structures for the Influent System (wet well), Primary System (Imhoff tanks), and Secondary System (trickling filters) as indicated in Section 3.2.4.
- Update this AMP every 5 years (minimum).
- Update the City's GIS database through the Dashboard/GIS Platform with operator observations, updated inspections, and after completed construction projects.

9.2 Limits of Liability

Each asset was inspected and determined for replacement or rehabilitation of individual components. The improvement costs within this report are intended to provide budgetary costs for restoring the asset

back to its original functionality. Opinions of Probable Construction Costs are based on engineering judgement and should only be used for general budgetary planning by the City. Any construction project the city undergoes in the future should have a detailed opinion of probable cost and design.

APPENDIX A – Sanitary Manhole Asset Inventory and Condition Rating

Appendix A
Sanitary Manhole Asset Inventory and Condition Rating

OBJECTID	Lifecycle Status	Collection Status	Inspection Status	Cover Type	Cover Size (in)	Cover Condition	Frame Condition	Chimney Present
2	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
3	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Cracked	No
4	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
5	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	Yes
6	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
10	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Sound	Yes
11	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
12	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
13	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
14	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
15	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
17	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Restraint Defective	Sound	No
18	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
19	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
20	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Cracked	Corroded (Pitted/Worn)	No
22	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
23	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Sound	Yes
24	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
25	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
26	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
27	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
28	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
29	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
30	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
31	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
32	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
33	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
34	Active	GPS-Centimeter	Inspection Complete	Solid	24	Cracked	Corroded (Pitted/Worn)	Yes
35	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
36	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
37	Active	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
38	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
39	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Sound	No
40	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Broken	No
41	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
42	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
43	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
44	Active	GPS-Centimeter	No Access	Solid	24	Sound	<Null>	<Null>
45	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
46	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
47	Active	GPS-Centimeter	Inspection Complete	Solid	24	Cracked	Corroded (Pitted/Worn)	Yes
48	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
49	Active	GPS-Centimeter	No Access	Solid	24	<Null>	<Null>	<Null>
50	Active	GPS-Centimeter	Needs Information	<Null>	<Null>	<Null>	<Null>	<Null>

OBJECTID	Chimney Material	Chimney Condition	Cone Type	Cone Material	Cone Lining Interior	Cone Condition	Wall Material	Wall Condition
2	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
3	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
4	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
5	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
6	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
10	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
11	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
12	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
13	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
14	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
15	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
17	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
18	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
19	Concrete (precast)	Defective	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
20	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
22	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
23	Brick	Sound	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
24	Brick	Sound	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
25	Concrete (precast)	Sound	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
26	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
27	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
28	Brick	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
29	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
30	Not Known	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
31	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
32	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
33	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
34	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
35	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
36	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
37	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
38	Brick	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
39	<Null>	<Null>	Not Present	<Null>	<Null>	<Null>	Concrete (precast)	Sound
40	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Defective	Concrete (precast)	Defective
41	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
42	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
43	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
44	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
45	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
46	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
47	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
48	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
49	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
50	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

OBJECTID	Evidence of Surcharge	Roots Present	Manhole Size (in)	Overall I&I	I&I Notes	Inspection Condition	Manhole Depth (ft)
2	No	None	36	Stains	<Null>	**Fair**	2.35
3	No	None	48	Stains	<Null>	**Fair**	3.4
4	No	None	48	Stains	<Null>	**Fair**	3.52
5	No	None	36	None	<Null>	**Fair**	4.03
6	No	None	36	None	<Null>	**Bad**	4.35
10	No	None	48	None	<Null>	**Good**	4.4
11	No	None	48	Stains	<Null>	**Fair**	5
12	No	None	48	Stains	<Null>	**Fair**	6.05
13	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
14	No	None	48	Stains	<Null>	**Fair**	5.41
15	No	None	48	Stains	<Null>	**Fair**	5.2
17	Yes	None	48	Stains	<Null>	**Poor**	5.69
18	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
19	No	None	48	Stains	<Null>	**Fair**	7.35
20	Yes	None	48	Stains	<Null>	**Fair**	6.32
22	Yes	None	48	Stains	<Null>	**Poor**	3.87
23	No	None	48	Weeper	<Null>	**Fair**	7.36
24	No	None	48	Stains	<Null>	**Fair**	7.85
25	No	None	48	Stains	<Null>	**Fair**	6.26
26	No	None	48	None	<Null>	**Fair**	8.03
27	No	None	48	Stains	<Null>	**Fair**	8.75
28	No	None	48	Stains	<Null>	**Fair**	8.9
29	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
30	No	None	36	Stains	<Null>	**Fair**	4.15
31	No	None	48	Stains	<Null>	**Fair**	5.4
32	Yes	None	48	Stains	<Null>	**Fair**	8.46
33	Yes	None	48	Stains	<Null>	**Poor**	6.33
34	No	None	48	Stains	<Null>	**Fair**	6.3
35	Yes	None	48	Stains	<Null>	**Fair**	5.9
36	No	None	48	Stains	<Null>	**Fair**	9.44
37	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
38	No	None	48	Stains	<Null>	**Fair**	6.2
39	No	None	48	Stains	<Null>	**Fair**	4.02
40	Yes	None	48	Stains	<Null>	**Poor**	3.78
41	No	None	48	Stains	<Null>	**Fair**	8.7
42	No	None	48	Stains	<Null>	**Fair**	9.45
43	No	None	48	Stains	<Null>	**Fair**	7.55
44	<Null>	<Null>	<Null>	<Null>	<Null>	**No Access**	<Null>
45	N/A	None	48	Stains	Weeper too	**Fair**	9.15
46	No	None	48	Stains	<Null>	**Fair**	8.46
47	No	None	48	Stains	<Null>	**Fair**	9.08
48	No	None	48	Stains	<Null>	**Fair**	8.65
49	<Null>	<Null>	<Null>	<Null>	<Null>	**No Access**	<Null>
50	<Null>	<Null>	<Null>	<Null>	<Null>	**Fair**	9.51

OBJECTID	Additional Information	Latitude	Longitude	Fix Type
2	<Null>	29.638321	-96.06099	RTK Fixed
3	<Null>	29.637765	-96.061584	RTK Fixed
4	<Null>	29.639096	-96.061842	RTK Fixed
5	<Null>	29.638536	-96.062443	RTK Fixed
6	<Null>	29.638774	-96.062711	RTK Fixed
10	<Null>	29.638329	-96.063781	RTK Fixed
11	<Null>	29.637558	-96.064607	RTK Fixed
12	<Null>	29.636707	-96.065521	RTK Fixed
13	<Null>	<Null>	<Null>	<Null>
14	<Null>	29.638784	-96.066058	RTK Fixed
15	<Null>	29.638331	-96.066573	RTK Fixed
17	<Null>	29.636851	-96.06782	RTK Fixed
18	<Null>	<Null>	<Null>	<Null>
19	<Null>	29.635805	-96.066489	RTK Fixed
20	Large crack in cover, coated wall and cone	29.636174	-96.061345	RTK Fixed
22	Debris obstructing the pipe	29.63692	-96.063799	RTK Fixed
23	<Null>	29.6355	-96.062067	RTK Fixed
24	<Null>	29.634543	-96.063092	RTK Fixed
25	Float/ under tree	29.635651	-96.064996	RTK Float
26	<Null>	29.635094	-96.065593	RTK Fixed
27	<Null>	29.634361	-96.064709	RTK Fixed
28	<Null>	29.63375	-96.063942	RTK Fixed
29	<Null>	<Null>	<Null>	<Null>
30	<Null>	29.633625	-96.065535	RTK Fixed
31	<Null>	29.634336	-96.066408	RTK Fixed
32	<Null>	29.632242	-96.065538	RTK Fixed
33	<Null>	29.632663	-96.066523	RTK Fixed
34	<Null>	29.635043	-96.067277	RTK Fixed
35	<Null>	29.63424	-96.068144	RTK Fixed
36	<Null>	29.633624	-96.068787	RTK Fixed
37	Spoke with the city, per them it could be potentially buried. Went to go check and they did not find it	<Null>	<Null>	<Null>
38	<Null>	29.632562	-96.069598	RTK Fixed
39	<Null>	29.632508	-96.067797	RTK Fixed
40	<Null>	29.6322	-96.067063	RTK Fixed
41	<Null>	29.63394	-96.06953	RTK Fixed
42	<Null>	29.633632	-96.068805	RTK Fixed
43	<Null>	29.634072	-96.070061	RTK Fixed
44	Had trouble opening this manhole, was not able to	29.634438	-96.070694	RTK Fixed
45	<Null>	29.634925	-96.07183	RTK Fixed
46	<Null>	29.634601	-96.071292	RTK Fixed
47	<Null>	29.635414	-96.07297	RTK Fixed
48	<Null>	29.635132	-96.072522	RTK Fixed
49	could not open the manhole, struggled so no access	29.635913	-96.074116	RTK Fixed
50	On Main line to WWTP but needs to be reshot	<Null>	<Null>	<Null>

OBJECTID	Lifecycle Status	Collection Status	Inspection Status	Cover Type	Cover Size (in)	Cover Condition	Frame Condition	Chimney Present
51	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
52	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
54	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
55	Active	GPS-Centimeter	Needs Information	<Null>	<Null>	<Null>	<Null>	<Null>
56	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
57	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
58	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
59	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
60	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
61	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
62	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Sound	No
63	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
64	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
65	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
66	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
67	Active	GPS-Centimeter	Needs Information	Solid	24	Sound	Corroded (Pitted/Worn)	No
68	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
69	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Sound	No
70	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Sound	No
71	Active	GPS-Centimeter	Needs Information	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
72	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
73	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
74	Inactive	GPS-Centimeter	Needs Information	Solid	24	Sound	Corroded (Pitted/Worn)	No
76	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
77	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Sound	Yes
78	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	Yes
79	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Sound	No
80	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
81	Active	GPS-Centimeter	Needs Information	Solid	24	Sound	Corroded (Pitted/Worn)	No
82	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Sound	No
83	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Sound	No
84	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	Yes
85	Active	GPS-Centimeter	Needs Information	Vented (Slots)	24	Sound	Cracked	No
86	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
87	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
88	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
89	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
90	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
91	Active	GPS-Centimeter	Needs Information	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
92	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Broken	Corroded (Pitted/Worn)	No
93	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
94	Unknown	GPS-Subfoot	No Access	<Null>	<Null>	<Null>	<Null>	<Null>

OBJECTID	Chimney Material	Chimney Condition	Cone Type	Cone Material	Cone Lining Interior	Cone Condition	Wall Material	Wall Condition
51	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
52	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
54	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
55	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
56	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
57	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
58	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
59	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
60	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
61	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
62	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
63	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
64	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
65	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
66	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
67	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
68	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
69	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
70	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Fiberglass Reinforc	Sound
71	<Null>	<Null>	Conical Centered (Concentric)	Fiberglass Reinforced	<Null>	Sound	Concrete (precast)	Sound
72	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
73	<Null>	<Null>	Conical Centered (Concentric)	Concrete (cast in place)	<Null>	Sound	Concrete (precast)	Sound
74	<Null>	<Null>	Conical Centered (Concentric)	Brick	Cured-in-Place	Sound	Brick	Sound
76	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
77	Brick	Sound	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
78	Brick	Sound	Not Present	<Null>	<Null>	<Null>	Brick	Sound
79	<Null>	<Null>	Flat Top	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
80	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
81	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	<Null>	Concrete (precast)	<Null>
82	<Null>	<Null>	Not Present	<Null>	<Null>	<Null>	Brick	Sound
83	<Null>	<Null>	Not Present	<Null>	<Null>	<Null>	Concrete (precast)	Sound
84	Brick	Sound	Not Present	<Null>	<Null>	<Null>	Brick	Sound
85	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
86	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
87	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
88	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
89	<Null>	<Null>	Not Present	<Null>	<Null>	<Null>	Brick	Sound
90	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
91	Brick	Sound	Conical Centered (Concentric)	Brick	Cured-in-Place	Sound	Brick	Sound
92	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
93	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
94	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

OBJECTID	Evidence of Surcharge	Roots Present	Manhole Size (in)	Overall I&I	I&I Notes	Inspection Condition	Manhole Depth (ft)
51	Yes	None	48	Stains	<Null>	**Poor**	10.26
52	Yes	None	48	Stains	<Null>	**Poor**	10.74
54	Yes	None	48	Stains	<Null>	**Fair**	5.24
55	<Null>	<Null>	<Null>	<Null>	<Null>	**Fair**	<Null>
56	Yes	None	48	Stains	<Null>	**Poor**	7.2
57	Yes	None	48	Stains	<Null>	**Fair**	6.71
58	Yes	None	48	Stains	<Null>	**Poor**	9.55
59	Yes	Root Ball	48	Stains	<Null>	**Fair**	10.48
60	Yes	None	48	Stains	<Null>	**Poor**	10.08
61	No	None	48	Stains	<Null>	**Fair**	10.78
62	Yes	None	48	Stains	<Null>	**Poor**	8.65
63	Yes	None	48	Stains	<Null>	**Fair**	9.69
64	Yes	None	48	Stains	<Null>	**Poor**	7.64
65	No	None	48	Stains	<Null>	**Fair**	6.65
66	Yes	None	48	Stains	<Null>	**Fair**	6.13
67	Yes	None	48	Stains	<Null>	**Poor**	<Null>
68	No	None	48	Stains	<Null>	**Fair**	3.79
69	No	None	48	Stains	<Null>	**Fair**	6.06
70	No	None	48	Stains	<Null>	**Fair**	7.3
71	Yes	None	48	Stains	<Null>	**Poor**	<Null>
72	Yes	None	48	Stains	<Null>	**Poor**	6.91
73	No	None	48	Stains	<Null>	**Fair**	7.28
74	Yes	None	48	Stains	<Null>	**Fair**	7.29
76	Yes	None	48	Stains	<Null>	**Poor**	9.85
77	Yes	None	48	Stains	<Null>	**Fair**	8.99
78	No	None	48	Stains	<Null>	**Fair**	6.7
79	Yes	None	48	Stains	<Null>	**Fair**	4.95
80	Yes	None	48	Stains	<Null>	**Poor**	3.05
81	Yes	None	48	Stains	<Null>	**Poor**	<Null>
82	Yes	None	48	Stains	<Null>	**Fair**	4.44
83	Yes	None	48	Stains	<Null>	**Fair**	5.4
84	No	None	48	Stains	<Null>	**Fair**	3.58
85	Yes	None	48	Stains	<Null>	**Fair**	2.89
86	Yes	Roots Medium	48	Stains	<Null>	**Fair**	4
87	Yes	None	48	Stains	<Null>	**Fair**	5.64
88	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
89	Yes	None	48	Stains	<Null>	**Fair**	5.87
90	No	None	48	Stains	<Null>	**Fair**	5.2
91	N/A	None	48	Stains	<Null>	**Fair**	8.85
92	Yes	None	48	Stains	<Null>	**Fair**	9.89
93	Yes	None	48	Stains	<Null>	**Poor**	9.49
94	<Null>	<Null>	<Null>	<Null>	<Null>	**No Access**	<Null>

OBJECTID	Additional Information	Latitude	Longitude	Fix Type
51	<Null>	29.636278	-96.07496	RTK Fixed
52	<Null>	29.636192	-96.074964	RTK Fixed
54	<Null>	29.63169	-96.068431	RTK Fixed
55	Part of lift station	29.630969	-96.069028	RTK Fixed
56	<Null>	29.630913	-96.069027	RTK Fixed
57	<Null>	29.62955	-96.072198	RTK Fixed
58	<Null>	29.629598	-96.07131	RTK Fixed
59	Review	29.629675	-96.069968	RTK Fixed
60	<Null>	29.629096	-96.070377	RTK Fixed
61	<Null>	29.628335	-96.072304	RTK Fixed
62	<Null>	29.628093	-96.071887	RTK Fixed
63	<Null>	29.628031	-96.071776	RTK Fixed
64	Collected this float, literally under a tree, very bad signal and area	29.627745	-96.072078	RTK Float
65	need to come back and look at this	29.627197	-96.072854	RTK Fixed
66	<Null>	29.627704	-96.076641	RTK Fixed
67	<Null>	29.626788	-96.075076	RTK Fixed
68	<Null>	29.626898	-96.077263	RTK Fixed
69	<Null>	29.625993	-96.075697	RTK Fixed
70	<Null>	29.625543	-96.074912	RTK Fixed
71	Currently surcharged, could not get depths of manholes and pipes	29.626335	-96.074291	RTK Fixed
72	<Null>	29.626609	-96.071668	RTK Fixed
73	Wall is coated, collected in float because we are literally under a tree and in someone's back yard	29.627382	-96.071058	RTK Float
74	Need GPS (Get GPS location)	<Null>	<Null>	<Null>
76	<Null>	29.628682	-96.069688	RTK Fixed
77	<Null>	29.628374	-96.069167	RTK Fixed
78	<Null>	29.627929	-96.068409	RTK Fixed
79	<Null>	29.628797	-96.067726	RTK Fixed
80	Had to take in float completely covered under two trees. Need to come back and revisit this manhole to confirm whether the gravity either shoots across or does connect to the gravity main on Anita - GC	29.62962	-96.06806	RTK Float
81	Manhole completely clogged, completely surrounded by trees had to take it float	29.628892	-96.068763	RTK Float
82	<Null>	29.62773	-96.066329	RTK Fixed
83	<Null>	29.628033	-96.066073	RTK Fixed
84	<Null>	29.628658	-96.065546	RTK Fixed
85	Needs GPS Information (Get new GPS location)	<Null>	<Null>	<Null>
86	<Null>	29.629809	-96.064146	RTK Fixed
87	<Null>	29.630287	-96.063864	RTK Fixed
88	Spoke with city, and they don't know where this one is	<Null>	<Null>	<Null>
89	<Null>	29.62977	-96.062674	RTK Fixed
90	<Null>	29.629297	-96.061579	RTK Fixed
91	Need GPS (Get GPS location)	<Null>	<Null>	<Null>
92	Pick hole corroded	29.628367	-96.059429	RTK Fixed
93	<Null>	29.62791	-96.058365	RTK Fixed
94	Manhole 8 ft above ground, need help to even open it	29.627476	-96.057432	RTK Float

OBJECTID	Lifecycle Status	Collection Status	Inspection Status	Cover Type	Cover Size (in)	Cover Condition	Frame Condition	Chimney Present
95	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
96	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
97	Unknown	No Access	No Access	<Null>	<Null>	<Null>	<Null>	<Null>
98	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
99	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
100	Unknown	GPS-Centimeter	No Access	<Null>	<Null>	<Null>	<Null>	<Null>
101	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
103	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
104	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Cracked	Broken	No
105	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
107	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
108	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
109	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
110	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Sound	No
111	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
112	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
113	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
114	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
115	Active	GPS-Centimeter	No Access	<Null>	<Null>	<Null>	<Null>	<Null>
116	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
117	Active	GPS-Centimeter	No Access	<Null>	<Null>	<Null>	<Null>	<Null>
118	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
119	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
120	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
121	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
122	Active	GPS-Centimeter	Needs Information	<Null>	<Null>	<Null>	<Null>	<Null>
123	Unknown	Digitized	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
124	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
125	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
126	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
127	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
128	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
129	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
130	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
131	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
132	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	Yes
133	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
134	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
135	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
136	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
137	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Bolts Missing	Corroded (Pitted/Worn)	No
138	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
139	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
140	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No

OBJECTID	Chimney Material	Chimney Condition	Cone Type	Cone Material	Cone Lining Interior	Cone Condition	Wall Material	Wall Condition
95	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
96	Brick	Sound	Conical Centered (Concentric)	Brick	Cured-in-Place	Sound	Brick	Sound
97	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
98	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
99	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
100	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
101	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
103	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
104	<Null>	<Null>	Conical Centered (Concentric)	Brick	Cured-in-Place	Sound	Brick	Sound
105	<Null>	<Null>	Conical Centered (Concentric)	Brick	Cured-in-Place	Sound	Brick	Sound
107	<Null>	<Null>	Conical Centered (Concentric)	Brick	Cured-in-Place	Sound	Brick	Sound
108	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
109	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
110	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
111	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Defective	Concrete (precast)	Defective
112	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
113	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Defective	Concrete (precast)	Sound
114	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
115	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
116	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
117	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
118	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
119	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
120	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
121	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
122	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
123	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
124	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
125	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
126	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
127	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
128	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
129	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
130	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
131	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
132	Brick	Sound	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
133	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
134	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
135	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
136	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
137	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
138	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
139	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
140	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound

OBJECTID	Evidence of Surcharge	Roots Present	Manhole Size (in)	Overall I&I	I&I Notes	Inspection Condition	Manhole Depth (ft)
95	No	None	48	Stains	<Null>	**Fair**	9.71
96	Yes	None	48	Stains	<Null>	**Fair**	8.9
97	<Null>	<Null>	<Null>	<Null>	<Null>	**No Access**	<Null>
98	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
99	Yes	None	48	Stains	<Null>	**Fair**	5.12
100	<Null>	<Null>	<Null>	<Null>	<Null>	**No Access**	<Null>
101	Yes	None	48	Stains	<Null>	**Fair**	6.42
103	Yes	None	48	Stains	<Null>	**Fair**	7.75
104	Yes	None	48	Stains	<Null>	**Poor**	4.78
105	No	None	48	Stains	<Null>	**Fair**	8.01
107	Yes	None	48	Stains	<Null>	**Fair**	6.65
108	No	None	48	Stains	<Null>	**Fair**	7.11
109	Yes	None	48	Stains	<Null>	**Fair**	3.62
110	Yes	None	48	Stains	<Null>	**Fair**	8.79
111	Yes	Root Tap	40	Stains	<Null>	**Bad**	5.42
112	No	None	48	Stains	<Null>	**Fair**	6.84
113	No	None	48	Stains	<Null>	**Fair**	6.25
114	No	None	48	Stains	<Null>	**Fair**	4.58
115	<Null>	<Null>	<Null>	<Null>	<Null>	**No Access**	<Null>
116	Yes	None	48	Stains	<Null>	**Fair**	5.34
117	<Null>	<Null>	<Null>	<Null>	<Null>	**No Access**	<Null>
118	No	None	48	Stains	<Null>	**Fair**	5.39
119	No	None	48	Stains	<Null>	**Fair**	3.92
120	No	None	48	Stains	<Null>	**Fair**	8.89
121	Yes	None	48	Stains	<Null>	**Fair**	11.55
122	<Null>	<Null>	<Null>	<Null>	<Null>	**Fair**	<Null>
123	<Null>	<Null>	<Null>	<Null>	<Null>	**Fair**	<Null>
124	Yes	None	48	Stains	<Null>	**Fair**	6.74
125	Yes	None	48	Stains	<Null>	**Poor**	3.95
126	No	None	48	Stains	<Null>	**Fair**	5.41
127	No	None	48	Stains	<Null>	**Fair**	6.35
128	No	None	48	Stains	<Null>	**Fair**	7.05
129	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
130	No	Roots Medium	48	Stains	<Null>	**Fair**	5.11
131	Yes	None	48	Stains	<Null>	**Poor**	4.6
132	No	None	48	Stains	<Null>	**Poor**	8.92
133	No	None	48	Stains	<Null>	**Fair**	5.2
134	No	None	48	Stains	<Null>	**Fair**	10.51
135	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
136	Yes	None	48	Stains	<Null>	**Good**	9.49
137	Yes	None	48	Stains	<Null>	**Poor**	9.1
138	Yes	None	48	Stains	<Null>	**Poor**	8.78
139	Yes	None	48	Stains	<Null>	**Fair**	7.25
140	Yes	None	48	Stains	<Null>	**Fair**	5.55

OBJECTID	Additional Information	Latitude	Longitude	Fix Type
95	<Null>	29.626557	-96.057934	RTK Fixed
96	<Null>	29.626088	-96.056867	RTK Fixed
97	Underneath debris	<Null>	<Null>	<Null>
98	<Null>	<Null>	<Null>	<Null>
99	<Null>	29.623586	-96.056416	RTK Fixed
100	Manhole found with metal detector, buried though	29.624546	-96.055153	RTK Fixed
101	<Null>	29.624436	-96.056398	RTK Fixed
103	<Null>	29.625059	-96.055983	RTK Fixed
104	<Null>	29.626045	-96.054008	RTK Fixed
105	<Null>	29.626583	-96.055287	RTK Fixed
107	<Null>	29.628768	-96.061835	RTK Fixed
108	<Null>	29.628111	-96.062336	RTK Fixed
109	<Null>	29.628612	-96.063158	RTK Fixed
110	<Null>	29.627602	-96.062734	RTK Fixed
111	<Null>	29.626899	-96.063851	RTK Fixed
112	<Null>	29.626651	-96.063485	RTK Fixed
113	<Null>	29.626057	-96.062498	RTK Fixed
114	<Null>	29.626492	-96.060849	RTK Fixed
115	Manhole buried under pavement, was able to detect per metal detector	29.625799	-96.059714	RTK Fixed
116	<Null>	29.624843	-96.06044	RTK Fixed
117	Manhole buried under pavement, used metal detector to confirm	29.626528	-96.059178	RTK Fixed
118	<Null>	29.626966	-96.058883	RTK Fixed
119	<Null>	29.627566	-96.053235	RTK Fixed
120	<Null>	29.628067	-96.054413	RTK Fixed
121	<Null>	29.628977	-96.056572	RTK Fixed
122	Part of lift station	29.629016	-96.056604	RTK Fixed
123	Manhole coming into 7th st LS but not found	<Null>	<Null>	<Null>
124	<Null>	29.629475	-96.05766	RTK Fixed
125	<Null>	29.635228	-96.060873	RTK Fixed
126	<Null>	29.634432	-96.061723	RTK Fixed
127	<Null>	29.633997	-96.062082	RTK Fixed
128	<Null>	29.633146	-96.060778	RTK Fixed
129	<Null>	<Null>	<Null>	<Null>
130	<Null>	29.633243	-96.062254	RTK Fixed
131	<Null>	29.632744	-96.062544	RTK Fixed
132	<Null>	29.632201	-96.061321	RTK Fixed
133	<Null>	29.631768	-96.060308	RTK Fixed
134	<Null>	29.632613	-96.06516	RTK Fixed
135	<Null>	<Null>	<Null>	<Null>
136	A lot of trees, had to collect in float	29.632034	-96.064068	RTK Float
137	<Null>	29.632195	-96.064003	RTK Fixed
138	<Null>	29.631727	-96.0629	RTK Fixed
139	<Null>	29.63127	-96.061828	RTK Fixed
140	<Null>	29.630793	-96.06073	RTK Fixed

Appendix A
Sanitary Manhole Asset Inventory and Condition Rating

OBJECTID	Lifecycle Status	Collection Status	Inspection Status	Cover Type	Cover Size (in)	Cover Condition	Frame Condition	Chimney Present
141	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
142	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
143	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
144	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
145	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
146	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
147	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
148	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
149	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
150	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
151	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
152	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Sound	No
153	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	32	Sound	Sound	Yes
155	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
156	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
160	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
162	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
163	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
164	Active	GPS-Centimeter	Needs Information	Solid	24	Sound	Sound	No
165	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Sound	Yes
556	Active	GPS-Centimeter	Needs Information	Vented (Slots)	24	Sound	<Null>	<Null>
956	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
957	Unknown	GPS-Centimeter	No Access	<Null>	<Null>	<Null>	<Null>	<Null>
1356	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	Yes
1357	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Corroded (Pitted/Worn)	No
1358	Active	GPS-Centimeter	Inspection Complete	Solid	24	Sound	Cracked	No
1359	Active	GPS-Centimeter	Inspection Complete	Vented (Slots)	24	Sound	Corroded (Pitted/Worn)	No
1360	Unknown	Not Found	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>
1757	Unknown	<Null>	Not Found	<Null>	<Null>	<Null>	<Null>	<Null>

OBJECTID	Chimney Material	Chimney Condition	Cone Type	Cone Material	Cone Lining Interior	Cone Condition	Wall Material	Wall Condition
141	<Null>	<Null>	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
142	Brick	Sound	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
143	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
144	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
145	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Not Known
146	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
147	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
148	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
149	Concrete (precast)	Sound	Conical Centered (Concentric)	Fiberglass Reinforced	<Null>	Sound	Fiberglass Reinforc	Sound
150	Concrete (precast)	Sound	Conical Centered (Concentric)	Fiberglass Reinforced	<Null>	Sound	Fiberglass Reinforc	Sound
151	Concrete (precast)	Sound	Conical Centered (Concentric)	Fiberglass Reinforced	<Null>	Sound	Fiberglass Reinforc	Sound
152	<Null>	<Null>	Conical Centered (Concentric)	Fiberglass Reinforced	<Null>	Defective	Fiberglass Reinforc	Sound
153	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
155	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
156	<Null>	<Null>	Flat Top	Concrete (precast)	<Null>	Defective	Concrete (precast)	Defective
160	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Defective	Concrete (precast)	Defective
162	Brick	Sound	Conical Centered (Concentric)	Brick	<Null>	Sound	Brick	Sound
163	Concrete (precast)	Defective	Conical Centered (Concentric)	Fiberglass Reinforced	<Null>	Sound	Fiberglass Reinforc	Sound
164	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
165	Concrete (precast)	Sound	Conical Centered (Concentric)	Fiberglass Reinforced	<Null>	Sound	Fiberglass Reinforc	Sound
556	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
956	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
957	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1356	Concrete (precast)	Sound	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
1357	<Null>	<Null>	Conical Centered (Concentric)	Brick	Cured-in-Place	Sound	Brick	Sound
1358	<Null>	<Null>	Conical Centered (Concentric)	Concrete (precast)	<Null>	Sound	Concrete (precast)	Sound
1359	<Null>	<Null>	Flat Top	Concrete (precast)	<Null>	Sound	Concrete (precast)	Defective
1360	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1757	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

Appendix A
Sanitary Manhole Asset Inventory and Condition Rating

OBJECTID	Evidence of Surcharge	Roots Present	Manhole Size (in)	Overall I&I	I&I Notes	Inspection Condition	Manhole Depth (ft)
141	Yes	None	48	Stains	<Null>	**Fair**	6.18
142	Yes	None	48	Stains	<Null>	**Poor**	4.44
143	Yes	None	48	Stains	<Null>	**Fair**	6.82
144	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
145	No	Root Ball	48	Stains	<Null>	**Fair**	8.25
146	Yes	None	48	Stains	<Null>	**Fair**	8.29
147	No	None	48	Stains	<Null>	**Fair**	7.67
148	Yes	None	48	Stains	<Null>	**Fair**	10.17
149	No	None	48	Stains	<Null>	**Fair**	7.48
150	No	None	48	Stains	<Null>	**Fair**	6.65
151	No	None	48	Stains	<Null>	**Good**	6.82
152	No	None	48	Stains	<Null>	**Good**	5.59
153	No	None	48	Stains	<Null>	**Good**	4.26
155	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
156	No	None	48	Stains	<Null>	**Poor**	14.62
160	Yes	None	48	Stains	<Null>	**Fair**	6.83
162	No	None	48	Stains	<Null>	**Fair**	6.1
163	Yes	None	48	Stains	<Null>	**Poor**	7.25
164	Yes	None	48	Stains	<Null>	**Fair**	7.59
165	No	Root Ball	48	Stains	<Null>	**Fair**	7.95
556	<Null>	<Null>	48	<Null>	<Null>	**Fair**	<Null>
956	Yes	None	48	Stains	<Null>	**Fair**	7.21
957	<Null>	<Null>	<Null>	<Null>	<Null>	**No Access**	<Null>
1356	Yes	None	48	Stains	<Null>	**Fair**	7.1
1357	Yes	None	48	Stains	<Null>	**Poor**	5.7
1358	No	None	48	Stains	<Null>	**Good**	3.64
1359	No	None	48	Stains	<Null>	**Poor**	5.42
1360	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>
1757	<Null>	<Null>	<Null>	<Null>	<Null>	**Not Found**	<Null>

OBJECTID	Additional Information	Latitude	Longitude	Fix Type
141	<Null>	29.630325	-96.059672	RTK Fixed
142	<Null>	29.629903	-96.058692	RTK Fixed
143	<Null>	29.631421	-96.057949	RTK Fixed
144	<Null>	<Null>	<Null>	<Null>
145	<Null>	29.630354	-96.056996	RTK Fixed
146	<Null>	29.629933	-96.056041	RTK Fixed
147	<Null>	29.629419	-96.054847	RTK Fixed
148	<Null>	29.62901	-96.053933	RTK Fixed
149	<Null>	29.63042	-96.053396	RTK Fixed
150	<Null>	29.631398	-96.053233	RTK Fixed
151	<Null>	29.632836	-96.052637	RTK Fixed
152	<Null>	29.633132	-96.05251	RTK Fixed
153	<Null>	29.633431	-96.052235	RTK Fixed
155	<Null>	<Null>	<Null>	<Null>
156	<Null>	29.632628	-96.065012	RTK Fixed
160	<Null>	29.633567	-96.068903	RTK Fixed
162	Float because under tree	29.633634	-96.061859	RTK Float
163	<Null>	29.632116	-96.05294	RTK Fixed
164	Missing Photos	29.630857	-96.05337	RTK Fixed
165	<Null>	29.630094	-96.053486	RTK Fixed
556	Part of WWTP	29.636513	-96.074883	RTK Fixed
956	<Null>	29.627891	-96.07231	RTK Fixed
957	<Null>	29.627059	-96.072695	RTK Fixed
1356	<Null>	29.626674	-96.063466	RTK Fixed
1357	spectrashield coating is corroding off mh	29.628317	-96.060807	RTK Fixed
1358	<Null>	29.625564	-96.061687	RTK Fixed
1359	<Null>	29.625249	-96.060133	RTK Fixed
1360	City confirmed that they could not find this one	<Null>	<Null>	<Null>
1757	confirmed with city, doesn;t exist	<Null>	<Null>	<Null>

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APPENDIX B – Sanitary Sewer Pipe Asset Inventory

Appendix B
Sanitary Sewer Pipe Asset Inventory

Asset Number	fecycle Stat	Pipe Shape	Diameter (in)	Pipe Material	Upstream Pipe Invert (ft)	Downstream Pipe Invert (ft)	Length (ft)2
1	Active	Circular	6"	Polyvinyl Chloride	3.52	4	279.23
2	Active	Circular	6"	Polyvinyl Chloride	3.87	4.99	345.91
3	Active	Circular	6"	Polyvinyl Chloride	6.1	<Null>	161.47
4	Active	Circular	6"	Polyvinyl Chloride	6.38	7.65	277.44
5	Active	Circular	6"	Polyvinyl Chloride	<Null>	8.75	198.95
6	Active	Circular	6"	Polyvinyl Chloride	<Null>	7	278.64
7	Active	Circular	6"	Not Known	<Null>	6.31	884.23
8	Active	Circular	8"	Polyvinyl Chloride	7.37	7.81	476.56
9	Active	Circular	10"	Polyvinyl Chloride	8.95	10.48	566.30
10	Active	Circular	6"	Vitrified Clay Pipe	<Null>	4.95	486.44
11	Active	Circular	6"	Vitrified Clay Pipe	<Null>	5.27	225.60
12	Active	Circular	12"	Vitrified Clay Pipe	4.16	5.4	379.29
13	Active	Circular	12"	Polyvinyl Chloride	6.32	5.89	401.33
14	Active	Circular	6"	Polyvinyl Chloride	6.36	6.09	149.80
15	Active	Circular	6"	Polyvinyl Chloride	7.05	8.85	384.45
16	Active	Circular	8"	Vitrified Clay Pipe	8.95	7.23	375.01
17	Active	Circular	6"	Polyvinyl Chloride	6.85	<Null>	382.56
18	Active	Circular	6"	Polyvinyl Chloride	8.2	<Null>	388.17
19	Active	Circular	8"	Polyvinyl Chloride	8.5	7	386.43
20	Active	Circular	10"	Vitrified Clay Pipe	4.45	6.17	346.95
21	Active	Circular	10"	Vitrified Clay Pipe	7.3	8.77	379.14
22	Active	Circular	12"	Polyvinyl Chloride	9.7	<Null>	354.40
23	Active	Circular	8"	Vitrified Clay Pipe	10.65	10.41	540.45
24	Active	Circular	6"	Polyvinyl Chloride	6.14	<Null>	598.30
25	Active	Circular	6"	Polyvinyl Chloride	3.8	5.98	596.48
26	Active	Circular	6"	Polyvinyl Chloride	7.44	<Null>	349.12
27	Active	Circular	10"	Polyvinyl Chloride	6.87	7.54	411.07
28	Active	Circular	6"	Polyvinyl Chloride	2.36	3.39	276.77
29	Active	Circular	6"	Vitrified Clay Pipe	5.3	5.3	115.98
30	Active	Circular	6"	Vitrified Clay Pipe	<Null>	5.28	428.03
31	Active	Circular	6"	Vitrified Clay Pipe	<Null>	4.75	431.85
32	Active	Circular	8"	Polyvinyl Chloride	8.05	8.75	387.25
33	Active	Circular	6"	Polyvinyl Chloride	3.87	3.87	351.82
34	Active	Circular	8"	Polyvinyl Chloride	7.88	8.89	394.98
35	Active	Circular	6"	Vitrified Clay Pipe	6.34	<Null>	313.12
36	Active	Circular	6"	Polyvinyl Chloride	6.64	6.32	348.42
37	Active	Circular	6"	Polyvinyl Chloride	<Null>	6.4	72.47
38	Active	Circular	8"	Polyvinyl Chloride	<Null>	9.4	199.00
39	Active	Circular	6"	Polyvinyl Chloride	<Null>	5.27	338.02
40	Active	<Null>	10"	Not Known	<Null>	<Null>	205.91
41	Active	Circular	6"	Polyvinyl Chloride	<Null>	6.64	605.64
42	Active	Circular	10"	Vitrified Clay Pipe	<Null>	9.19	319.44
43	Active	Circular	10"	Vitrified Clay Pipe	9	9.83	199.96
44	Active	Circular	6"	Vitrified Clay Pipe	<Null>	2.84	158.55
45	Active	Circular	6"	Polyvinyl Chloride	3.04	<Null>	55.86
46	Active	<Null>	6"	Not Known	3.06	<Null>	346.40
47	Active	Circular	8"	Vitrified Clay Pipe	5.88	5.19	388.08
48	Active	Circular	10"	Not Known	9.9	9.48	376.92
49	Active	<Null>	6"	Not Known	<Null>	<Null>	214.75
50	Active	<Null>	6"	Vitrified Clay Pipe	<Null>	<Null>	321.54
51	Active	<Null>	6"	Not Known	<Null>	5.33	340.99
52	Active	<Null>	6"	Not Known	<Null>	<Null>	434.32
53	Active	Circular	6"	Vitrified Clay Pipe	5.13	6.4	309.13
54	Active	Circular	6"	Polyvinyl Chloride	<Null>	6.72	378.10
55	Active	Circular	10"	Not Known	<Null>	11.54	610.06
56	Active	Circular	6"	Polyvinyl Chloride	8.91	7.19	761.47
57	Active	<Null>	6"	Not Known	<Null>	<Null>	148.95
58	Active	Circular	6"	Polyvinyl Chloride	4.65	8.15	435.80
59	Active	Circular	6"	Polyvinyl Chloride	5.25	8.55	358.23
60	Active	Circular	8"	Polyvinyl Chloride	7.68	8.28	422.92
61	Active	Circular	4"	Polyvinyl Chloride	<Null>	6.81	175.61
62	Active	Circular	6"	Polyvinyl Chloride	<Null>	3.5	562.88
63	Active	<Null>	10"	Not Known	<Null>	<Null>	263.33
64	Active	Circular	6"	Polyvinyl Chloride	<Null>	4.41	68.43
65	Active	Circular	8"	Polyvinyl Chloride	4.41	4.99	384.22
66	Active	Circular	8"	Polyvinyl Chloride	<Null>	7.34	292.72
67	Active	Circular	8"	Polyvinyl Chloride	5.05	6.05	424.40
68	Active	Circular	6"	Vitrified Clay Pipe	<Null>	6.25	148.65
69	Active	Circular	8"	Polyvinyl Chloride	6.31	7.3	335.72
70	Active	Circular	6"	Polyvinyl Chloride	8.46	9.61	180.49
71	Active	Circular	12"	Polyvinyl Chloride	5.49	6.3	377.19
72	Active	Circular	12"	Polyvinyl Chloride	<Null>	4.14	309.72
73	Active	Circular	12"	Polyvinyl Chloride	10.3	<Null>	89.06

Appendix B
Sanitary Sewer Pipe Asset Inventory

Asset Number	fecycle Stat	Pipe Shape	Diameter (in)	Pipe Material	Upstream Pipe Invert (ft)	Downstream Pipe Invert (ft)	Length (ft)2
74	Active	Circular	6"	Polyvinyl Chloride	<Null>	7.03	439.93
75	Active	Circular	6"	Polyvinyl Chloride	<Null>	6.83	557.25
76	Active	Circular	6"	Polyvinyl Chloride	<Null>	7.34	151.73
77	Active	Circular	8"	Polyvinyl Chloride	8.24	8.19	339.72
78	Active	Circular	6"	Not Known	<Null>	11.56	17.39
79	Active	<Null>	6"	Not Known	<Null>	<Null>	16.50
80	Active	<Null>	6"	Not Known	<Null>	<Null>	123.01
81	Active	Circular	10"	Vitrified Clay Pipe	6.23	5.54	376.86
82	Active	Circular	10"	Polyvinyl Chloride	9.2	9.37	61.84
83	Active	Circular	10"	Vitrified Clay Pipe	8.8	9.07	389.49
84	Active	Circular	10"	Vitrified Clay Pipe	5.56	7.2	389.41
85	Active	<Null>	12"	Not Known	<Null>	<Null>	64.52
86	Active	Circular	8"	Polyvinyl Chloride	5.29	6.43	487.80
87	Active	Circular	6"	Polyvinyl Chloride	<Null>	6.12	147.61
88	Active	Circular	6"	Not Known	<Null>	<Null>	298.71
89	Active	Circular	6"	Polyvinyl Chloride	<Null>	3.78	160.27
90	Active	Circular	6"	Polyvinyl Chloride	6.07	7.29	298.39
91	Active	Circular	10"	Polyvinyl Chloride	9.52	10.73	433.93
92	Active	Circular	10"	Polyvinyl Chloride	8.66	9.5	432.20
93	Active	Circular	10"	Polyvinyl Chloride	8.47	8.64	435.86
94	Active	Circular	10"	Polyvinyl Chloride	7.56	8.45	435.96
95	Active	Circular	6"	Polyvinyl Chloride	<Null>	2.34	534.99
96	Active	Circular	6"	Polyvinyl Chloride	4.38	<Null>	126.68
97	Active	Circular	6"	Polyvinyl Chloride	4.04	4.33	121.47
98	Active	Circular	6"	Vitrified Clay Pipe	5.41	5.15	232.14
99	Active	Circular	6"	Vitrified Clay Pipe	5.25	<Null>	373.37
100	Active	Circular	8"	Vitrified Clay Pipe	<Null>	5.62	295.03
101	Active	Circular	8"	Vitrified Clay Pipe	5.72	<Null>	294.92
102	Active	Circular	8"	Polyvinyl Chloride	<Null>	7.34	275.15
103	Active	Circular	10"	Polyvinyl Chloride	7.36	8.02	384.73
104	Active	Circular	8"	Polyvinyl Chloride	8.8	8.9	329.54
105	Active	Circular	8"	Polyvinyl Chloride	6.47	<Null>	266.88
106	Active	Circular	8"	Vitrified Clay Pipe	7.45	<Null>	11.60
107	Active	Circular	8"	Polyvinyl Chloride	7.29	7.28	313.59
108	Active	Circular	10"	Polyvinyl Chloride	<Null>	7.27	99.95
109	Active	Circular	6"	Polyvinyl Chloride	3.99	2.9	352.73
110	Active	Circular	6"	Vitrified Clay Pipe	3.59	2.88	267.00
111	Active	<Null>	8"	Not Known	<Null>	<Null>	113.41
112	Active	Circular	8"	Vitrified Clay Pipe	5.65	5.86	422.05
113	Active	Circular	10"	Vitrified Clay Pipe	5.21	8.84	354.63
114	Active	Circular	8"	Vitrified Clay Pipe	8.86	9.88	409.44
115	Active	<Null>	10"	Not Known	9.5	<Null>	335.52
116	Active	Circular	6"	Not Known	<Null>	<Null>	175.38
117	Active	Circular	8"	Vitrified Clay Pipe	5.71	8.84	238.60
118	Active	Circular	6"	Polyvinyl Chloride	5.4	8.71	336.09
119	Active	Circular	6"	Vitrified Clay Pipe	6.43	7.73	261.97
120	Active	Circular	8"	Polyvinyl Chloride	8.91	9.7	379.43
121	Active	Circular	10"	Polyvinyl Chloride	9.72	<Null>	370.28
122	Active	Circular	6"	Polyvinyl Chloride	<Null>	5.1	195.53
123	Active	Circular	6"	Polyvinyl Chloride	5.13	4.59	203.52
124	Active	Circular	6"	Polyvinyl Chloride	<Null>	4.9	262.68
125	Active	Circular	6"	Polyvinyl Chloride	5.6	6.81	115.06
126	Active	Circular	6"	Polyvinyl Chloride	6.83	7.2	278.90
127	Active	Circular	8"	Polyvinyl Chloride	7.58	6.64	277.14
128	Active	Circular	8"	Polyvinyl Chloride	7.6	7.47	159.37
129	Active	Circular	8"	Polyvinyl Chloride	6.66	7.5	201.29
130	Active	Circular	8"	Polyvinyl Chloride	10.18	7.58	326.11
131	Active	Circular	12"	Vitrified Clay Pipe	<Null>	10.26	299.00
132	Active	Circular	12"	Polyvinyl Chloride	9.12	<Null>	406.95
133	Active	Circular	12"	Polyvinyl Chloride	9.25	9.08	403.47
134	Active	Circular	12"	Polyvinyl Chloride	<Null>	9.15	402.00
135	Active	Circular	12"	Polyvinyl Chloride	8.75	<Null>	411.49
136	Active	Circular	12"	Polyvinyl Chloride	9.45	8.68	256.44
137	Active	Circular	12"	Polyvinyl Chloride	5.91	7.25	303.16
138	Active	Circular	6"	Vitrified Clay Pipe	<Null>	5.11	259.15
139	Active	Circular	6"	Polyvinyl Chloride	3.4	4.03	391.40
140	Active	Circular	6"	Polyvinyl Chloride	<Null>	3.3	105.43
141	Active	Circular	6"	Polyvinyl Chloride	<Null>	3.2	309.61
142	<Null>	Circular	6"	Polyvinyl Chloride	<Null>	4.39	357.38
143	Active	Circular	Unknown	Not Known	14.65	<Null>	17.06
144	Active	Circular	10"	Polyvinyl Chloride	10.65	12.45	47.41
145	Active	Circular	12"	Polyvinyl Chloride	<Null>	9.46	6.06
146	Active	Circular	Unknown	Not Known	10.75	10.26	31.44

Appendix B
Sanitary Sewer Pipe Asset Inventory

Asset Number	ecycle Stat	Pipe Shape	Diameter (in)	Pipe Material	Upstream Pipe Invert (ft)	Downstream Pipe Invert (ft)	Length (ft)2
147	Active	Circular	6"	Polyvinyl Chloride	5.5	6.34	194.99
148	Active	Circular	6"	Polyvinyl Chloride	4	3.95	395.57
149	Active	Circular	6"	Polyvinyl Chloride	6.11	<Null>	386.73
150	Active	Circular	6"	Polyvinyl Chloride	<Null>	4.25	563.48
151	Active	Circular	6"	Polyvinyl Chloride	4.27	5.68	139.32
152	Active	Circular	6"	Polyvinyl Chloride	<Null>	7.2	310.84
153	Active	Circular	8"	Polyvinyl Chloride	7.96	10.16	418.98
154	Active	Circular	8"	Polyvinyl Chloride	<Null>	7.94	121.78
155	Active	Circular	6"	Polyvinyl Chloride	<Null>	3.91	141.85
156	Active	Circular	6"	Polyvinyl Chloride	<Null>	3.91	105.70
157	Active	Circular	6"	Polyvinyl Chloride	3.97	8.82	416.34
158	Active	Circular	6"	Vitrified Clay Pipe	6.77	<Null>	235.44
159	Active	Circular	6"	Vitrified Clay Pipe	<Null>	4.39	134.77
160	Active	Circular	8"	Polyvinyl Chloride	9.79	8.64	41.94
161	Active	Circular	6"	Vitrified Clay Pipe	<Null>	7.58	183.69
162	Active	Circular	8"	Polyvinyl Chloride	8.77	10.67	158.82
163	Active	Circular	10"	Vitrified Clay Pipe	10.94	9.5	557.36
164	Active	Circular	8"	Vitrified Clay Pipe	<Null>	3.59	335.37
165	Active	Circular	8"	Vitrified Clay Pipe	3.78	3.99	258.84
166	Active	Circular	8"	Vitrified Clay Pipe	10.1	10.46	247.46
167	Active	Circular	12"	Vitrified Clay Pipe	9.87	10.07	265.65
168	Active	Circular	8"	Polyvinyl Chloride	5.27	4.13	359.10
169	Active	Circular	6"	Polyvinyl Chloride	<Null>	6.9	213.24
170	Active	Circular	8"	Polyvinyl Chloride	7.12	7.27	341.56
171	Active	Circular	8"	Polyvinyl Chloride	<Null>	6.13	238.60
172	Active	Circular	6"	Polyvinyl Chloride	7.26	7.63	90.59
173	Active	Circular	6"	Polyvinyl Chloride	6.67	7.17	305.65
174	Active	Circular	6"	Polyvinyl Chloride	<Null>	6.48	239.16
175	Active	Circular	10"	Vitrified Clay Pipe	10.75	10.47	427.43
176	Active	Circular	6"	Vitrified Clay Pipe	7.1	7.4	282.49
177	Active	Circular	6"	Polyvinyl Chloride	<Null>	5.19	384.27
178	Active	Circular	6"	Vitrified Clay Pipe	<Null>	7.74	322.93
179	Active	Circular	8"	Vitrified Clay Pipe	7.76	<Null>	242.58
180	Active	Circular	6"	Vitrified Clay Pipe	<Null>	7.74	409.34
181	Active	Circular	6"	Vitrified Clay Pipe	<Null>	6.41	242.41
182	Active	Circular	8"	Vitrified Clay Pipe	6.71	8.98	290.08
183	Active	Circular	8"	Vitrified Clay Pipe	<Null>	8.98	227.71
184	Active	Circular	6"	Polyvinyl Chloride	<Null>	4.94	226.43
185	Active	Circular	6"	Polyvinyl Chloride	4.96	6.69	382.88
186	Active	Circular	6"	Polyvinyl Chloride	7.65	8.61	141.59
187	<Null>	Circular	6"	Not Known	<Null>	<Null>	133.47
188	Active	Circular	6"	Vitrified Clay Pipe	4.01	5.63	195.59
189	Active	Circular	8"	Vitrified Clay Pipe	<Null>	5.62	348.63
190	Active	Circular	6"	Vitrified Clay Pipe	5.41	3.57	282.03
191	Active	Circular	6"	Vitrified Clay Pipe	<Null>	4.43	183.33
192	Active	Circular	6"	Vitrified Clay Pipe	4.45	5.39	136.97
193	Active	Circular	6"	Vitrified Clay Pipe	<Null>	5.38	317.56
194	Active	Circular	6"	Vitrified Clay Pipe	<Null>	3.61	84.29
195	Active	Circular	6"	Vitrified Clay Pipe	3.63	7.08	318.26
196	Active	Circular	6"	Polyvinyl Chloride	6.26	6.83	380.54
197	Active	Circular	6"	Polyvinyl Chloride	6.85	7.09	10.17
198	Active	Circular	6"	Polyvinyl Chloride	7.11	8.75	409.79
199	Active	Circular	6"	Polyvinyl Chloride	<Null>	7.08	147.26
200	Active	Circular	8"	Vitrified Clay Pipe	8.8	7.1	224.01
201	Active	Circular	6"	Vitrified Clay Pipe	<Null>	6.55	199.90
202	Active	Circular	8"	Vitrified Clay Pipe	7.12	6.64	287.38
203	Active	Circular	6"	Not Known	6.66	5.69	365.37
204	Active	Circular	6"	Vitrified Clay Pipe	<Null>	2.62	189.77
205	Active	Circular	6"	Polyvinyl Chloride	3.65	6.24	314.19
206	Active	Circular	6"	Vitrified Clay Pipe	<Null>	4.57	235.38
207	Active	Circular	6"	Vitrified Clay Pipe	4.59	5.32	440.06
208	Active	Circular	6"	Vitrified Clay Pipe	<Null>	5.33	116.39
209	Active	Circular	6"	Vitrified Clay Pipe	5.35	5.41	177.14
210	Active	Circular	8"	Vitrified Clay Pipe	5.43	<Null>	240.13
211	Active	Circular	6"	Polyvinyl Chloride	<Null>	5.31	184.81
212	Active	Circular	6"	Polyvinyl Chloride	<Null>	5.33	467.84
213	Active	Circular	Unknown	Not Known	<Null>	<Null>	314.93
214	Active	Circular	8"	Polyvinyl Chloride	8.02	<Null>	754.73
215	Active	Circular	8"	Polyvinyl Chloride	4.79	8	451.08
216	Active	Circular	6"	Vitrified Clay Pipe	<Null>	4.77	530.48
217	Active	Circular	6"	Polyvinyl Chloride	<Null>	3.94	264.82
218	Active	<Null>	6"	Polyvinyl Chloride	<Null>	<Null>	71.37
219	Active	Circular	6"	Vitrified Clay Pipe	<Null>	<Null>	15.93

APPENDIX C – Lift Station Detailed Assessment and Photographs

City of Wallis, TX
Detailed Lift Station Assessment
LS#1 - WWTP INFLUENT LS

CITY OF WALLIS
LIFT STATION NO: 1
LOCATION: WWTP LIFT STATION
COORDINATES (LATITUDE, LONGITUDE): 29.636548, -96.074942
ORIGINAL YEAR OF CONSTRUCTION: 1985
STATION TYPE/CONFIGURATION: DRY WELL PUMP STATION

GENERAL SITE, SAFETY & LOCATION:		
	ACCESS ROAD & PARKING:	The LS is located within the WWTP site facility. Parking is within the WWTP site on paved access road to the WWTP.
	FENCE /LOCK:	The LS is located within the WWTP site facility which is secured via a chain link fence surrounding the WWTP site, which padlocked with swing chainlink gate.
	LIGHTING:	LS does not have overhead lighting. The WWTP has lighting generally on site.
	FLOODING/DRAINAGE:	The pumps are set on a 4" thick concrete slab (25.5'x27.3'). The site drains generally to the south on the Railroad Street ditch on the southside of the LS . City notes there is not concerns on flooding issues in this site. City noted there was some minor flooding during the major Harvey storm but no equipment was damaged.
	SITE WATER AVAILABLE:	None
	WEATHER PROTECTION:	There are temporary tarps that are covering the pump equipment. No permanent weather protection in this LS area. However, the City staff noted they are planning to built a wooden overhead awning over this LS area to protect the LS equipment from weather conditions.
WET WELL		
	DIMENSIONS (FT):	24'-10" x 8'-0" x 16'-0" (L x W x D)
	DEPTH (RIM TO INVERT), FT:	16
	ACCESS:	Circular 32" Iron access lid. Fair condition. Typically not locked.
	STRUCTURE AND LINING:	Visual Inspection indicates concrete structure is in Fair Condition. There are signs of surcharge to the top of the well from debris on pipe supports. There are signs of exposed aggregate. There are no signs of apparent concrete cracking or flaking.
	INTERIOR PIPING:	There are four 6" DIP suction pipes. All pipes show wear, past surcharging, and potentially corrosion. It was difficult to indicate if pipes had major corrosion or if it was a surface grime layer that needs to be blasted. Pipes are original from the 1980s indicting the life time is appoximately ~40 years. Concrete knockout between discharge pipe and wall shows no sign of leaking during visual inspection. There is a 15" DIP influent pipe with unknown condition. There is also a 8" PVC drain line on the west side of the wet well coming from the WWTP with condition unknown.
	EXTERIOR PIPING:	The valves and piping are in fair condition. Pump 1 & 2 discharge into a 8" DIP header, and Pump 3 & 4 dicharge into a 4" DIP header. The lines can be joined through opening a gate valve. Operator notes the isolation gate valves are working, the ARVs are in poor condition and show age. The swing check valves for Pump No. 3 and 4 have been replaced recently. The check valves for Pump No. 1 and 2 sometimes do not swing well. The piping are in fair condition. Pressure gages are operational but in poor condition.
	DEBRIS:	There are signs of grit and some debris floating on top of water surface.

City of Wallis, TX
Detailed Lift Station Assessment
LS#1 - WWTP INFLUENT LS

PUMP & EQUIPMENT:		
PUMPS		
	LOCATION:	Top of Concrete Slab, protected with tarp
	NO. OF PUMPS:	4
	TYPE:	Self-Priming
	MODEL:	GORMAN RUPP T-SERIES
	TOTAL CAPACITY (GPM):	1760
	MOTOR HORSEPOWER (HP):	15, 15, 7.5, 7.5
	MODEL:	GORMAN RUPP
	DRIVE TYPE:	CONSTANT
CONTROLS & ELECTRICAL		
	FLOAT SWITCH SYSTEM:	Mercury Float
	ALARMS:	Visual - Light indicator during loss of power and circuit breaker trip. Note no other alarm present as indicated by City.
	BREAKER SIZE:	Unknown
	TRANSFORMER:	Unknown
	STARTER TYPE:	Constant
	REMARKS:	City is notified when visual alarm is trigged.
SCADA SYSTEM		
	EQUIPMENT MONTIORED/CONTROLLED:	None
	COMMUNICATION METHOD:	None
	REMARKS:	City notes that they do not have SCADA on any site. All logs are manually recorded on pen and paper.
EMERGENCY GENERATOR		
	TYPE (ON-SITE/HOOKUP CONNECTION)	On-site
	MODEL AND SIZE:	Cummins Onan 40
	FUEL TYPE & CAPACITY:	Diesel
	TRANFER SWITCH LOCATION AND TYPE (MANUAL, AUTO):	Unknown
	REMARKS:	
GENERAL MISC COMMENTS & REMARKS:		

City of Wallis, TX
Detailed Lift Station Assessment
LS#2 - COLUMBUS LS

CITY OF WALLIS
LIFT STATION NO: 2
LOCATION: COLUMBUS ST/GUYLER ST
COORDINATES (LATITUDE, LONGITUDE): 29.632662,-96.064975
ORIGINAL YEAR OF CONSTRUCTION: 1987
STATION TYPE/CONFIGURATION: DRY WELL PUMP STATION

GENERAL SITE, SAFETY & LOCATION:		
	ACCESS ROAD & PARKING:	The driveway to the LS is unpaved and on grass. The parking is on grass.
	FENCE /LOCK:	The LS is not fenced. The access to the LS equipment is through the Fiberglass Enclosure that is typically padlocked.
	LIGHTING:	The site has one overhead lighting.
	FLOODING/DRAINAGE:	The equipment is raised above natural ground approximately 1.5-ft on concrete slab. The site drains to the ditch on the west of the LS site. City notes there is not concerns on flooding issues in this site.
	SITE WATER AVAILABLE:	None
	WEATHER PROTECTION:	Yes, above grade equipment is protected with fiberglass enclosure. There is a heat lamp located inside the enclosure.
WET WELL		
	DIMENSIONS (FT):	5-ft diameter wet well
	DEPTH (RIM TO INVERT), FT:	19
	ACCESS:	Circular 24" Iron access lid. Fair condition and difficult to open. Typically locked with a metal cross bar.
	STRUCTURE AND LINING:	Visual Inspection indicates concrete structure is in Poor/Fair Condition. There are signs of surcharge to the top of the well. There are signs of exposed aggregate and some pitting. There are signs are concrete cracking and flaking around joints halfway down well structure. There are indicatations of historical black asphalt patch work erroding. There is signs of efflorescence near the bottom of the well which indicates high moisture and poor ventilation.
	INTERIOR PIPING:	There are two 6" DIP suction pipes, and one 10" DIP discharge elbow and pipe. All pipes show wear, past surcharging, and potentially corrosion. It was difficult to indicate if pipes had major corrosion or if it was a surface grime layer that needs to be blasted. Pipes are original from the 1980s indicting the life time is appoximately ~40 years. Concrete knockout between discharge pipe and wall shows no sign of leaking during visual inspection. The 12" DIP influent pipe is corroded and typically submerged per operator.
	EXTERIOR PIPING:	The valves and piping were difficult to evaluate due to being inside enclosure. It is assumed the exterior piping is in fair condition.
	DEBRIS:	There are signs of grit and some debris floating on top of water surface. There are rags on top of the discharge pipe that indicates signs of a flooded surcharged well.
PUMP & EQUIPMENT		
PUMPS		
	LOCATION:	Top of Concrete Slab, protected within fiberglass enclosure
	NO. OF PUMPS:	2
	TYPE:	Self-Priming Centrifugal
	MODEL:	GORMAN RUPP T-SERIES
	FIRM CAPACITY (GPM):	1040
	MOTOR HORSEPOWER (HP):	15, 15
	MODEL:	GORMAN RUPP B0154DLF2UD
	DRIVE TYPE:	CONSTANT
CONTROLS & ELECTRICAL		
	FLOAT SWITCH SYSTEM:	Mercury Float

	ALARMS:	Visual - Light indicator during loss of power and circuit breaker trip. Note no other alarm present as indicated by City.
	BREAKER SIZE:	Unknown
	TRANSFORMER:	Unknown
	STARTER TYPE:	Constant
	REMARKS:	City is notified through residents alerting when visual alarm is trigged.
SCADA SYSTEM		
	EQUIPMENT MONTIORED/CONTROLLED:	None
	COMMUNICATION METHOD:	None
	REMARKS:	City notes that they do not have SCADA on any site. All logs are manually recorded on pen and paper.
EMERGENCY GENERATOR		
	TYPE (ON-SITE/HOOKUP CONNECTION)	On-site, Portable Generator Hookup Connection
	MODEL AND SIZE:	Cummins 35GGPA, Size 35kW
	FUEL TYPE & CAPACITY:	Natural Gas
	TRANFER SWITCH LOCATION AND TYPE (MANUAL, AUTO):	Automatic, Model No. OTPC125
	REMARKS:	City notes generator was recently installed in 2021-2022. The generator automatically exercizes every Tuesday morning.
GENERAL MISC COMMENTS & REMARKS:		
		Operator note maintainence is difficult as they would have to remove entire enclosure over the pumps to access parts for maintainence.
		Staff note that the MH on the north end was part of an old LS wet well. It is now used as collector MH before it gravities into main wet well. The LS3 on 7th Street forcemain flows into this MH.

LIFT STATION #2 (COLUMBUS ST) PHOTOGRAPHS

The following pictures were taken during the field visit in February 2023.
*Note that wet well was pumped down for visual inspection from the top of well, no wet well entry inspection took place.
**LS enclosures were not removed as part of site visit.


Site (Overall)

Pumps Enclosure


Collector Manhole (Old Wet Well), Interior


Wet Well (Top)

Wet Well (Interior)

Centrifugal Pump 1

Discharge Piping and Level Controls

Pump Control Panel

Gas Generator

Generator Automatic Transfer Switch Panel

City of Wallis, TX
Detailed Lift Station Assessment
LS#3 - 7th STREET

CITY OF WALLIS
LIFT STATION NO: 3
LOCATION: 7th STREET
COORDINATES (LATITUDE, LONGITUDE): 29.629038,-96.056649
ORIGINAL YEAR OF CONSTRUCTION: 1987
STATION TYPE/CONFIGURATION: DRY WELL PUMP STATION

GENERAL SITE, SAFETY & LOCATION:		
	ACCESS ROAD & PARKING:	The driveway to the LS is unpaved and on grass. There are concrete steps on the north side to reach to top of slab of the LS. The parking is on grass. Note the driveway is along an alleyway that can be accessed by the public and nearby mobile home residents.
	FENCE /LOCK:	The LS is not fenced. The access to the LS equipment is through the Fiberglass Enclosure that is typically padlocked.
	LIGHTING:	The site has one overhead lighting.
	FLOODING/DRAINAGE:	The equipment is raised above natural ground approximately 3-ft on concrete slab. The site drainage is unknown. City is not aware of any flooding at this LS but it should be noted that this LS is located within the FEMA 100-YR floodplain.
	SITE WATER AVAILABLE:	None
	WEATHER PROTECTION:	Yes, above grade equipment is protected with fiberglass enclosure. There is a heat lamp located inside the enclosure.
WET WELL		
	DIMENSIONS (FT):	5-ft diameter wet well
	DEPTH (RIM TO INVERT), FT:	19.31
	ACCESS:	Circular 24" Iron access lid. Fair condition and difficult to open. Typically locked with a metal cross bar.
	STRUCTURE AND LINING:	Visual Inspection indicates concrete structure is in Poor Condition. There are signs of surcharge to the top of the well. There are signs of exposed aggregate. There are no signs are concrete cracking. But there are indicatations of historical black asphalt patchwork erroding throughout the wet well. There is signs of floating debris on wet well.
	INTERIOR PIPING:	There are two 6" DIP suction pipes, and one 6" DIP discharge elbow and pipe. All pipes show wear, past surcharging, and potentially corrosion. It was difficult to indicate if pipes had major corrosion or if it was a surface grime layer that needs to be blasted. Pipes are original from the 1980s indicting the life time is appoximately ~40 years. Concrete knockout between discharge pipe and wall shows no sign of leaking during visual inspection. The 12" DIP influent pipe from the old wet well is corroded and typically submerged per operator. There is an active 6" PVC influent line coming in from below the discharge line that looks to be in fair condition.
	EXTERIOR PIPING:	The valves and piping were difficult to evaluate due to being inside enclosure. It is assumed the exterior piping is in fair condition.

	DEBRIS:	There are signs of grit and some debris floating on top of water surface. The operator and staff notes this LS has needed constant de-ragging and maintainence in the past.
PUMP & EQUIPMENT:		
PUMPS		
	LOCATION:	Top of Concrete Slab, protected within fiberglass enclosure
	NO. OF PUMPS:	2
	TYPE:	Self-Priming Centrifugal
	MODEL:	GORMAN RUPP T-SERIES
	FIRM CAPACITY (GPM):	1040
	MOTOR HORSEPOWER (HP):	15, 15
	MODEL:	GORMAN RUPP B0154DLF2UD (NOT VERIFIED)
	DRIVE TYPE:	CONSTANT
CONTROLS & ELECTRICAL		
	FLOAT SWITCH SYSTEM:	Mercury Float
	ALARMS:	Visual - Light indicator during loss of power and circuit breaker trip. Note no other alarm present as indicated by City.
	BREAKER SIZE:	Unknown
	TRANSFORMER:	Unknown
	STARTER TYPE:	Constant
	REMARKS:	City is notified through residents alerting when visual alarm is trigged.
SCADA SYSTEM		
	EQUIPMENT MONTIORED/CONTROLLED:	None
	COMMUNICATION METHOD:	None
	REMARKS:	City notes that they do not have SCADA on any site. All logs are manually recorded on pen and paper.
EMERGENCY GENERATOR		
	TYPE (ON-SITE/HOOKUP CONNECTION)	On-site, Portable Generator Hookup Connection
	MODEL AND SIZE:	Cummins 35GGPA, Size 35kW
	FUEL TYPE & CAPACITY:	Natural Gas
	TRANFER SWITCH LOCATION AND TYPE (MANUAL, AUTO):	Automatic, Model No. OTPC125
	REMARKS:	City notes generator was recently installed in 2021-2022. The generator automatically exercizes every Tuesday morning. The generator is on a rised concrete slab approximately 3.5' above NG.
GENERAL MISC COMMENTS & REMARKS:		
		Operator note maintainence is difficult as they would have to remove entire enclosure over the pumps to access parts for maintainence.
		Staff note that the MH on the north end was part of an old LS wet well. It is now used as collector MH before it gravities into main wet well. This LS3 forcemain flows into the MH at LS2. Staff notes this LS requires the most maintainence. The pumps are consistently clogged. It is noted that this LS receives flow from the southeast and northeast sanitary system.

LIFT STATION #3 (7th ST) PHOTOGRAPHS

The following pictures were taken during the field visit in February 2023.
*Note that wet well was pumped down for visual inspection from the top of well, no wet well entry inspection took place.
**LS enclosures were not removed as part of site visit.


Site (Overall)


Pumps Enclosure


Collector Manhole (Old Wet Well), Exterior


Wet Well (Interior)

Pump Control Panel

Discharge Piping and Level Controls

Pump 1 Motor

Gas Generator and Slab

City of Wallis, TX
Detailed Lift Station Assessment
LS#4 - LEGION RD

CITY OF WALLIS
LIFT STATION NO: 4
LOCATION: LEGION RD
COORDINATES (LATITUDE, LONGITUDE): 29.630935,-96.069053
ORIGINAL YEAR OF CONSTRUCTION: 1987
STATION TYPE/CONFIGURATION: DRY WELL PUMP STATION

GENERAL SITE, SAFETY & LOCATION:		
	ACCESS ROAD & PARKING:	The LS is located on the north side of Legion Road on grass. The parking is typically on the shoulder of Legion Road.
	FENCE /LOCK:	The LS is not fenced. The access to the LS equipment is through the Fiberglass Enclosure that is typically padlocked.
	LIGHTING:	The site has one overhead lighting.
	FLOODING/DRAINAGE:	The equipment is raised above natural ground approximately 2-ft on concrete slab. The site drainage is towards the roadside ditch on Legion Road. City is not aware of any flooding at this LS.
	SITE WATER AVAILABLE:	None
	WEATHER PROTECTION:	Yes, above grade equipment is protected with fiberglass enclosure. There is a heat lamp located inside the enclosure.
WET WELL		
	DIMENSIONS (FT):	5-ft diameter wet well
	DEPTH (RIM TO INVERT), FT:	14.65
	ACCESS:	Circular 24" Iron access lid. Fair condition and difficult to open. Typically locked with a metal cross bar.
	STRUCTURE AND LINING:	Visual Inspection indicates concrete structure is in Poor Condition. There are signs of surcharge to the top of the well. There are no signs are concrete cracking. But there are indicatations of historical black asphalt patchwork erroding throughout the wet well. There is signs of floating debris on wet well.
	INTERIOR PIPING:	There are two 4" DIP suction pipes, and one 4" DIP discharge elbow and pipe. All pipes show wear, past surcharging, and potentially corrosion. It was difficult to indicate if pipes had major corrosion or if it was a surface grime layer that needs to be blasted. Pipes are original from the 1980s indicting the life time is appoximately ~40 years. Concrete knockout between discharge pipe and wall shows no sign of leaking during visual inspection. The 12" DIP influent pipe from the old wet well is corroded and typically submerged per operator. There is an active 6" PVC influent line coming in from below the discharge line that looks to be in fair condition.
	EXTERIOR PIPING:	The valves and piping were difficult to evaluate due to being inside enclosure. It is assumed the exterior piping is in fair condition.
	DEBRIS:	There are signs of grit and some debris floating on top of water surface. The operator and staff notes this LS has needed constant de-ragging and maintainence in the past coming for the apartment complex on the south side of the Legion Road.
PUMP & EQUIPMENT:		

City of Wallis, TX
Detailed Lift Station Assessment
LS#4 - LEGION RD

PUMPS		
	LOCATION:	Top of Concrete Slab, protected within fiberglass enclosure
	NO. OF PUMPS:	2
	TYPE:	Self-Priming Centrifugal
	MODEL:	GORMAN RUPP T-SERIES
	FIRM CAPACITY (GPM):	400
	MOTOR HORSEPOWER (HP):	3, 3
	MODEL:	GORMAN RUPP B0034DCF2AA
	DRIVE TYPE:	CONSTANT
CONTROLS & ELECTRICAL		
	FLOAT SWITCH SYSTEM:	Mercury Float
	ALARMS:	Visual - Light indicator during loss of power and circuit breaker trip. Note no other alarm present as indicated by City.
	BREAKER SIZE:	Unknown
	TRANSFORMER:	Unknown
	STARTER TYPE:	Constant
	REMARKS:	City is notified through residents alerting when visual alarm is trigged.
SCADA SYSTEM		
	EQUIPMENT MONTIORED/CONTROLLED:	None
	COMMUNICATION METHOD:	None
	REMARKS:	City notes that they do not have SCADA on any site. All logs are manually recorded on pen and paper.
EMERGENCY GENERATOR		
	TYPE (ON-SITE/HOOKUP CONNECTION)	On-site, Portable Generator Hookup Connection
	MODEL AND SIZE:	Cummins 29GGMC, Capacity 29kW
	FUEL TYPE & CAPACITY:	Natural Gas
	TRANFER SWITCH LOCATION AND TYPE (MANUAL, AUTO):	Automatic, Model No. OTPC70
	REMARKS:	City notes generator was recently installed in 2021-2022. The generator automatically exercizes every Tuesday morning. The generator is on a rised concrete slab approximately 2' above NG.
GENERAL MISC COMMENTS & REMARKS:		
		Operator note maintainence is difficult as they would have to remove entire enclosure over the pumps to access parts for maintainence.
		Staff note that the MH on the north end was part of an old LS wet well. It is now used as collector MH before it gravities into main wet well. City notes the pumps are consistently clogged from customers throwing rags away.

LIFT STATION #4 (LEGION RD) PHOTOGRAPHS

The following pictures were taken during the field visit in February 2023.
*Note that wet well was pumped down for visual inspection from the top of well, no wet well entry inspection took place.
**LS enclosures were not removed as part of site visit.


Site (Overall)


Pumps Enclosure


Collector Manhole (Old Wet Well), Interior


Wet Well (Top)

Centrifugal Pump 1

Centrifugal Pump 1 Motor Tag

Pump Control Panel

Gas Generator

City of Wallis, TX
Detailed Lift Station Assessment
LS#5 - MAREK RD

CITY OF WALLIS
LIFT STATION NO: 5
LOCATION: MAREK RD
COORDINATES (LATITUDE, LONGITUDE): 29.639591,-96.065127
ORIGINAL YEAR OF CONSTRUCTION: 1987
STATION TYPE/CONFIGURATION: DRY WELL PUMP STATION

GENERAL SITE, SAFETY & LOCATION:		
	ACCESS ROAD & PARKING:	The LS is located on the south side of Marek Road on grass. The parking is typically on the shoulder of Marek Road.
	FENCE /LOCK:	The LS is fenced. There are concrete steps on the north side to reach to top of slab of the LS. The access to the LS equipment is through the wood fence gate that is typically padlocked.
	LIGHTING:	The site has no overhead lighting.
	FLOODING/DRAINAGE:	The equipment is raised above natural ground approximately 3-ft on concrete slab. The site drainage is towards the roadside ditch on Marek Road. City is not aware of any flooding at this LS.
	SITE WATER AVAILABLE:	Yes, via hose bib located outside fence.
	WEATHER PROTECTION:	The above grade equipment is currently being protected by covered tarps. There is a heat lamp located inside the tarp.
WET WELL		
	DIMENSIONS (FT):	5-ft diameter wet well
	DEPTH (RIM TO INVERT), FT:	14.14
	ACCESS:	Circular 24" Iron access lid. Fair condition and difficult to open. Typically locked with a metal cross bar.
	STRUCTURE AND LINING:	Visual Inspection indicates concrete structure is in Fair Condition. There are no signs of surcharge to the top of the well. There are no signs are concrete cracking.
	INTERIOR PIPING:	There are two 4" DIP suction pipes. There are 3 influent pipes coming into the wet well. All pipes show wear, past surcharging, and potentially corrosion. It was difficult to indicate if pipes had major corrosion or if it was a surface grime layer that needs to be blasted. Pipes are original from the 1980s indicting the life time is appoximately ~40 years. Concrete knockout between discharge pipe and wall shows no sign of leaking during visual inspection.
	EXTERIOR PIPING:	The valves and piping are in fair condition and functional according to the City. Check valves look to be recently replaced. 4" DIP forcemain ties into a tee over the fence and down into underground outside of fence.
	DEBRIS:	There were no signs of grit and some debris floating on top of water surface. The operator and staff notes this LS have little capacity as it does not serve many customers.
PUMP & EQUIPMENT:		
PUMPS		
	LOCATION:	Top of Concrete Slab, protected with tarp
	NO. OF PUMPS:	2
	TYPE:	Self-Priming
	MODEL:	GORMAN RUPP T-SERIES
	FIRM CAPACITY (GPM):	400

	MOTOR HORSEPOWER (HP):	5, 5
	MODEL:	GORMAN RUPP T3A3-B
	DRIVE TYPE:	CONSTANT
CONTROLS & ELECTRICAL		
	FLOAT SWITCH SYSTEM:	Mercury Float
	ALARMS:	Visual - Light indicator during loss of power and circuit breaker trip. Note no other alarm present as indicated by City.
	BREAKER SIZE:	Unknown
	TRANSFORMER:	Unknown
	STARTER TYPE:	Constant
	REMARKS:	City is notified through residents alerting when visual alarm is trigged.
SCADA SYSTEM		
	EQUIPMENT MONTIORED/CONTROLLED:	None
	COMMUNICATION METHOD:	None
	REMARKS:	City notes that they do not have SCADA on any site. All logs are manually recorded on pen and paper.
EMERGENCY GENERATOR		
	TYPE (ON-SITE/HOOKUP CONNECTION)	On-site, Portable Generator Hookup Connection
	MODEL AND SIZE:	Gillette Generator, Capacity Unknown
	FUEL TYPE & CAPACITY:	Natural Gas
	TRANFER SWITCH LOCATION AND TYPE (MANUAL, AUTO):	Outside Fence, Automatic
	REMARKS:	City notes generator was recently installed in 2021-2022.
GENERAL MISC COMMENTS & REMARKS:		
		Operator note that is LS is rarely used due to little customers it serves.

LIFT STATION #5 (MAREK ST) PHOTOGRAPHS

The following pictures were taken during the field visit in February 2023.
*Note that wet well was pumped down for visual inspection from the top of well, no wet well entry inspection took place.
**LS enclosures were not removed as part of site visit.


Site (Overall)


Pumps Enclosure


Collector Manhole (Old Wet Well), Interior


Wet Well (Top)

Centrifugal Pump 1

Centrifugal Pump 1 Motor Tag

Pump Control Panel

Gas Generator

City of Wallis, TX
Detailed Lift Station Assessment
LS#6 - WESTGATE LS

CITY OF WALLIS
LIFT STATION NO: 6
LOCATION: WESTGATE/WESTFRONT ST
COORDINATES (LATITUDE, LONGITUDE): 29.62663,-96.074041
ORIGINAL YEAR OF CONSTRUCTION: Unknown
STATION TYPE/CONFIGURATION: DRY WELL PUMP STATION

GENERAL SITE, SAFETY & LOCATION:		
	ACCESS ROAD & PARKING:	The LS is located on the end of Westfront Street. There is an unpaved access road leading to the LS. The parking is typically on the grass area. The LS is located directly east of a residental house.
	FENCE /LOCK:	The LS is fenced. The access to the LS equipment is through the wood fence gate that is typically padlocked. The wet well access hatch is also padlocked.
	LIGHTING:	The site has one overhead lighting.
	FLOODING/DRAINAGE:	The equipment is raised above natural ground approximately 3-ft on concrete slab. The site drainage is unknown. City is not aware of any flooding at this LS.
	SITE WATER AVAILABLE:	None
	WEATHER PROTECTION:	The above grade equipment is currently being protected by covered tarps. There is a heat lamp located inside the tarp.
WET WELL		
	DIMENSIONS (FT):	5-ft diameter wet well (unverified)
	DEPTH (RIM TO INVERT), FT:	Unknown
	ACCESS:	2x2' Iron access hatch. Typically locked with a padlock.
	STRUCTURE AND LINING:	Visual Inspection indicates concrete structure is in Fair Condition. There are no signs of surcharge to the top of the well. There are signs are concrete cracking at bottom ring joints. There is signs of floating debris on wet well.
	INTERIOR PIPING:	There are two 3" PVC suction pipes. All pipes show no wear or leaks. C The 6" DIP influent pipe was submerged per operator. Condition of knock out joint for the influent pipe is unknown.
	EXTERIOR PIPING:	The valves and piping are in fair condition and functional according to the City. Swing Check valve from Pump 1 is in bad condition and does not close correctly. 4" PVC forcemain ties into a tee at NG.
	DEBRIS:	There are signs of some debris floating on top of water surface.
PUMP & EQUIPMENT:		
PUMPS		
	LOCATION:	Top of Concrete Slab, protected with tarp
	NO. OF PUMPS:	2 (one pump out of service)
	TYPE:	Self-Priming
	MODEL:	Hydromatic
	FIRM CAPACITY (GPM):	400
	MOTOR HORSEPOWER (HP):	3, 3
	MODEL:	Hydromatic 20MP

City of Wallis, TX
Detailed Lift Station Assessment
LS#6 - WESTGATE LS

	DRIVE TYPE:	CONSTANT
CONTROLS & ELECTRICAL		
	FLOAT SWITCH SYSTEM:	Mercury Float
	ALARMS:	Visual - Light indicator during loss of power and circuit breaker trip. Note no other alarm present as indicated by City.
	BREAKER SIZE:	Unknown
	TRANSFORMER:	Unknown
	STARTER TYPE:	Constant
	REMARKS:	City is notified through residents alerting when visual alarm is trigged.
SCADA SYSTEM		
	EQUIPMENT MONTIORED/CONTROLLED:	None
	COMMUNICATION METHOD:	None
	REMARKS:	City notes that they do not have SCADA on any site. All logs are manually recorded on pen and paper.
EMERGENCY GENERATOR		
	TYPE (ON-SITE/HOOKUP CONNECTION)	On-site, Portable Generator Hookup Connection
	MODEL AND SIZE:	Gillette Generator, Capacity Unknown
	FUEL TYPE & CAPACITY:	Natural Gas
	TRANFER SWITCH LOCATION AND TYPE (MANUAL, AUTO):	Outside Fence, Automatic
	REMARKS:	City notes generator was recently installed in 2021-2022.
GENERAL MISC COMMENTS & REMARKS:		
		Operator note maintainence is difficult as they would have to remove entire enclosure over the pumps to access parts for maintainence.
		Currently one pump is out of service. One pump was running and had a extended draw down time in the well. There is a lot of flow coming into this LS which may be a capacity issue.

LIFT STATION #6 (WESTGATE) PHOTOGRAPHS

The following pictures were taken during the field visit in February 2023.
*Note that wet well was pumped down for visual inspection from the top of well, no wet well entry inspection took place.
**LS enclosures were not removed as part of site visit.


Site (Overall)


Discharge Piping & Wet Well


Centrifugal Pumps 1 & 2


Wet Well Cover and Discharge Connection

Pump Discharge Check Valves 1 & 2

Well Well Exterior Structure

Wet Well (Interior)

Gas Generator

APPENDIX D – WWTP Detailed Asset Inventory

Appendix D
Detailed WWTP Asset Inventory and Condition Rating

SYSTEM	POSITION	ASSET	ASSET ID	CLASS	STATUS	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/SIZE
INFLUENT SYSTEM	LIFT STATION	INFLUENT PUMP 1	L1	MECHANICAL	ACTIVE	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T6A3-B	220GPM @ 37-FT, MOTOR 7.5HP
INFLUENT SYSTEM	LIFT STATION	INFLUENT PUMP 2	L2	MECHANICAL	ACTIVE	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T6A3-B	220GPM @ 37-FT, MOTOR 7.5HP
INFLUENT SYSTEM	LIFT STATION	INFLUENT PUMP 3	L3	MECHANICAL	ACTIVE	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T6A3-B	660GPM @ 33-FT, MOTOR 15HP
INFLUENT SYSTEM	LIFT STATION	INFLUENT PUMP 4	L4	MECHANICAL	ACTIVE	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T6A3-B	660GPM @ 33-FT, MOTOR 15HP
INFLUENT SYSTEM	LIFT STATION	DISCONNECT SWITCH 1	L5	ELECTRICAL	ACTIVE	UNKNOWN	-	-
INFLUENT SYSTEM	LIFT STATION	DISCONNECT SWITCH 2	L6	ELECTRICAL	ACTIVE	UNKNOWN	-	-
INFLUENT SYSTEM	LIFT STATION	DISCONNECT SWITCH 3	L7	ELECTRICAL	ACTIVE	UNKNOWN	-	-
INFLUENT SYSTEM	LIFT STATION	DISCONNECT SWITCH 4	L8	ELECTRICAL	ACTIVE	UNKNOWN	-	-
INFLUENT SYSTEM	LIFT STATION	4" CHECK VALVE 1	L9	VALVE	ACTIVE	SWING CHECK	-	4"
INFLUENT SYSTEM	LIFT STATION	4" CHECK VALVE 2	L10	VALVE	ACTIVE	SWING CHECK	-	4"
INFLUENT SYSTEM	LIFT STATION	6" CHECK VALVE 3	L11	VALVE	ACTIVE	SWING CHECK	-	6"
INFLUENT SYSTEM	LIFT STATION	6" CHECK VALVE 4	L12	VALVE	ACTIVE	SWING CHECK	-	6"
INFLUENT SYSTEM	LIFT STATION	4" DISCHARGE VALVE 1	L13	VALVE	ACTIVE	PLUG	-	4"
INFLUENT SYSTEM	LIFT STATION	4" DISCHARGE VALVE 2	L14	VALVE	ACTIVE	PLUG	-	4"
INFLUENT SYSTEM	LIFT STATION	6" DISCHARGE VALVE 3	L15	VALVE	ACTIVE	PLUG	-	6"
INFLUENT SYSTEM	LIFT STATION	6" DISCHARGE VALVE 4	L16	VALVE	ACTIVE	PLUG	-	6"
INFLUENT SYSTEM	LIFT STATION	4" DISCHARGE VALVE 5	L17	VALVE	ACTIVE	PLUG	-	4"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 1	L18	VALVE	ACTIVE	GORMAN-RUPP	AUTOMATI C ARV GRP3-07	1"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 2	L19	VALVE	ACTIVE	GORMAN-RUPP	AUTOMATI C ARV GRP3-08	1"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 3	L20	VALVE	ACTIVE	GORMAN-RUPP	AUTOMATI C ARV GRP3-09	1"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 4	L21	VALVE	ACTIVE	GORMAN-RUPP	AUTOMATI C ARV GRP3-10	1"
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 5	L22	VALVE	ACTIVE	UNKNOWN	UNKNOWN	UNKNOWN
INFLUENT SYSTEM	LIFT STATION	AIR RELEASE VALVE 6	L23	VALVE	ACTIVE	UNKNOWN	UNKNOWN	UNKNOWN
INFLUENT SYSTEM	LIFT STATION	WET WELL STRUCTURE	L24	STRUCTURE	ACTIVE	CONCRETE	WET WELL	24'-10" x 8'-0" x 16'-0" (L x W x D)
INFLUENT SYSTEM	LIFT STATION	SWITCH PANEL AND ALARM	L25	ELECTRICAL	ACTIVE	UNKNOWN	UNKNOWN	-
PRIMARY TREATMENT	HEADWORKS	BAR SCREEN 1	P1	SCREEN	ACTIVE	MANUAL	COARSE	1 - 3/8" OPENING
PRIMARY TREATMENT	HEADWORKS	BAR SCREEN 2	P2	SCREEN	ACTIVE	MANUAL	COARSE	1 - 3/8" OPENING
PRIMARY TREATMENT	HEADWORKS	BAR SCREEN 3 (IMHOFF 1)	P3	SCREEN	ACTIVE	MANUAL	COARSE	1 - 3/8" OPENING
PRIMARY TREATMENT	HEADWORKS	SLIDE WEIR GATE 1	P4	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.5'x4.0'
PRIMARY TREATMENT	HEADWORKS	SLIDE WEIR GATE 2	P5	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.5'x4.0'
PRIMARY TREATMENT	HEADWORKS	SLIDE WEIR GATE 3	P6	GATE	INACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	2.0'x4.0'
PRIMARY TREATMENT	HEADWORKS	SLIDE WEIR GATE 4 (IMHOFF 1)	P7	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	2.0'x4.0'
PRIMARY TREATMENT	HEADWORKS	4" SLUDGE VALVE	P8	VALVE	ACTIVE	PLUG	-	4"
PRIMARY TREATMENT	HEADWORKS	BASIN STRUCTURE	P9	STRUCTURE	ACTIVE	CONCRETE	-	10.75'x7'x4' D
PRIMARY TREATMENT	IMHOFF TANK 2	GAS VENT CHANNELS	P10	STRUCTURE	ACTIVE	CONCRETE	-	(3) 1.7x36.8x26'D
PRIMARY TREATMENT	IMHOFF TANK 2	SETTLING CHANNELS	P11	STRUCTURE	ACTIVE	CONCRETE	-	(2) 6.5x36.8x11'D
PRIMARY TREATMENT	IMHOFF TANK 2	WALKWAY GRATING	P12	GENERAL	ACTIVE	GALVANIZED STEEL/FRP	-	480 SF
PRIMARY TREATMENT	IMHOFF TANK 2	HAND RAILS	P13	GENERAL	ACTIVE	ALUMINUM	-	300
PRIMARY TREATMENT	IMHOFF TANK 2	STAIRS	P14	GENERAL	ACTIVE	GALVANIZED STEEL	-	29'
PRIMARY TREATMENT	IMHOFF TANK 2	8" SLUDGE VALVE	P15	VALVE	ACTIVE	PLUG	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 2	8" SLUDGE VALVE	P16	VALVE	ACTIVE	PLUG	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 2	10" EFFLUENT VALVE	P17	VALVE	ACTIVE	GATE	-	10"
PRIMARY TREATMENT	IMHOFF TANK 2	BASIN STRUCTURE	P18	STRUCTURE	ACTIVE	CONCRETE	-	36.8'x19.8'x 26' D
PRIMARY TREATMENT	IMHOFF TANK 3	GAS VENT CHANNELS	P19	STRUCTURE	ACTIVE	CONCRETE	-	(3) 1.7x36.8x26'D
PRIMARY TREATMENT	IMHOFF TANK 3	SETTLING CHANNELS	P20	STRUCTURE	ACTIVE	CONCRETE	-	(2) 6.5x36.8x11'D
PRIMARY TREATMENT	IMHOFF TANK 3	WALKWAY GRATING	P21	GENERAL	ACTIVE	GALVANIZED STEEL	-	480 SF
PRIMARY TREATMENT	IMHOFF TANK 3	HAND RAILS	P22	GENERAL	ACTIVE	ALUMINUM	-	300
PRIMARY TREATMENT	IMHOFF TANK 3	8" SLUDGE VALVE	P23	VALVE	ACTIVE	PLUG	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 3	8" SLUDGE VALVE	P24	VALVE	ACTIVE	PLUG	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 3	10" EFFLUENT VALVE	P25	VALVE	ACTIVE	GATE	-	10"
PRIMARY TREATMENT	IMHOFF TANK 3	BASIN STRUCTURE	P26	STRUCTURE	ACTIVE	CONCRETE	-	36.8'x19.8'x 26' D
PRIMARY TREATMENT	IMHOFF TANK 1	GAS VENT CHANNELS	P27	STRUCTURE	ACTIVE	CONCRETE	-	(2) 30'x1.7x 23.5' D
PRIMARY TREATMENT	IMHOFF TANK 1	SETTLING CHANNELS	P28	STRUCTURE	ACTIVE	CONCRETE	-	(1) 30'x8.75x 16' D
PRIMARY TREATMENT	IMHOFF TANK 1	WALKWAY GRATING	P29	GENERAL	ACTIVE	GALVANIZED STEEL	-	80 SF
PRIMARY TREATMENT	IMHOFF TANK 1	HAND RAILS	P30	GENERAL	ACTIVE	ALUMINUM	-	180 LF
PRIMARY TREATMENT	IMHOFF TANK 1	8" SLUDGE VALVE & CLEANOUT	P31	VALVE	ACTIVE	UNKNOWN	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 1	8" SLUDGE VALVE & CLEANOUT	P32	VALVE	ACTIVE	UNKNOWN	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 1	8" SLUDGE VALVE & CLEANOUT	P33	VALVE	ACTIVE	UNKNOWN	UNDERGROUND	8"

Appendix D
Detailed WWTP Asset Inventory and Condition Rating

SYSTEM	POSITION	ASSET	ASSET ID	CLASS	STATUS	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/SIZE
PRIMARY TREATMENT	IMHOFF TANK 1	8" SLUDGE VALVE & CLEANOUT	P34	VALVE	ACTIVE	UNKNOWN	UNDERGROUND	8"
PRIMARY TREATMENT	IMHOFF TANK 1	BASIN STRUCTURE	P35	STRUCTURE	ACTIVE	CONCRETE	-	30'x12'x 23.5' D
PRIMARY TREATMENT	SPLITTER BOX	SLIDE GATE 1	P36	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.7'x4.75'
PRIMARY TREATMENT	SPLITTER BOX	SLIDE GATE 2	P37	GATE	ACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.7'x4.75'
PRIMARY TREATMENT	SPLITTER BOX	SLIDE GATE 3	P38	GATE	INACTIVE	ALUMINUM SHARP-CRESTED WEIR SLIDE GATE	-	1.7'x4.75'
PRIMARY TREATMENT	SPLITTER BOX	TRASH DROP CHUTE	P39	GENERAL	ACTIVE	PVC	-	8"
PRIMARY TREATMENT	SPLITTER BOX	METAL WALKWAY GRATING	P40	GENERAL	ACTIVE	GALVANIZED STEEL	-	25 SF
PRIMARY TREATMENT	SPLITTER BOX	HAND RAILS	P41	GENERAL	ACTIVE	ALUMINUM	-	20 LF
PRIMARY TREATMENT	SPLITTER BOX	BASIN STRUCTURE	P42	STRUCTURE	ACTIVE	CONCRETE	-	7'x7'x4.25' D
SECONDARY TREATMENT	TRICKLING FILTER 1	FILTER DRIVE MECHANISM	S1	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 1	SPREADER ARM	S2	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 1	FILTER MEDIA	S3	MECHANICAL	ACTIVE	ROCK MEDIA	-	-
SECONDARY TREATMENT	TRICKLING FILTER 1	LADDER	S4	GENERAL	ACTIVE	METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 1	BASIN STRUCTURE	S5	STRUCTURE	ACTIVE	CONCRETE	-	24' diameter x 12' height
SECONDARY TREATMENT	TRICKLING FILTER 2	FILTER DRIVE MECHANISM	S6	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	SPREADER ARM	S7	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	14" VENT PIPE	S8	GENERAL	ACTIVE	DIP	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	14" VENT PIPE	S9	GENERAL	ACTIVE	DIP	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	FILTER MEDIA	S10	MECHANICAL	ACTIVE	ROCK MEDIA	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	LADDER	S11	GENERAL	ACTIVE	METAL	-	-
SECONDARY TREATMENT	TRICKLING FILTER 2	BASIN STRUCTURE	S12	STRUCTURE	ACTIVE	CONCRETE	-	24' diameter x 12' height
CLARIFICATION SYSTEM	CLARIFIER 1	DRIVE MECHANISM	C1	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	SKIMMER ARMS	C2	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	SWITCH PANEL AND ALARM	C3	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	WEIRS	C4	MECHANICAL	ACTIVE	SHARP CRESTED	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	METAL WALKWAY GRATING	C5	GENERAL	ACTIVE	GALVANIZED STEEL	-	170 SF
CLARIFICATION SYSTEM	CLARIFIER 1	HAND RAILS	C6	GENERAL	ACTIVE	ALUMINUM	-	100 LF
CLARIFICATION SYSTEM	CLARIFIER 1	BASIN STRUCTURE	C7	STRUCTURE	ACTIVE	CONCRETE	-	24' diameter x 15' height
CLARIFICATION SYSTEM	CLARIFIER 2	DRIVE MECHANISM	C8	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
CLARIFICATION SYSTEM	CLARIFIER 2	SKIMMER ARMS	C9	MECHANICAL	ACTIVE	FABRICATED METAL	-	-
CLARIFICATION SYSTEM	CLARIFIER 1	SWITCH PANEL AND ALARM	C10	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	CLARIFIER 2	WEIRS	C11	MECHANICAL	ACTIVE	SHARP CRESTED	-	-
CLARIFICATION SYSTEM	CLARIFIER 2	METAL WALKWAY GRATING	C12	GENERAL	ACTIVE	GALVANIZED STEEL	-	170 SF
CLARIFICATION SYSTEM	CLARIFIER 2	HAND RAILS	C13	GENERAL	ACTIVE	ALUMINUM	-	100 LF
CLARIFICATION SYSTEM	CLARIFIER 2	BASIN STRUCTURE	C14	STRUCTURE	ACTIVE	CONCRETE	-	24' diameter x 15' height
CLARIFICATION SYSTEM	SCUM AREA	SCUM PUMP 1	C15	MECHANICAL	ACTIVE	-	-	3HP
CLARIFICATION SYSTEM	SCUM AREA	SCUM PUMP 2	C16	MECHANICAL	ACTIVE	-	-	3HP
CLARIFICATION SYSTEM	SCUM AREA	4" SUCTION VALVE 1	C17	VALVE	ACTIVE	GATE	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" SUCTION VALVE 2	C18	VALVE	ACTIVE	GATE	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" SUCTION VALVE 3	C19	VALVE	ACTIVE	GATE	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" DISCHARGE VALVE 1	C20	VALVE	ACTIVE	PLUG	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" DISCHARGE VALVE 2	C21	VALVE	ACTIVE	PLUG	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" CHECK VALVE 1	C22	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	SCUM AREA	4" CHECK VALVE 2	C23	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	SCUM AREA	LADDER	C24	VALVE	ACTIVE	METAL	-	-
CLARIFICATION SYSTEM	SCUM AREA	BASIN STRUCTURE	C25	STRUCTURE	ACTIVE	CONCRETE	-	11'x6.4'x5.3'
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	RECIRCULATION PUMP 1	C26	MECHANICAL	ACTIVE	-	-	7.5HP
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	RECIRCULATION PUMP 2	C27	MECHANICAL	ACTIVE	-	-	7.5HP
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	6" CHECK VALVE 1	C28	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	6" CHECK VALVE 2	C29	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	6" DISCHARGE VALVE 1	C30	VALVE	ACTIVE	PLUG	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	6" DISCHARGE VALVE 2	C31	VALVE	ACTIVE	PLUG	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	AIR RELEASE VALVE	C32	VALVE	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	DISCONNECT SWITCH 1	C33	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RECIRCULATION PUMP AREA	DISCONNECT SWITCH 2	C34	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	RETURN SLUDGE PUMP 1	C35	MECHANICAL	ACTIVE	-	-	10HP
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	RETURN SLUDGE PUMP 2	C36	MECHANICAL	ACTIVE	-	-	10HP
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	4" CHECK VALVE 1	C37	VALVE	ACTIVE	SWING CHECK	-	-

Appendix D
Detailed WWTP Asset Inventory and Condition Rating

SYSTEM	POSITION	ASSET	ASSET ID	CLASS	STATUS	MANUFACTURER/MATERIAL/TYPE	MODEL NO.	CAPACITY/SIZE
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	4" CHECK VALVE 2	C38	VALVE	ACTIVE	SWING CHECK	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	DISCONNECT SWITCH 1	C39	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	DISCONNECT SWITCH 2	C40	ELECTRICAL	ACTIVE	-	-	-
CLARIFICATION SYSTEM	RETURN SLUDGE AREA	BASIN STRUCTURE	C41	STRUCTURE	ACTIVE	CONCRETE	WET WELL	4' diameter x 15.4' depth
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	WOODEN BAFFLES	D1	GENERAL	ACTIVE	WOOD	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	6" DRAIN VALVE	D2	VALVE	ACTIVE	GATE	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	6" DRAIN VALVE	D3	VALVE	ACTIVE	GATE	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	6" DRAIN VALVE	D4	VALVE	ACTIVE	GATE	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	HAND RAILS	D5	GENERAL	ACTIVE	ALUMINUM	-	50 LF
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 1	BASIN STRUCTURE	D6	STRUCTURE	ACTIVE	CONCRETE	-	19'x6.4'x 15' height
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 2	BAFFLES	D7	GENERAL	ACTIVE	CONCRETE	-	-
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 2	HAND RAILS	D8	GENERAL	ACTIVE	ALUMINUM	-	50 LF
DISINFECTION SYSTEM	CHLORINE CONTACT BASIN 2	BASIN STRUCTURE	D9	STRUCTURE	ACTIVE	CONCRETE	-	19'x6.4'x 15' height
DISINFECTION SYSTEM	CHLORINATOR BUILDING	CHLORINATOR SYSTEM	D10	EQUIPMENT	ACTIVE	2-SCALE	-	-
DISINFECTION SYSTEM	CHLORINATOR BUILDING	CHLORINE CYLINDER SCALES	D11	EQUIPMENT	ACTIVE	2-SCALE	-	-
DISINFECTION SYSTEM	CHLORINATOR BUILDING	LOUVRES	D12	GENERAL	ACTIVE	METAL	-	-
DISINFECTION SYSTEM	CHLORINATOR BUILDING	BUILDING STRUCTURE	D13	STRUCTURE	ACTIVE	CMU	-	-
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	SLUDGE DRYING BED 1 STRUCTURE	B1	STRUCTURE	ACTIVE	CONCRETE	-	45x25x5.2' D
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	SLUDGE DRYING BED 2 STRUCTURE	B2	STRUCTURE	ACTIVE	CONCRETE	-	45x25x5.2' D
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	SLUDGE DRYING BED 3 STRUCTURE	B3	STRUCTURE	ACTIVE	CONCRETE	-	45x25x5.2' D
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	SLUDGE DRYING BED 4 STRUCTURE	B4	STRUCTURE	ACTIVE	CONCRETE	-	45x25x5.2' D
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	8" SHEAR VALVE 1	B5	VALVE	ACTIVE	-	-	-
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	8" SHEAR VALVE 2	B6	VALVE	ACTIVE	-	-	-
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	8" SHEAR VALVE 3	B7	VALVE	ACTIVE	-	-	-
SLUDGE SYSTEM	SLUDGE DRYING BED AREA	8" SHEAR VALVE 4	B8	VALVE	ACTIVE	-	-	-
FACILITY	OFFICE & LAB BUILDING	MCC	F1	ELECTRICAL	ACTIVE	-	-	-
FACILITY	OFFICE & LAB BUILDING	RECORDER & FLOWMETER INTERFACE	F2	EQUIPMENT	ACTIVE	CHLORINATOR MAINTAINENCE	-	-
FACILITY	OFFICE & LAB BUILDING	BUILDING STRUCTURE	F3	STRUCTURE	ACTIVE	CMU	-	-
FACILITY	EFFLUENT BOX	V-NOTCH WEIR	F4	GENERAL	ACTIVE	V-NOTCH	-	-
FACILITY	EFFLUENT BOX	FLOWMETER	F5	EQUIPMENT	ACTIVE	ULTRASONIC	-	-
FACILITY	EFFLUENT BOX	BASIN STRUCTURE	F6	STRUCTURE	ACTIVE	CONCRETE	-	10.5'x5.8'6.25'
FACILITY	CHLORINE CONTACT BASIN 1	BLOWER 1	F7	MECHANICAL	ACTIVE	Republic	HRC400	3.4HP
FACILITY	CHLORINE CONTACT BASIN 2	BLOWER 2	F8	MECHANICAL	ACTIVE	Republic	HRC400	3.4HP
FACILITY	GENERATOR	OVERHEAD CANOPY/SLAB	F9	EQUIPMENT	ACTIVE	FABRICATED METAL	-	-
FACILITY	GENERATOR	GENERATOR	F10	EQUIPMENT	ACTIVE	DIESEL GENERATOR	-	40kW
FACILITY	GROUNDS	FENCE & GATE	F11	GENERAL	ACTIVE	6' METAL CHAIN LINK	-	1200 LF
FACILITY	GROUNDS	SITE LIGHTING	F12	GENERAL	ACTIVE	-	-	-

GENERAL NOTES
1. Note lengths of piping, underground or buried yard piping and valves not evaluated or inventoried unless described below. Plumbing pipe and pipe < 3" were not evaluated unless described.
2. Valve exercises not performed.
3. Pumps and Associated Motors were accessed as one item.
4. Note that LS enclosures were not removed to access general piping and valves within the enclosure, therefore, conditions as listed below are based on visual evalution and staff discussions.
5. Anticipated costs are based primarily on general capacity or size of equipment shown in field or as-built plans. This cost does not represent all-inclusive construction costs and should only be referenced on a budgetary level. Items such as site preparation, grading, yard piping, and mobilization were not part of this study.
6. "-" indicates unknown or not applicable.

Appendix D
Detailed WWTP Asset Inventory and Condition Rating

ASSET NUMBER	ASSET	ASSET ID	CLASS	STATUS	GENERAL NOTES	FIELD NOTES	CONDITION RATING	INSTALL DATE	ESTIMATED LIFE EXPECTANCY	ERUL	REMAINING ASSET LIFE RATING	CAPACITY	RELIABILTY	OBSOLESCENCE	REDUNDANCY	LOF
1	INFLUENT PUMP 1	L1	MECHANICAL	ACTIVE			2	1985	10	-29	2	1	1	3	3	2
2	INFLUENT PUMP 2	L2	MECHANICAL	ACTIVE			2	1985	10	-29	5	1	1	3	3	2
3	INFLUENT PUMP 3	L3	MECHANICAL	ACTIVE			2	1985	10	-29	5	1	1	3	3	2
4	INFLUENT PUMP 4	L4	MECHANICAL	ACTIVE		Pump currently does not kick on properly.	4	1985	10	-29	5	1	3	3	3	2
5	DISCONNECT SWITCH 1	L5	ELECTRICAL	ACTIVE			3	1985	12	-27	5	1	1	3	3	2.5
6	DISCONNECT SWITCH 2	L6	ELECTRICAL	ACTIVE			3	1985	12	-27	5	1	1	3	3	2
7	DISCONNECT SWITCH 3	L7	ELECTRICAL	ACTIVE			3	1985	12	-27	5	1	1	3	5	2
8	DISCONNECT SWITCH 4	L8	ELECTRICAL	ACTIVE			3	1985	12	-27	5	1	1	3	5	2.5
9	4" CHECK VALVE 1	L9	VALVE	ACTIVE		Check swing valve does not hammer properly.	5	1985	40	1	5	1	5	3	1	2.5
10	4" CHECK VALVE 2	L10	VALVE	ACTIVE		Check swing valve does not hammer properly.	5	1985	40	1	5	1	5	3	1	2.5
11	6" CHECK VALVE 3	L11	VALVE	ACTIVE			2	1985	40	1	5	1	1	3	1	2.5
12	6" CHECK VALVE 4	L12	VALVE	ACTIVE			2	1985	40	1	5	1	1	3	1	1.5
13	4" DISCHARGE VALVE 1	L13	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	1	1.5
14	4" DISCHARGE VALVE 2	L14	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	1	1.5
15	6" DISCHARGE VALVE 3	L15	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	1	1.5
16	6" DISCHARGE VALVE 4	L16	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	1	1.5
17	4" DISCHARGE VALVE 5	L17	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	1	1.5
18	AIR RELEASE VALVE 1	L18	VALVE	ACTIVE			4	1985	40	1	5	1	3	4	5	1.5
19	AIR RELEASE VALVE 2	L19	VALVE	ACTIVE			4	1985	40	1	5	1	3	4	5	3.25
20	AIR RELEASE VALVE 3	L20	VALVE	ACTIVE			4	1985	40	1	5	1	3	4	5	3.25
21	AIR RELEASE VALVE 4	L21	VALVE	ACTIVE			4	1985	40	1	5	1	3	4	5	3.25
22	AIR RELEASE VALVE 5	L22	VALVE	ACTIVE			3	1985	40	1	5	1	3	3	5	3.25
23	AIR RELEASE VALVE 6	L23	VALVE	ACTIVE			3	1985	40	1	5	1	3	3	5	3
24	WET WELL STRUCTURE	L24	STRUCTURE	ACTIVE			4	1985	50	11	5	1	1	3	5	3
25	SWITCH PANEL AND ALARM	L25	ELECTRICAL	ACTIVE		Visual inspection in sound condition.	3	1985	12	-27	2	1	1	4	5	2.5
26	BAR SCREEN 1	P1	SCREEN	ACTIVE	Bar Screen for Imhoff 2 & 3	Operator rakes "several" times a day, more than 3-times a day. Operator rakes into bucket and drop chute on other end of tank. Shows signs of corrosion.	3	1985	20	-19	5	1	1	4	3	2.75
27	BAR SCREEN 2	P2	SCREEN	ACTIVE	Bar Screen for Imhoff 2 & 3	Operator rakes "several" times a day, more than 3-times a day. Operator rakes into bucket and drop chute on other end of tank. Shows signs of corrosion.	3	1985	20	-19	5	1	1	4	3	2.25
28	BAR SCREEN 3 (IMHOFF 1)	P3	SCREEN	ACTIVE	Bar Screen for Imhoff 1		3	1985	20	-19	5	1	1	4	3	2.25
29	SLIDE WEIR GATE 1	P4	GATE	ACTIVE		Plate is in sound condition.	3	1985	20	-19	5	1	1	3	3	2.25
30	SLIDE WEIR GATE 2	P5	GATE	ACTIVE		Plate is in sound condition.	3	1985	20	-19	5	1	1	3	3	2
31	SLIDE WEIR GATE 3	P6	GATE	INACTIVE	Gate not used, it is installed as splitter for future Imhoff Tank	Plate is in sound condition.	3	1985	20	-19	5	1	1	3	3	2
32	SLIDE WEIR GATE 4 (IMHOFF 1)	P7	GATE	ACTIVE	Slide Weir for Imhoff 1	Plate is in sound condition.	3	1985	20	-19	5	1	1	3	3	2
33	4" SLUDGE VALVE	P8	VALVE	ACTIVE	Plug valve from RAS pumps after clarifiers. Operated with long stem and arm.		3	1985	40	1	5	1	1	3	5	2
34	BASIN STRUCTURE	P9	STRUCTURE	ACTIVE			4	1985	50	11	5	3	1	3	5	2.5
35	GAS VENT CHANNELS	P10	STRUCTURE	ACTIVE		Visual inspection shows channel is in fair condition.	3	1985	50	11	2	3	1	3	3	3
36	SETTLING CHANNELS	P11	STRUCTURE	ACTIVE		Visual inspection shows channel is in fair condition.	3	1985	50	11	2	3	1	3	3	2.5
37	WALKWAY GRATING	P12	GENERAL	ACTIVE	Partial Metal and Fiberglass Grating	Grating shows signs of corrosion, grate plate spacing makes walkway unsafe.	3	1985	30	-9	2	1	1	3	3	2.5
38	HAND RAILS	P13	GENERAL	ACTIVE		Rails are in sound condition.	2	1985	30	-9	5	1	1	3	3	2
39	STAIRS	P14	GENERAL	ACTIVE		Stairs are in sound condition.	2	1985	30	-9	5	1	1	3	3	2
40	8" SLUDGE VALVE	P15	VALVE	ACTIVE	Valve cap, buried Isolation valve from tank to sludge beds		3	1985	40	1	5	1	1	3	5	2
41	8" SLUDGE VALVE	P16	VALVE	ACTIVE	Valve cap, buried Isolation valve from tank to sludge beds		3	1985	40	1	5	1	1	3	5	2.5
42	10" EFFLUENT VALVE	P17	VALVE	ACTIVE	Isolation from Imhoff to Splitter Box	Gate valve with long stem and handwheel	2	1985	40	1	5	1	1	3	5	2.5
43	BASIN STRUCTURE	P18	STRUCTURE	ACTIVE		Concrete exterior walls shows major cracks and exposed aggregate in some areas.	4	1985	50	11	5	3	1	5	3	2.5
44	GAS VENT CHANNELS	P19	STRUCTURE	ACTIVE		Visual inspection shows channel is in fair condition.	3	1985	50	11	2	3	1	3	3	3
45	SETTLING CHANNELS	P20	STRUCTURE	ACTIVE		Visual inspection shows channel is in fair condition.	3	1985	50	11	2	3	1	3	3	2.5
46	WALKWAY GRATING	P21	GENERAL	ACTIVE	Partial Metal and Fiberglass Grating	Grate is in sound condition.	2	1985	30	-9	2	1	1	3	3	2.5
47	HAND RAILS	P22	GENERAL	ACTIVE			2	1985	30	-9	5	1	1	3	3	2
48	8" SLUDGE VALVE	P23	VALVE	ACTIVE	Valve cap, buried Isolation valve from tank to sludge beds		3	1985	40	1	5	1	1	3	5	2
49	8" SLUDGE VALVE	P24	VALVE	ACTIVE	Valve cap, buried Isolation valve from tank to sludge beds		3	1985	40	1	5	1	1	3	5	2.5
50	10" EFFLUENT VALVE	P25	VALVE	ACTIVE	Isolation from Imhoff to Splitter Box	Gate valve with long stem and handwheel	2	1985	40	1	5	1	1	3	5	2.5
51	BASIN STRUCTURE	P26	STRUCTURE	ACTIVE		Concrete exterior walls shows major cracks and exposed aggregate in some areas.	3	1985	50	11	5	3	1	5	3	2.5
52	GAS VENT CHANNELS	P27	STRUCTURE	ACTIVE		Visual inspection shows channel is in fair condition.	3	1985	50	11	2	3	1	3	3	3
53	SETTLING CHANNELS	P28	STRUCTURE	ACTIVE		Visual inspection shows channel is in fair condition.	3	1985	50	11	2	3	1	3	3	2.5
54	WALKWAY GRATING	P29	GENERAL	ACTIVE	Metal grating	Grate is in sound condition.	2	1985	30	-9	2	1	1	3	3	2.5
55	HAND RAILS	P30	GENERAL	ACTIVE		Rails are in sound condition.	2	1985	30	-9	5	1	1	3	3	2
56	8" SLUDGE VALVE & CLEANOUT	P31	VALVE	ACTIVE	Valve cap, buried Isolation valve from tank to sludge beds	Condition unknown.	3	1985	40	1	5	1	1	3	5	2
57	8" SLUDGE VALVE & CLEANOUT	P32	VALVE	ACTIVE	Valve cap, buried Isolation valve from tank to sludge beds	Condition unknown.	3	1985	40	1	5	1	1	3	5	2.5
58	8" SLUDGE VALVE & CLEANOUT	P33	VALVE	ACTIVE	Valve cap, buried Isolation valve from tank to sludge beds	Condition unknown.	3	1985	40	1	5	1	1	3	5	2.5
59	8" SLUDGE VALVE & CLEANOUT	P34	VALVE	ACTIVE	Valve cap, buried Isolation valve from tank to sludge beds	Condition unknown.	3	1985	40	1	5	1	1	3	5	2.5
60	BASIN STRUCTURE	P35	STRUCTURE	ACTIVE		Concrete exterior walls shows major cracks and exposed aggregate in some areas.	4	1985	50	11	5	3	1	5	3	2.5
61	SLIDE GATE 1	P36	GATE	ACTIVE	Weir from Splitter Box to Trickling Filter No. 1	Slide plate is in sound condition. Slide gate is removed during inspection.	2	1985	20	-19	2	1	1	3	3	3
62	SLIDE GATE 2	P37	GATE	ACTIVE	Weir from Splitter Box to Trickling Filter No. 2	Slide plate is in sound condition. Slide gate is removed during inspection.	2	1985	20	-19	5	1	1	3	3	2

Appendix D
Detailed WWTP Asset Inventory and Condition Rating

ASSET NUMBER	ASSET	LEVEL OF SERVICE REQUIRED	PERMIT COMPLIANCE	HEALTH & SAFETY	SYSTEM DISRUPTIONS	COF	CRITICALITY	PRIORITY RATING	ROUNDED PRIORITY RATING
1	INFLUENT PUMP 1	3	2	1	1	1.75	1.4	0.672	4
2	INFLUENT PUMP 2	3	2	1	1	1.75	1.4	0.672	1
3	INFLUENT PUMP 3	3	2	1	1	1.75	1.4	0.672	1
4	INFLUENT PUMP 4	3	2	1	1	1.75	1.4	0.672	1
5	DISCONNECT SWITCH 1	3	2	1	1	1.75	1.75	1.68	2
6	DISCONNECT SWITCH 2	3	2	1	1	1.75	1.4	1.008	1
7	DISCONNECT SWITCH 3	2	2	1	1	1.75	1.4	1.008	1
8	DISCONNECT SWITCH 4	2	2	1	1	1.5	1.5	1.08	1
9	4" CHECK VALVE 1	3	2	1	3	1.5	1.5	1.08	1
10	4" CHECK VALVE 2	3	2	1	3	2.25	2.25	2.7	3
11	6" CHECK VALVE 3	3	2	1	3	2.25	2.25	2.7	3
12	6" CHECK VALVE 4	3	2	1	3	2.25	1.35	0.648	1
13	4" DISCHARGE VALVE 1	3	2	1	3	2.25	1.35	0.648	1
14	4" DISCHARGE VALVE 2	3	2	1	3	2.25	1.35	0.972	1
15	6" DISCHARGE VALVE 3	3	2	1	3	2.25	1.35	0.972	1
16	6" DISCHARGE VALVE 4	3	2	1	3	2.25	1.35	0.972	1
17	4" DISCHARGE VALVE 5	3	2	1	3	2.25	1.35	0.972	1
18	AIR RELEASE VALVE 1	2	2	1	1	2.25	1.35	0.972	1
19	AIR RELEASE VALVE 2	2	2	1	1	1.5	1.95	1.872	2
20	AIR RELEASE VALVE 3	2	2	1	1	1.5	1.95	1.872	2
21	AIR RELEASE VALVE 4	2	2	1	1	1.5	1.95	1.872	2
22	AIR RELEASE VALVE 5	2	2	1	1	1.5	1.95	1.872	2
23	AIR RELEASE VALVE 6	2	2	1	1	1.5	1.8	1.296	1
24	WET WELL STRUCTURE	5	4	3	2	1.5	1.8	1.296	1
25	SWITCH PANEL AND ALARM	3	2	4	1	3.5	3.5	3.36	3
26	BAR SCREEN 1	2	2	2	1	2.5	2.75	1.98	2
27	BAR SCREEN 2	2	2	2	1	1.75	1.575	1.134	1
28	BAR SCREEN 3 (IMHOFF 1)	2	2	2	1	1.75	1.575	1.134	1
29	SLIDE WEIR GATE 1	2	2	2	1	1.75	1.575	1.134	1
30	SLIDE WEIR GATE 2	2	2	2	1	1.75	1.4	1.008	1
31	SLIDE WEIR GATE 3	2	2	2	1	1.75	1.4	1.008	1
32	SLIDE WEIR GATE 4 (IMHOFF 1)	2	2	2	1	1.75	1.4	1.008	1
33	4" SLUDGE VALVE	2	2	1	2	1.75	1.4	1.008	1
34	BASIN STRUCTURE	5	3	2	3	1.75	1.75	1.26	1
35	GAS VENT CHANNELS	5	2	2	1	3.25	3.9	3.744	4
36	SETTLING CHANNELS	5	2	2	1	2.5	2.5	1.8	2
37	WALKWAY GRATING	2	1	5	1	2.5	2.5	1.8	2
38	HAND RAILS	2	1	5	1	2.25	1.8	1.296	1
39	STAIRS	2	1	5	1	2.25	1.8	0.864	1
40	8" SLUDGE VALVE	3	2	1	1	2.25	1.8	0.864	1
41	8" SLUDGE VALVE	3	2	1	1	1.75	1.75	1.26	1
42	10" EFFLUENT VALVE	3	2	1	1	1.75	1.75	1.26	1
43	BASIN STRUCTURE	5	5	1	3	1.75	1.75	0.84	1
44	GAS VENT CHANNELS	5	2	2	1	3.5	4.2	4.032	4
45	SETTLING CHANNELS	5	2	2	1	2.5	2.5	1.8	2
46	WALKWAY GRATING	2	1	5	1	2.5	2.5	1.8	2
47	HAND RAILS	2	1	5	1	2.25	1.8	0.864	1
48	8" SLUDGE VALVE	3	2	1	1	2.25	1.8	0.864	1
49	8" SLUDGE VALVE	3	2	1	1	1.75	1.75	1.26	1
50	10" EFFLUENT VALVE	3	2	1	1	1.75	1.75	1.26	1
51	BASIN STRUCTURE	5	5	1	3	1.75	1.75	0.84	1
52	GAS VENT CHANNELS	5	2	2	1	3.5	4.2	3.024	3
53	SETTLING CHANNELS	5	2	2	1	2.5	2.5	1.8	2
54	WALKWAY GRATING	2	1	5	1	2.5	2.5	1.8	2
55	HAND RAILS	2	1	5	1	2.25	1.8	0.864	1
56	8" SLUDGE VALVE & CLEANOUT	3	2	1	1	2.25	1.8	0.864	1
57	8" SLUDGE VALVE & CLEANOUT	3	2	1	1	1.75	1.75	1.26	1
58	8" SLUDGE VALVE & CLEANOUT	3	2	1	1	1.75	1.75	1.26	1
59	8" SLUDGE VALVE & CLEANOUT	3	2	1	1	1.75	1.75	1.26	1
60	BASIN STRUCTURE	5	5	1	3	1.75	1.75	1.26	1
61	SLIDE GATE 1	2	2	2	1	3.5	4.2	4.032	4
62	SLIDE GATE 2	2	2	2	1	1.75	1.4	0.672	1

Appendix D
Detailed WWTP Asset Inventory and Condition Rating

ASSET NUMBER	ASSET	ASSET ID	CLASS	STATUS	GENERAL NOTES	FIELD NOTES	CONDITION RATING	INSTALL DATE	ESTIMATED LIFE EXPECTANCY	ERUL	REMAINING ASSET LIFE RATING	CAPACITY	RELIABILTY	OBSOLESCENCE	REDUNDANCY	LOF
63	SLIDE GATE 3	P38	GATE	INACTIVE	Gate not used, it is installed as splitter for future trickling filter no. 3.	Plate is in sound condition.	2	1985	20	-19	5	1	1	3	3	2
64	TRASH DROP CHUTE	P39	GENERAL	ACTIVE		Chute in sound condition.	3	1985	30	-9	5	3	1	4	4	2
65	METAL WALKWAY GRATING	P40	GENERAL	ACTIVE		Grate is in sound condition.	2	1985	30	-9	5	1	1	3	3	3
66	HAND RAILS	P41	GENERAL	ACTIVE		Rails are in sound condition.	2	1985	30	-9	5	1	1	3	3	2
67	BASIN STRUCTURE	P42	STRUCTURE	ACTIVE		Visual inspection shows basin wall is in fair condition.	3	1985	50	11	5	3	1	5	3	2
68	FILTER DRIVE MECHANISM	S1	MECHANICAL	ACTIVE		Operator notes bearings in drive may need replacement.	3	1985	15	-24	2	1	3	3	5	3
69	SPREADER ARM	S2	MECHANICAL	ACTIVE		Operator notes nozzles clogs frequently.	3	1985	15	-24	5	1	3	3	5	3
70	FILTER MEDIA	S3	MECHANICAL	ACTIVE		Rock media may need backwashing?	3	1985	15	-24	5	1	1	3	5	3
71	LADDER	S4	GENERAL	ACTIVE		Ladder in sound condition.	2	1985	30	-9	5	1	1	3	5	3
72	BASIN STRUCTURE	S5	STRUCTURE	ACTIVE		Concrete exterior is defective with cracks and holes that need to be repaired. Operator notes that hole causes leakage from Trickling Filter.	4	1985	50	11	5	3	3	3	3	2.5
73	FILTER DRIVE MECHANISM	S6	MECHANICAL	ACTIVE		Operator notes bearings in drive may need replacement.	4	1985	15	-24	2	1	3	3	5	3
74	SPREADER ARM	S7	MECHANICAL	ACTIVE		Operator notes nozzles clogs frequently.	4	1985	15	-24	5	1	3	3	5	3
75	14" VENT PIPE	S8	GENERAL	ACTIVE	Green DIP with screen, Vents for botttom of filters.	Vent pipes are in sound condition.	2	1985	30	-9	5	1	1	3	1	3
76	14" VENT PIPE	S9	GENERAL	ACTIVE	Green DIP with screen, Vents for botttom of filters.	Vent pipes are in sound condition.	2	1985	30	-9	5	1	1	3	1	1.5
77	FILTER MEDIA	S10	MECHANICAL	ACTIVE		Rock media may need backwashing?	3	1985	15	-24	5	1	1	3	5	1.5
78	LADDER	S11	GENERAL	ACTIVE		Ladder in sound condition.	2	1985	30	-9	5	1	1	3	5	3
79	BASIN STRUCTURE	S12	STRUCTURE	ACTIVE		Concrete exterior walls shows major cracks and exposed aggregate in some areas.	4	1985	50	11	5	3	3	3	3	2.5
80	DRIVE MECHANISM	C1	MECHANICAL	ACTIVE		Operator notes bearings in drive may need replacement.	3	1985	15	-24	2	1	3	3	5	3
81	SKIMMER ARMS	C2	MECHANICAL	ACTIVE		Visual inspection shows arm is in sound condition.	3	1985	15	-24	5	1	1	3	5	3
82	SWITCH PANEL AND ALARM	C3	ELECTRICAL	ACTIVE		Visual inspection in sound condition.	3	1985	12	-27	5	1	1	4	5	2.5
83	WEIRS	C4	MECHANICAL	ACTIVE		Weir is in sound condition. Signs of algae growth and scum on the exterior ring.	2	1985	40	1	5	1	1	3	3	2.75
84	METAL WALKWAY GRATING	C5	GENERAL	ACTIVE		Grate is in sound condition.	2	1985	30	-9	4	1	1	3	3	2
85	HAND RAILS	C6	GENERAL	ACTIVE		Rails are in sound condition.	2	1985	30	-9	5	1	1	3	3	2
86	BASIN STRUCTURE	C7	STRUCTURE	ACTIVE		Walls are in sound condition.	2	1985	50	11	5	3	1	3	3	2
87	DRIVE MECHANISM	C8	MECHANICAL	ACTIVE		Operator notes bearings in drive may need replacement.	3	1985	15	-24	2	1	3	3	5	2.5
88	SKIMMER ARMS	C9	MECHANICAL	ACTIVE		Visual inspection shows arm is in sound condition.	2	1985	15	-24	5	1	1	3	5	3
89	SWITCH PANEL AND ALARM	C10	ELECTRICAL	ACTIVE		Visual inspection in sound condition.	3	1985	12	-27	5	1	1	4	5	2.5
90	WEIRS	C11	MECHANICAL	ACTIVE		Weir is in sound condition. Signs of algae growth and scum on the exterior ring.	2	1985	40	1	5	1	1	3	3	2.75
91	METAL WALKWAY GRATING	C12	GENERAL	ACTIVE		Grate is in sound condition.	2	1985	30	-9	4	1	1	3	3	2
92	HAND RAILS	C13	GENERAL	ACTIVE		Rails are in sound condition.	2	1985	30	-9	5	1	1	3	3	2
93	BASIN STRUCTURE	C14	STRUCTURE	ACTIVE		Walls are in sound condition.	2	1985	50	11	5	3	1	3	3	2
94	SCUM PUMP 1	C15	MECHANICAL	ACTIVE	Pumps are below grade inside concrete vault. Submersible Pumps to manhole to flow into influent LS wet well.	Pumps are in sound condition according to operator. No on site equipment to lift pump.	3	1985	10	-29	2	1	1	3	2	2.5
95	SCUM PUMP 2	C16	MECHANICAL	ACTIVE	Pumps are below grade inside concrete vault. Submersible Pumps to manhole to flow into influent LS wet well.	Pumps are in sound condition according to operator. No on site equipment to lift pump.	3	1985	10	-29	5	1	1	3	2	1.75
96	4" SUCTION VALVE 1	C17	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	1.75
97	4" SUCTION VALVE 2	C18	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
98	4" SUCTION VALVE 3	C19	VALVE	ACTIVE		Valve looks to be recently replaced.	2	1985	40	1	5	1	1	3	5	2.5
99	4" DISCHARGE VALVE 1	C20	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
100	4" DISCHARGE VALVE 2	C21	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
101	4" CHECK VALVE 1	C22	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
102	4" CHECK VALVE 2	C23	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
103	LADDER	C24	VALVE	ACTIVE		Ladder in sound condition.	2	1985	40	1	5	1	1	3	5	2.5
104	BASIN STRUCTURE	C25	STRUCTURE	ACTIVE		Walls are in sound condition but show signs of being submerged.	3	1985	50	11	5	1	1	3	5	2.5
105	RECIRCULATION PUMP 1	C26	MECHANICAL	ACTIVE	Pumps from clarifier outer ring chamber to Splitter Box.	Pumps are in sound condition according to operator.	2	1985	10	-29	2	1	1	3	2	2.5
106	RECIRCULATION PUMP 2	C27	MECHANICAL	ACTIVE	Pumps from clarifier outer ring chamber to Splitter Box.	Pumps are in sound condition according to operator.	2	1985	10	-29	5	1	1	3	2	1.75
107	6" CHECK VALVE 1	C28	VALVE	ACTIVE		Check valve shows corrosion and age.	4	1985	40	1	5	1	1	3	5	1.75
108	6" CHECK VALVE 2	C29	VALVE	ACTIVE		Check valve shows corrosion and age.	4	1985	40	1	5	1	1	3	5	2.5
109	6" DISCHARGE VALVE 1	C30	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
110	6" DISCHARGE VALVE 2	C31	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
111	AIR RELEASE VALVE	C32	VALVE	ACTIVE			3	1985	40	1	5	1	3	4	5	2.5
112	DISCONNECT SWITCH 1	C33	ELECTRICAL	ACTIVE			3	1985	12	-27	5	1	1	4	5	3.25
113	DISCONNECT SWITCH 2	C34	ELECTRICAL	ACTIVE			3	1985	12	-27	5	1	1	4	5	2.75
114	RETURN SLUDGE PUMP 1	C35	MECHANICAL	ACTIVE	Pumps from clarifier bottom to Headworks Chamber area. This was originally an influent LS that was converted to sludge basin.		3	1985	10	-29	5	1	1	3	2	2.75
115	RETURN SLUDGE PUMP 2	C36	MECHANICAL	ACTIVE	Pumps from clarifier bottom to Headworks Chamber area. This was originally an influent LS that was converted to sludge basin.		3	1985	10	-29	5	1	1	3	2	1.75
116	4" CHECK VALVE 1	C37	VALVE	ACTIVE		Check valve looks new and sound condition.	2	1985	40	1	5	1	1	3	5	1.75
117	4" CHECK VALVE 2	C38	VALVE	ACTIVE		Check valve looks new and sound condition.	2	1985	40	1	5	1	1	3	5	2.5

ASSET NUMBER	ASSET	LEVEL OF SERVICE REQUIRED	PERMIT COMPLIANCE	HEALTH & SAFETY	SYSTEM DISRUPTIONS	COF	CRITICALITY	PRIORITY RATING	ROUNDED PRIORITY RATING
63	SLIDE GATE 3	2	2	2	1	1.75	1.4	0.672	1
64	TRASH DROP CHUTE	2	1	2	1	1.75	1.4	0.672	1
65	METAL WALKWAY GRATING	2	1	5	1	1.5	1.8	1.296	1
66	HAND RAILS	2	1	5	1	2.25	1.8	0.864	1
67	BASIN STRUCTURE	5	5	1	3	2.25	1.8	0.864	1
68	FILTER DRIVE MECHANISM	4	4	1	3	3.5	4.2	3.024	3
69	SPREADER ARM	4	4	1	3	3	3.6	2.592	3
70	FILTER MEDIA	4	4	1	3	3	3.6	2.592	3
71	LADDER	2	1	3	1	3	3.6	2.592	3
72	BASIN STRUCTURE	5	5	1	2	1.75	1.75	0.84	1
73	FILTER DRIVE MECHANISM	4	4	1	3	3.25	3.9	3.744	4
74	SPREADER ARM	4	4	1	3	3	3.6	3.456	3
75	14" VENT PIPE	2	2	1	1	3	3.6	3.456	3
76	14" VENT PIPE	2	2	1	1	1.5	0.9	0.432	0
77	FILTER MEDIA	4	4	1	3	1.5	0.9	0.432	0
78	LADDER	2	1	3	1	3	3.6	2.592	3
79	BASIN STRUCTURE	5	5	1	2	1.75	1.75	0.84	1
80	DRIVE MECHANISM	4	4	1	3	3.25	3.9	3.744	4
81	SKIMMER ARMS	4	3	1	3	3	3.6	2.592	3
82	SWITCH PANEL AND ALARM	3	2	4	1	2.75	2.75	1.98	2
83	WEIRS	4	2	1	1	2.5	2.75	1.98	2
84	METAL WALKWAY GRATING	2	1	5	1	2	1.6	0.768	1
85	HAND RAILS	2	1	5	1	2.25	1.8	0.864	1
86	BASIN STRUCTURE	5	5	1	5	2.25	1.8	0.864	1
87	DRIVE MECHANISM	4	4	1	3	4	4	1.92	2
88	SKIMMER ARMS	4	3	1	3	3	3.6	2.592	3
89	SWITCH PANEL AND ALARM	3	2	4	1	2.75	2.75	1.32	1
90	WEIRS	4	2	1	1	2.5	2.75	1.98	2
91	METAL WALKWAY GRATING	2	1	5	1	2	1.6	0.768	1
92	HAND RAILS	2	1	5	1	2.25	1.8	0.864	1
93	BASIN STRUCTURE	5	5	1	5	2.25	1.8	0.864	1
94	SCUM PUMP 1	4	3	1	2	4	4	1.92	2
95	SCUM PUMP 2	4	3	1	2	2.5	1.75	1.26	1
96	4" SUCTION VALVE 1	2	2	1	1	2.5	1.75	1.26	1
97	4" SUCTION VALVE 2	2	2	1	1	1.5	1.5	1.08	1
98	4" SUCTION VALVE 3	2	2	1	1	1.5	1.5	1.08	1
99	4" DISCHARGE VALVE 1	2	2	1	1	1.5	1.5	0.72	1
100	4" DISCHARGE VALVE 2	2	2	1	1	1.5	1.5	1.08	1
101	4" CHECK VALVE 1	2	2	1	1	1.5	1.5	1.08	1
102	4" CHECK VALVE 2	2	2	1	1	1.5	1.5	1.08	1
103	LADDER	2	1	3	1	1.5	1.5	1.08	1
104	BASIN STRUCTURE	4	1	1	3	1.75	1.75	0.84	1
105	RECIRCULATION PUMP 1	4	3	1	3	2.25	2.25	1.62	2
106	RECIRCULATION PUMP 2	4	3	1	3	2.75	1.925	0.924	1
107	6" CHECK VALVE 1	2	2	1	1	2.75	1.925	0.924	1
108	6" CHECK VALVE 2	2	2	1	1	1.5	1.5	1.44	1
109	6" DISCHARGE VALVE 1	2	2	1	1	1.5	1.5	1.44	1
110	6" DISCHARGE VALVE 2	2	2	1	1	1.5	1.5	1.08	1
111	AIR RELEASE VALVE	2	2	1	1	1.5	1.5	1.08	1
112	DISCONNECT SWITCH 1	3	2	4	1	1.5	1.95	1.404	1
113	DISCONNECT SWITCH 2	3	2	4	1	2.5	2.75	1.98	2
114	RETURN SLUDGE PUMP 1	4	3	1	4	2.5	2.75	1.98	2
115	RETURN SLUDGE PUMP 2	4	3	1	4	3	2.1	1.512	2
116	4" CHECK VALVE 1	2	2	1	1	3	2.1	1.512	2
117	4" CHECK VALVE 2	2	2	1	1	1.5	1.5	0.72	1

Appendix D
Detailed WWTP Asset Inventory and Condition Rating

ASSET NUMBER	ASSET	ASSET ID	CLASS	STATUS	GENERAL NOTES	FIELD NOTES	CONDITION RATING	INSTALL DATE	ESTIMATED LIFE EXPECTANCY	ERUL	REMAINING ASSET LIFE RATING	CAPACITY	RELIABILTY	OBSOLESCENCE	REDUNDANCY	LOF
118	DISCONNECT SWITCH 1	C39	ELECTRICAL	ACTIVE			3	1985	12	-27	5	1	1	4	5	2.5
119	DISCONNECT SWITCH 2	C40	ELECTRICAL	ACTIVE			3	1985	12	-27	5	1	1	4	5	2.75
120	BASIN STRUCTURE	C41	STRUCTURE	ACTIVE			3	1985	50	11	5	1	1	3	5	2.75
121	WOODEN BAFFLES	D1	GENERAL	ACTIVE		Wooden baffles may need replacement.	3	1985	30	-9	2	1	1	4	3	2.5
122	6" DRAIN VALVE	D2	VALVE	ACTIVE	Valve is buried, stem head is surrounded by plastic pipe below grade.		3	1985	40	1	5	1	1	3	5	2
123	6" DRAIN VALVE	D3	VALVE	ACTIVE	Valve is buried, stem head is surrounded by plastic pipe below grade.		3	1985	40	1	5	1	1	3	5	2.5
124	6" DRAIN VALVE	D4	VALVE	ACTIVE	Valve is buried, stem head is surrounded by plastic pipe below grade.		3	1985	40	1	5	1	1	3	5	2.5
125	HAND RAILS	D5	GENERAL	ACTIVE		Rails are in sound condition.	2	1985	30	-9	5	1	1	3	3	2.5
126	BASIN STRUCTURE	D6	STRUCTURE	ACTIVE		Minimal cracks and sound condition.	2	1985	50	11	5	1	1	3	3	2
127	BAFFLES	D7	GENERAL	ACTIVE			2	1985	30	-9	2	1	1	4	3	2
128	HAND RAILS	D8	GENERAL	ACTIVE		Rails are in sound condition.	2	1985	30	-9	2	1	1	3	3	2
129	BASIN STRUCTURE	D9	STRUCTURE	ACTIVE			2	1985	50	11	2	1	1	3	3	2
130	CHLORINATOR SYSTEM	D10	EQUIPMENT	ACTIVE		Chlorinator system is in sound condition. No issues noted.	2	1985	30	-9	2	1	1	3	3	1.75
131	CHLORINE CYLINDER SCALES	D11	EQUIPMENT	ACTIVE		Scales are in sound condition.	3	1985	30	-9	5	1	1	3	3	2
132	LOUVRES	D12	GENERAL	ACTIVE		Vents in sound condition.	3	1985	30	-9	5	1	1	3	1	2
133	BUILDING STRUCTURE	D13	STRUCTURE	ACTIVE		CMU building in sound condition.	2	1985	50	11	5	1	1	3	5	1.5
134	SLUDGE DRYING BED 1 STRUCTURE	B1	STRUCTURE	ACTIVE	Operator notes they remove once a year.	Concrete in sound condition.	2	1985	50	11	2	1	1	3	2	2.5
135	SLUDGE DRYING BED 2 STRUCTURE	B2	STRUCTURE	ACTIVE	Operator notes they remove once a year.	Concrete in sound condition.	2	1985	50	11	2	1	1	3	2	1.75
136	SLUDGE DRYING BED 3 STRUCTURE	B3	STRUCTURE	ACTIVE	Operator notes they remove once a year.	Concrete in sound condition.	2	1985	50	11	2	1	1	3	2	1.75
137	SLUDGE DRYING BED 4 STRUCTURE	B4	STRUCTURE	ACTIVE	Operator notes they remove once a year.	Concrete in sound condition.	2	1985	50	11	2	1	1	3	2	1.75
138	8" SHEAR VALVE 1	B5	VALVE	ACTIVE			3	1985	40	1	2	1	1	3	5	1.75
139	8" SHEAR VALVE 2	B6	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
140	8" SHEAR VALVE 3	B7	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
141	8" SHEAR VALVE 4	B8	VALVE	ACTIVE			3	1985	40	1	5	1	1	3	5	2.5
142	MCC	F1	ELECTRICAL	ACTIVE			2	1985	12	-27	5	1	1	3	5	2.5
143	RECORDER & FLOWMETER INTERFACE	F2	EQUIPMENT	ACTIVE	Flow recorder & electronic flow meter	Recorder is in sound condition.	1	2022	30	28	5	1	1	3	5	2.5
144	BUILDING STRUCTURE	F3	STRUCTURE	ACTIVE		Building is in sound condition.	2	1985	50	11	1	1	1	3	5	2.5
145	V-NOTCH WEIR	F4	GENERAL	ACTIVE		weir in sound condition.	2	1985	30	-9	2	1	1	3	5	2.5
146	FLOWMETER	F5	EQUIPMENT	ACTIVE		Ultrasonic flowmeter is in sound condition.	2	2022	10	8	5	1	1	3	5	2.5
147	BASIN STRUCTURE	F6	STRUCTURE	ACTIVE		Concrete in sound condition.	2	1985	50	11	2	1	1	3	3	2.5
148	BLOWER 1	F7	MECHANICAL	ACTIVE	Blowers used to aerated the CCBs.	Blower recently replaced.	1	1985	10	-29	2	1	1	3	3	2
149	BLOWER 2	F8	MECHANICAL	ACTIVE	Blowers used to aerated the CCBs.		3	1985	10	-29	5	1	1	3	3	2
150	OVERHEAD CANOPY/SLAB	F9	EQUIPMENT	ACTIVE		Canopy needs painting but in sound condition.	3	1985	30	-9	5	1	1	3	5	2
151	GENERATOR	F10	EQUIPMENT	ACTIVE		Diesel generator in sound condition.	2	1985	20	-19	5	3	1	3	5	2.5
152	FENCE & GATE	F11	GENERAL	ACTIVE		Fence & Gate in sound condition.	2	1985	30	-9	5	1	1	3	5	3
153	SITE LIGHTING	F12	GENERAL	ACTIVE		Site lighting is in sound condition.	3	1985	30	-9	5	1	1	3	5	2.5

ASSET NUMBER	ASSET	LEVEL OF SERVICE REQUIRED	PERMIT COMPLIANCE	HEALTH & SAFETY	SYSTEM DISRUPTIONS	COF	CRITICALITY	PRIORITY RATING	ROUNDED PRIORITY RATING
118	DISCONNECT SWITCH 1	3	2	4	1	1.5	1.5	0.72	1
119	DISCONNECT SWITCH 2	3	2	4	1	2.5	2.75	1.98	2
120	BASIN STRUCTURE	3	2	1	3	2.5	2.75	1.98	2
121	WOODEN BAFFLES	1	2	1	1	2.25	2.25	1.62	2
122	6" DRAIN VALVE	3	2	1	1	1.25	1	0.72	1
123	6" DRAIN VALVE	3	2	1	1	1.75	1.75	1.26	1
124	6" DRAIN VALVE	3	2	1	1	1.75	1.75	1.26	1
125	HAND RAILS	2	1	5	1	1.75	1.75	1.26	1
126	BASIN STRUCTURE	5	5	2	5	2.25	1.8	0.864	1
127	BAFFLES	1	2	1	1	3.5	2.8	1.344	1
128	HAND RAILS	2	1	5	1	1.25	1	0.48	0
129	BASIN STRUCTURE	5	5	2	5	2.25	1.8	0.864	1
130	CHLORINATOR SYSTEM	3	5	1	5	3.5	2.45	1.176	1
131	CHLORINE CYLINDER SCALES	2	2	1	1	3.5	2.8	1.344	1
132	LOUVRES	2	1	5	1	1.5	1.2	0.864	1
133	BUILDING STRUCTURE	5	1	1	1	2.25	1.35	0.972	1
134	SLUDGE DRYING BED 1 STRUCTURE	3	3	1	1	2	2	0.96	1
135	SLUDGE DRYING BED 2 STRUCTURE	3	3	1	1	2	1.4	0.672	1
136	SLUDGE DRYING BED 3 STRUCTURE	3	3	1	1	2	1.4	0.672	1
137	SLUDGE DRYING BED 4 STRUCTURE	3	3	1	1	2	1.4	0.672	1
138	8" SHEAR VALVE 1	3	2	1	1	2	1.4	0.672	1
139	8" SHEAR VALVE 2	3	2	1	1	1.75	1.75	1.26	1
140	8" SHEAR VALVE 3	3	2	1	1	1.75	1.75	1.26	1
141	8" SHEAR VALVE 4	3	2	1	1	1.75	1.75	1.26	1
142	MCC	3	2	1	5	1.75	1.75	1.26	1
143	RECORDER & FLOWMETER INTERFACE	2	3	1	3	2.75	2.75	1.32	1
144	BUILDING STRUCTURE	5	1	1	1	2.25	2.25	0.54	1
145	V-NOTCH WEIR	2	3	1	5	2	2	0.96	1
146	FLOWMETER	2	3	1	5	2.75	2.75	1.32	1
147	BASIN STRUCTURE	5	5	2	5	2.75	2.75	1.32	1
148	BLOWER 1	2	3	1	5	4.25	3.4	1.632	2
149	BLOWER 2	2	3	1	5	2.75	2.2	0.528	1
150	OVERHEAD CANOPY/SLAB	5	1	1	1	2.75	2.2	1.584	2
151	GENERATOR	3	3	2	1	2	2	1.44	1
152	FENCE & GATE	3	1	3	1	2.25	2.7	1.296	1
153	SITE LIGHTING	3	1	3	1	2	2	0.96	1

WASTEWATER TREATMENT PLANT SITE PHOTOGRAPHS

A.1 Site Pictures

The following pictures were taken during the field visit in February 2023.

Influent System (On-Site Lift Station "LS No. 1")

Lift Station Area (Overall View)

Lift Station Area (Overall View 2), Wet Well Cover

Inside Wet Well 1

Inside Wet Well 2

Lift Station Tarp Cover

Lift Station Controls

Air Release Valves and Check Valves

Pump 4

Primary Treatment (Headworks and Imhoff Tanks 1, 2, & 3)

Bar Screens 1 & 2 (Imhoff Tank 2)

Walkway to Bar Screens (Imhoff Tank 2)

Walkways/Handrails on Top of Imhoff 2 & 3

Walkways/Handrails on Top of Imhoff 2 & 3

Influent and Return Sludge Valve (Bar Screens)

Walkway/Handrails to Imhoff Tank 1

Imhoff Tank 1 (Bar Screen 3, far side view)

Influent and Return Sludge Valve (Bar Screens)

Headworks/Imhoff 2 & 3 Basin Structure

Walkway/Handrails to Imhoff Tank 1

Imhoff Tank 1 (Bar Screen 3, far side view)

Headworks/Imhoff 2 & 3 Basin Structure

Imhoff 2 Structure/Metal Stairs to top of Basin

Imhoff 2 Structure/Metal Stairs to top of Basin (2)

Sludge Valves (Imhoff Tank 1)

Splitter Box Structure (Drop Chute), Splitter Pipes

Splitter Box (Slide Gates 1 and 3, removed)

Imhoff 3 Structure, Imhoff 3 Sludge Valves

Secondary Treatment (Trickling Filters)

Trickling Filter 1 Structure

Trickling Filter 2 Structure

Tricking Filter 1 Structure (2)

Tricking Filter 2 Structure (2)

Trickling Filter 1 Media and Spray Arm

Tricking Filter 2 Media and Spray Arm

Clarification System (Clarifiers, Return Sludge, Recirculation, Scum Area)

Clarifier 1 (left) and Clarifier 2 (right)

Clarifier 1 Walkway, Drive, Arms, Weirs

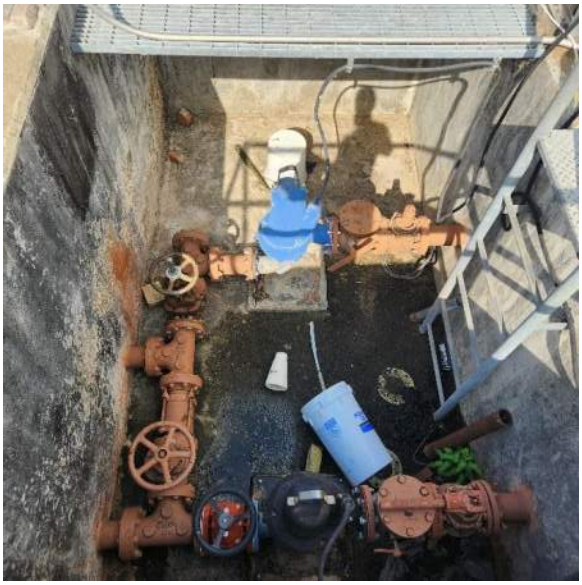
Clarifier 1 Walkway, Drive, Arms, Weirs (2)

Clarifier 2 Walkway, Drive, Arms, Weirs

Recirculation Pumps 1 & 2, Suction Pipes

Recirculation Pumps 1 (Front) and 2 (Back)

Recirculation Pumps Discharge Header



Scum Pump, Scum Structure, Scum Piping

Return Sludge Area

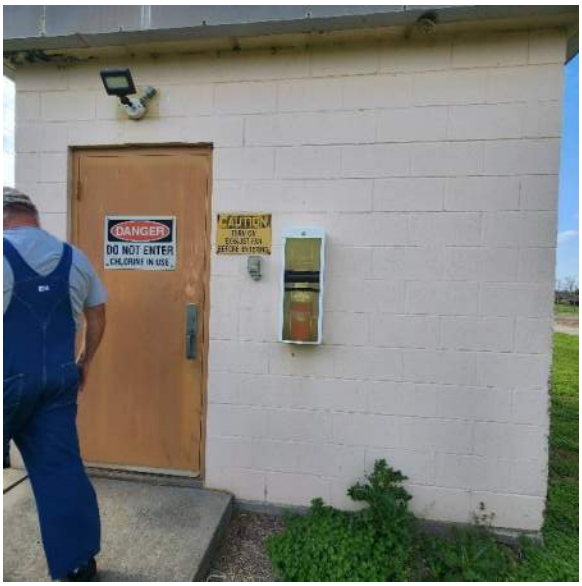
RAS Pump 1 (Left), RAS Pump 2 (Right)

Disinfection System (Chlorine Contact Basins and Chlorine Building)

Chlorine Contact Basin 2, Baffle

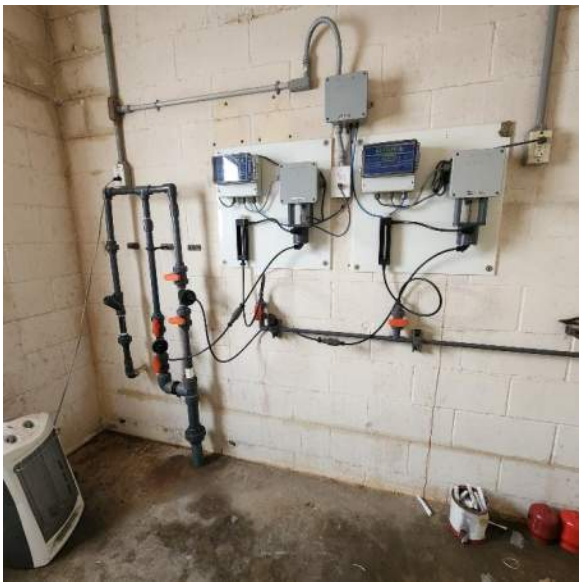
Chlorine Contact Basin 1, Baffle

CCB Blowers 1 & 2



Chlorine Building Structure, Exterior

Chlorine Gas Storage, Scales, System



Chlorination System

Sludge System (Drying Beds)

Sludge Drying Beds

Sludge Drying Beds (2)

Sludge Drying Bed Valve

Sludge Drying Bed (3)

Facility System

Office/Lab Building, Exterior

Flow Recorder, Building, Interior

Chart Recorder

Flow Reader/Recorder

Office/Lab Building, MCC, Interior

Diesel Emergency Generator and Canopy

Effluent Box, V-Notch Weir, Flowmeter

Site Access Gate and Fence

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APPENDIX E – Lift Station Detailed Asset Inventory

Appendix E
Lift Station Detailed Asset Inventory

SITE TYPE	SYSTEM	POSITION	ASSET NO.	ASSET	ASSET ID	CLASS	MANUFACTURER/MATERIAL/ TYPE	MODEL NO.	CAPACITY/ SIZE	STATUS	CONDITION RATING
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	30	PUMP 1	LT10	MECHANICAL	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	GORMAN RUPP B0154DLF2UD	15 HP	ACTIVE	4
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	31	PUMP 2	LT11	MECHANICAL	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	GORMAN RUPP B0154DLF2UD	15 HP	ACTIVE	4
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	90	PUMP 1	LW7	MECHANICAL	HYDROMATIC SELF-PRIMING	20MP	3 HP	ACTIVE	4
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	91	PUMP 2	LW8	MECHANICAL	HYDROMATIC SELF-PRIMING	20MP	3 HP	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	51	PUMP 1	LL11	MECHANICAL	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	B0034DCF2AA	3 HP	ACTIVE	4
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	52	PUMP 2	LL12	MECHANICAL	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	B0034DCF2AA	3 HP	ACTIVE	4
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	5	CONCRETE STRUCTURE	LC5	STRUCTURE	Concrete	-	-	ACTIVE	4
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	6	COLLECTOR MANHOLE	LC6	STRUCTURE	Concrete	-	-	ACTIVE	4
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	25	CONCRETE STRUCTURE	LT5	STRUCTURE	Concrete	-	-	ACTIVE	4
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	26	COLLECTOR MANHOLE	LT6	STRUCTURE	Concrete	-	-	ACTIVE	4
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	46	CONCRETE STRUCTURE	LL6	STRUCTURE	Concrete	-	-	ACTIVE	4
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	47	COLLECTOR MANHOLE	LL7	STRUCTURE	Concrete	-	-	ACTIVE	4
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	3	10" DISCHARGE PIPE	LC3	PIPE	DI	-	10"	ACTIVE	4
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	4	12" INFLUENT PIPE	LC4	PIPE	DI	-	12"	ACTIVE	4
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	24	12" INFLUENT PIPE	LT4	PIPE	DI	-	12"	ACTIVE	4
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	44	12" INFLUENT PIPE	LL4	PIPE	DI	-	12"	ACTIVE	4
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	10	PUMP 1	LC10	MECHANICAL	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	GORMAN RUPP B0154DLF2UD	15 HP	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	11	PUMP 2	LC11	MECHANICAL	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	GORMAN RUPP B0154DLF2UD	15 HP	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	43	4" DISCHARGE PIPE	LL3	PIPE	DI	-	4"	ACTIVE	4
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	94	4" CHECK VALVE 1	LW11	VALVE	Swing	-	4"	ACTIVE	4
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	23	6" DISCHARGE PIPE	LT3	PIPE	DI	-	6"	ACTIVE	4
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	45	6" INFLUENT PIPE	LL5	PIPE	PVC	-	6"	ACTIVE	4
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	67	CONCRETE STRUCTURE	LM6	STRUCTURE	Concrete	-	-	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	8	FLOATS	LC8	MECHANICAL	Mercury	-	-	ACTIVE	3
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	28	FLOATS	LT8	MECHANICAL	Mercury	-	-	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	49	FLOATS	LL9	MECHANICAL	Mercury	-	-	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	61	ALARM	LL21	EQUIPMENT	Strobe Visual	-	-	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	81	ALARM	LM20	EQUIPMENT	Strobe Visual	-	-	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	100	ALARM	LW17	EQUIPMENT	Strobe Visual	-	-	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	20	ALARM	LC20	EQUIPMENT	Visual Strobe	-	-	ACTIVE	3
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	40	ALARM	LT20	EQUIPMENT	Visual Strobe	-	-	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	13	PUMP CONTROL PANEL	LC13	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	33	PUMP CONTROL PANEL	LT13	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	54	PUMP CONTROL PANEL	LL14	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	73	PUMP CONTROL PANEL	LM12	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	93	PUMP CONTROL PANEL	LW10	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	12	LIQUID LEVEL FLOAT PANEL	LC12	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	32	LIQUID LEVEL FLOAT PANEL	LT12	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	53	LIQUID LEVEL FLOAT PANEL	LL13	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	72	LIQUID LEVEL FLOAT PANEL	LM11	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	92	LIQUID LEVEL FLOAT PANEL	LW9	ELECTRICAL	-	-	-	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	64	12" INFLUENT PIPE	LM3	PIPE	DI	-	12"	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	65	12" INFLUENT PIPE	LM4	PIPE	DI	-	12"	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	48	WELL COVER	LL8	GENERAL	Cast Iron	-	24"	ACTIVE	4
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	7	WELL COVER	LC7	GENERAL	Cast Iron	-	24"	ACTIVE	3
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	27	WELL COVER	LT7	GENERAL	Cast Iron	-	24"	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	68	WELL COVER	LM7	STRUCTURE	Cast Iron	-	24"	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	84	3" SUCTION PIPE	LW1	PIPE	PVC	-	3"	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	85	3" SUCTION PIPE	LW2	PIPE	PVC	-	3"	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	41	4" SUCTION PIPE	LL1	PIPE	DI	-	4"	ACTIVE	4
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	42	4" SUCTION PIPE	LL2	PIPE	DI	-	4"	ACTIVE	4
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	56	GENERAL PIPING	LL16	PIPE	DI	-	4"	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	77	GENERAL PIPING	LM16	PIPE	DI	-	4"	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	76	4" DISCHARGE PIPE	LM15	PIPE	DI	-	4"	ACTIVE	2
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	62	4" SUCTION PIPE	LM1	PIPE	DI	-	4"	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	63	4" SUCTION PIPE	LM2	PIPE	DI	-	4"	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	96	4" DISCHARGE PIPE	LW13	PIPE	PVC	-	4"	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	97	GENERAL PIPING	LW14	PIPE	PVC	-	4"	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	95	4" CHECK VALVE 2	LW12	VALVE	Swing	-	4"	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	74	4" CHECK VALVE 1	LM13	VALVE	Swing	-	4"	ACTIVE	2
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	75	4" CHECK VALVE 2	LM14	VALVE	Swing	-	4"	ACTIVE	2

Appendix E
Lift Station Detailed Asset Inventory

SITE TYPE	SYSTEM	POSITION	ASSET NO.	INSTALL DATE	ESTIMATED LIFE EXPECTANCY	ERUL	REMAINING ASSET LIFE RATING	CAPACITY	RELIABILTY	OBSOLESCENCE	REDUNDANCY	LOF	LEVEL OF SERVICE REQUIRED2	PERMIT COMPLIANCE	HEALTH & SAFETY	SYSTEM DISRUPTIONS	COF	CRITICALITY	ROUNDED PRIORITY VALUE
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	30	1985	20	-19	5	3	5	3	3	**3.8**	5	5	1	5	**4**	**3.8**	**1.0**
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	31	1985	20	-19	5	3	5	3	3	**3.8**	5	5	1	5	**4**	**3.8**	**1.0**
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	90	1985	20	-19	5	3	5	3	3	**3.8**	5	5	1	5	**4**	**3.8**	**1.0**
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	91	1985	20	-19	5	3	5	3	3	**3.8**	5	5	1	5	**4**	**3.8**	**2.0**
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	51	1985	20	-19	5	1	5	3	3	**3.4**	5	5	1	5	**4**	**3.4**	**2.0**
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	52	1985	20	-19	5	1	5	3	3	**3.4**	5	5	1	5	**4**	**3.4**	**2.0**
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	5	1985	50	11	2	1	3	3	5	**2.8**	5	5	3	5	**4.5**	**3.2**	**2.0**
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	6	1985	50	11	2	1	3	3	5	**2.8**	5	5	3	5	**4.5**	**3.2**	**2.0**
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	25	1985	50	11	2	1	3	3	5	**2.8**	5	5	3	5	**4.5**	**3.2**	**2.0**
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	26	1985	50	11	2	1	3	3	5	**2.8**	5	5	3	5	**4.5**	**3.2**	**2.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	46	1985	50	11	2	1	3	3	5	**2.8**	5	5	3	5	**4.5**	**3.2**	**2.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	47	1985	50	11	2	1	3	3	5	**2.8**	5	5	3	5	**4.5**	**3.2**	**2.0**
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	3	1985	50	11	2	1	1	3	2	**1.8**	5	4	1	4	**3.5**	**1.6**	**3.0**
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	4	1985	50	11	2	1	1	3	5	**2.4**	5	3	1	3	**3**	**1.8**	**3.0**
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	24	1985	50	11	2	1	1	3	5	**2.4**	5	3	1	3	**3**	**1.8**	**3.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	44	1985	50	11	2	1	1	3	5	**2.4**	5	3	1	3	**3**	**1.8**	**3.0**
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	10	1985	20	-19	5	1	3	3	2	**2.8**	5	5	1	5	**4**	**2.8**	**3.0**
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	11	1985	20	-19	5	1	3	3	2	**2.8**	5	5	1	5	**4**	**2.8**	**3.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	43	1985	50	11	2	1	1	3	2	**1.8**	5	4	1	4	**3.5**	**1.6**	**3.0**
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	94	1985	20	-19	5	3	3	3	2	**3.2**	3	4	1	3	**2.75**	**2.2**	**3.0**
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	23	1985	50	11	2	3	1	3	2	**2.2**	5	4	1	4	**3.5**	**1.9**	**3.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	45	1985	50	11	2	1	1	3	5	**2.4**	5	3	1	3	**3**	**1.8**	**3.0**
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	67	1985	50	11	2	1	1	3	5	**2.4**	5	5	3	5	**4.5**	**2.7**	**3.0**
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	8	1985	20	-19	5	1	3	3	5	**3.4**	2	4	2	3	**2.75**	**2.3**	**3.0**
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	28	1985	20	-19	5	1	3	3	5	**3.4**	2	4	2	3	**2.75**	**2.3**	**3.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	49	1985	20	-19	5	1	3	3	5	**3.4**	2	4	2	3	**2.75**	**2.3**	**3.0**
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	61	1985	15	-24	5	1	1	4	5	**3.2**	3	4	5	3	**3.75**	**3.0**	**3.0**
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	81	1985	15	-24	5	1	1	4	5	**3.2**	3	4	5	3	**3.75**	**3.0**	**3.0**
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	100	1985	15	-24	5	1	1	4	5	**3.2**	3	4	5	3	**3.75**	**3.0**	**3.0**
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	20	1985	15	-24	5	1	1	4	5	**3.2**	3	4	5	3	**3.75**	**3.0**	**3.0**
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	40	1985	15	-24	5	1	1	4	5	**3.2**	3	4	5	3	**3.75**	**3.0**	**3.0**
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	13	1985	15	-24	5	1	1	3	5	**3**	3	4	1	5	**3.25**	**2.4**	**3.0**
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	33	1985	15	-24	5	1	1	3	5	**3**	3	4	1	5	**3.25**	**2.4**	**3.0**
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	54	1985	15	-24	5	1	1	3	5	**3**	3	4	1	5	**3.25**	**2.4**	**3.0**
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	73	1985	15	-24	5	1	1	3	5	**3**	3	4	1	5	**3.25**	**2.4**	**3.0**
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	93	1985	15	-24	5	1	1	3	5	**3**	3	4	1	5	**3.25**	**2.4**	**3.0**
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	12	1985	15	-24	5	1	1	3	5	**3**	3	3	1	5	**3**	**2.3**	**3.0**
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	32	1985	15	-24	5	1	1	3	5	**3**	3	3	1	5	**3**	**2.3**	**3.0**
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	53	1985	15	-24	5	1	1	3	5	**3**	3	3	1	5	**3**	**2.3**	**3.0**
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	72	1985	15	-24	5	1	1	3	5	**3**	3	3	1	5	**3**	**2.3**	**3.0**
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	92	1985	15	-24	5	1	1	3	5	**3**	3	3	1	5	**3**	**2.3**	**3.0**
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	64	1985	50	11	2	1	1	3	2	**1.8**	5	4	1	4	**3.5**	**1.6**	**4.0**
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	65	1985	50	11	2	1	1	3	2	**1.8**	5	4	1	4	**3.5**	**1.6**	**4.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	48	1985	50	11	2	1	1	3	5	**2.4**	2	2	5	1	**2.5**	**1.5**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	7	1985	50	11	2	1	1	3	5	**2.4**	2	2	5	1	**2.5**	**1.5**	**4.0**
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	27	1985	50	11	2	1	1	3	5	**2.4**	2	2	5	1	**2.5**	**1.5**	**4.0**
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	68	1985	50	11	2	1	1	3	5	**2.4**	2	2	5	1	**2.5**	**1.5**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	84	1985	50	11	2	3	1	3	2	**2.2**	4	3	1	2	**2.5**	**1.4**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	85	1985	50	11	2	3	1	3	2	**2.2**	4	3	1	2	**2.5**	**1.4**	**4.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	41	1985	50	11	2	1	1	3	2	**1.8**	4	3	1	2	**2.5**	**1.1**	**4.0**
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	42	1985	50	11	2	1	1	3	2	**1.8**	4	3	1	2	**2.5**	**1.1**	**4.0**
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	56	1985	50	11	2	1	1	3	5	**2.4**	4	3	1	2	**2.5**	**1.5**	**4.0**
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	77	1985	50	11	2	1	1	3	5	**2.4**	4	3	1	2	**2.5**	**1.5**	**4.0**
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	76	1985	50	11	2	1	1	3	5	**2.4**	5	4	1	4	**3.5**	**2.1**	**4.0**
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	62	1985	50	11	2	1	1	3	2	**1.8**	4	3	1	2	**2.5**	**1.1**	**4.0**
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	63	1985	50	11	2	1	1	3	2	**1.8**	4	3	1	2	**2.5**	**1.1**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	96	1985	50	11	2	3	1	3	2	**2.2**	5	4	1	4	**3.5**	**1.9**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	97	1985	50	11	2	3	1	3	5	**2.8**	4	3	1	2	**2.5**	**1.8**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	95	1985	20	-19	5	3	1	3	2	**2.8**	3	4	1	3	**2.75**	**1.9**	**4.0**
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	74	2018	20	14	2	1	1	3	2	**1.8**	3	4	1	3	**2.75**	**1.2**	**4.0**
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	75	2018	20	14	2	1	1	3	2	**1.8**	3	4	1	3	**2.75**	**1.2**	**4.0**

Appendix E
Lift Station Detailed Asset Inventory

SITE TYPE	SYSTEM	POSITION	ASSET NO.	ANTICIPATED REPLACEMENT COST ($)
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	30	$40,000
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	31	$40,000
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	90	$8,000
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	91	$8,000
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	51	$8,000
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	52	$8,000
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	5	$60,000
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	6	$10,000
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	25	$60,000
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	26	$10,000
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	46	$60,000
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	47	$10,000
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	3	$180/LF
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	4	$200/LF
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	24	$200/LF
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	44	$200/LF
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	10	$40,000
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	11	$40,000
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	43	$150/LF
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	94	$3,000
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	23	$170/LF
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	45	$120/LF
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	67	$60,000
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	8	$5,000
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	28	$5,000
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	49	$5,000
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	61	$100
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	81	$100
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	100	$100
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	20	$100
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	40	$100
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	13	$20,000
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	33	$20,000
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	54	$20,000
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	73	$20,000
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	93	$20,000
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	EQUIPMENT	12	$5,000
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	EQUIPMENT	32	$5,000
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	EQUIPMENT	53	$5,000
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	72	$5,000
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	EQUIPMENT	92	$5,000
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	64	$200/LF
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	65	$200/LF
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	48	$1,000
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	7	$1,000
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	27	$1,000
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	68	$1,000
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	84	$80/LF
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	85	$80/LF
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	41	$150/LF
LIFT STATION NO 4 - LEGION ST	WET WELL AREA	WET WELL	42	$150/LF
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	56	$150/LF
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	77	$150/LF
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	76	$150/LF
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	62	$150/LF
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	63	$150/LF
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	96	$100/LF
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	97	$150/LF
LIFT STATION NO 6 - WESTGATE ST	DRY PIT AREA	PIPING	95	$3,000
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	74	$3,000
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	PIPING	75	$3,000

Appendix E
Lift Station Detailed Asset Inventory

SITE TYPE	SYSTEM	POSITION	ASSET NO.	ASSET	ASSET ID	CLASS	MANUFACTURER/MATERIAL/ TYPE	MODEL NO.	CAPACITY/ SIZE	STATUS	CONDITION RATING
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	88	WELL COVER	LW5	GENERAL	Steel	-	5'	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	70	PUMP 1	LM9	MECHANICAL	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T3A3-B	5 HP	ACTIVE	2
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	71	PUMP 2	LM10	MECHANICAL	GORMAN-RUPP T-SERIES/SELF PRIMING CENTRIFGAL PUMP	T3A3-B	5 HP	ACTIVE	2
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	82	GATE & FENCE	LM21	GENERAL	Wood	-	6'	ACTIVE	2
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	101	GATE & FENCE	LW18	GENERAL	Wood	-	6'	ACTIVE	2
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	21	6" SUCTION PIPE	LT1	PIPE	DI	-	6"	ACTIVE	4
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	22	6" SUCTION PIPE	LT2	PIPE	DI	-	6"	ACTIVE	4
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	66	6" INFLUENT PIPE	LM5	PIPE	DI	-	6"	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	1	6" SUCTION PIPE	LC1	PIPE	DI	-	6"	ACTIVE	4
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	2	6" SUCTION PIPE	LC2	PIPE	DI	-	6"	ACTIVE	4
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	36	GENERAL PIPING	LT16	PIPE	DI	-	6"	ACTIVE	2
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	86	6" INFLUENT PIPE	LW3	PIPE	DIP	-	6"	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	87	CONCRETE STRUCTURE	LW4	STRUCTURE	Concrete	-	-	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	17	CONCRETE SLAB	LC17	GENERAL	Concrete	-	-	ACTIVE	2
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	37	CONCRETE SLAB	LT17	GENERAL	Concrete	-	-	ACTIVE	2
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	58	CONCRETE SLAB	LL18	GENERAL	Concrete	-	-	ACTIVE	2
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	78	CONCRETE SLAB	LM17	GENERAL	Concrete	-	-	ACTIVE	2
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	57	VENT PIPE	LL17	PIPE	DI	-	-	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	15	GENERAL PIPING	LC15	PIPE	DI	-	-	ACTIVE	2
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	16	VENT PIPE	LC16	PIPE	DI	-	-	ACTIVE	2
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	35	VENT PIPE	LT15	PIPE	DI	-	-	ACTIVE	2
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	ENCLOSURE	9	ENCLOSURE STRUCTURE	LC9	STRUCTURE	Fiberglass	-	-	ACTIVE	2
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	ENCLOSURE	29	ENCLOSURE STRUCTURE	LT9	STRUCTURE	Fiberglass	-	-	ACTIVE	2
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	ENCLOSURE	50	ENCLOSURE STRUCTURE	LL10	STRUCTURE	Fiberglass	-	-	ACTIVE	2
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	98	GENERATOR	LW15	EQUIPMENT	Gillette	-	-	ACTIVE	2
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	69	FLOATS	LM8	MECHANICAL	Mercury	-	-	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	89	FLOATS	LW6	MECHANICAL	Mercury	-	-	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	55	AIR VALVE	LL15	VALVE	-	-	-	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	19	LIGHT POLE	LC19	GENERAL	-	-	-	ACTIVE	3
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	39	LIGHT POLE	LT19	GENERAL	-	-	-	ACTIVE	3
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	60	LIGHT POLE	LL20	GENERAL	-	-	-	ACTIVE	3
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	80	LIGHT POLE	LM19	GENERAL	-	-	-	ACTIVE	3
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	99	LIGHT POLE	LW16	GENERAL	-	-	-	ACTIVE	3
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	14	AIR VALVE	LC14	VALVE	-	-	-	ACTIVE	2
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	34	AIR VALVE	LT14	VALVE	-	-	-	ACTIVE	2
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	83	HOSE BIB	LM22	EQUIPMENT	-	-	-	ACTIVE	2
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	18	GENERATOR	LC18	EQUIPMENT	Cummins	-	-	ACTIVE	1
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	38	GENERATOR	LT18	EQUIPMENT	Cummins	-	-	ACTIVE	1
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	59	GENERATOR	LL19	EQUIPMENT	Cummins	-	-	ACTIVE	1
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	79	GENERATOR	LM18	EQUIPMENT	Gillette	-	-	ACTIVE	1

GENERAL NOTES

1. Note lengths of piping, underground or buried yard piping and valves not evaluated or inventoried unless described below. Plumbing pipe and pipe <3" were not evaluated unless described below.

2. Valve exercise not performed

3. Pumps and Associated Motors were accessed as one item.

4. Note that LS enclosures were not removed to access general piping and valves within the enclosure, therefore, conditions as listed below are based on visual evalution

Appendix E
Lift Station Detailed Asset Inventory

SITE TYPE	SYSTEM	POSITION	ASSET NO.	INSTALL DATE	ESTIMATED LIFE EXPECTANCY	ERUL	REMAINING ASSET LIFE RATING	CAPACITY	RELIABILTY	OBSOLESCENCE	REDUNDANCY	LOF	LEVEL OF SERVICE REQUIRED2	PERMIT COMPLIANCE	HEALTH & SAFETY	SYSTEM DISRUPTIONS	COF	CRITICALITY	ROUNDED PRIORITY VALUE
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	88	1985	50	11	2	1	1	3	5	**2.4**	2	2	5	1	**2.5**	**1.5**	**4.0**
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	70	1985	20	-19	5	1	1	3	3	**2.6**	5	5	1	5	**4**	**2.6**	**4.0**
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	71	1985	20	-19	5	1	1	3	3	**2.6**	5	5	1	5	**4**	**2.6**	**4.0**
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	82	1985	50	11	2	1	1	3	5	**2.4**	3	2	3	1	**2.25**	**1.4**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	101	1985	50	11	2	1	1	3	5	**2.4**	3	2	3	1	**2.25**	**1.4**	**4.0**
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	21	1985	50	11	2	3	1	3	2	**2.2**	4	3	1	2	**2.5**	**1.4**	**4.0**
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	22	1985	50	11	2	3	1	3	2	**2.2**	4	3	1	2	**2.5**	**1.4**	**4.0**
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	66	1985	50	11	2	1	1	3	5	**2.4**	5	3	1	3	**3**	**1.8**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	1	1985	50	11	2	1	1	3	2	**1.8**	4	3	1	2	**2.5**	**1.1**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	2	1985	50	11	2	1	1	3	2	**1.8**	4	3	1	2	**2.5**	**1.1**	**4.0**
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	36	1985	50	11	2	3	1	3	5	**2.8**	4	3	1	2	**2.5**	**1.8**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	86	1985	50	11	2	3	1	3	2	**2.2**	5	3	1	3	**3**	**1.7**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	87	1985	50	11	2	1	1	3	5	**2.4**	5	2	1	1	**2.25**	**1.4**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	17	1985	50	11	2	1	1	3	5	**2.4**	5	2	1	1	**2.25**	**1.4**	**4.0**
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	37	1985	50	11	2	1	1	3	5	**2.4**	5	2	1	1	**2.25**	**1.4**	**4.0**
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	58	1985	50	11	2	1	1	3	5	**2.4**	5	2	1	1	**2.25**	**1.4**	**4.0**
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	78	1985	50	11	2	1	1	3	5	**2.4**	5	2	1	1	**2.25**	**1.4**	**4.0**
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	57	1985	50	11	2	1	1	3	5	**2.4**	2	2	3	1	**2**	**1.2**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	15	1985	50	11	2	1	1	3	5	**2.4**	4	3	1	2	**2.5**	**1.5**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	16	1985	50	11	2	1	1	3	5	**2.4**	2	2	3	1	**2**	**1.2**	**4.0**
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	35	1985	50	11	2	1	1	3	5	**2.4**	2	2	3	1	**2**	**1.2**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	ENCLOSURE	9	1985	50	11	2	1	1	3	5	**2.4**	3	2	2	1	**2**	**1.2**	**4.0**
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	ENCLOSURE	29	1985	50	11	2	1	1	3	5	**2.4**	3	2	2	1	**2**	**1.2**	**4.0**
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	ENCLOSURE	50	1985	50	11	2	1	1	3	5	**2.4**	3	2	2	1	**2**	**1.2**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	98	2019	30	25	1	1	1	3	3	**1.8**	5	5	1	3	**3.5**	**1.6**	**4.0**
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	69	1985	20	-19	5	1	1	3	5	**3**	2	4	2	3	**2.75**	**2.1**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	89	1985	20	-19	5	1	1	3	5	**3**	2	4	2	3	**2.75**	**2.1**	**4.0**
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	55	1985	20	-19	5	1	3	3	5	**3.4**	3	2	2	2	**2.25**	**1.9**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	19	1985	15	-24	5	1	1	4	5	**3.2**	3	1	3	1	**2**	**1.6**	**4.0**
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	39	1985	15	-24	5	1	1	4	5	**3.2**	3	1	3	1	**2**	**1.6**	**4.0**
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	60	1985	15	-24	5	1	1	4	5	**3.2**	3	1	3	1	**2**	**1.6**	**4.0**
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	80	1985	15	-24	5	1	1	4	5	**3.2**	3	1	3	1	**2**	**1.6**	**4.0**
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	99	1985	15	-24	5	1	1	4	5	**3.2**	3	1	3	1	**2**	**1.6**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	14	1985	20	-19	5	1	3	3	5	**3.4**	3	2	2	2	**2.25**	**1.9**	**4.0**
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	34	1985	20	-19	5	1	3	3	5	**3.4**	3	2	2	2	**2.25**	**1.9**	**4.0**
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	83	1985	15	-24	5	1	1	3	5	**3**	3	2	3	1	**2.25**	**1.7**	**4.0**
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	18	2019	30	25	1	1	1	3	3	**1.8**	5	5	1	3	**3.5**	**1.6**	**5.0**
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	38	2019	30	25	1	1	1	3	3	**1.8**	5	5	1	3	**3.5**	**1.6**	**5.0**
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	59	2019	30	25	1	1	1	3	3	**1.8**	5	5	1	3	**3.5**	**1.6**	**5.0**
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	79	2019	30	25	1	1	1	3	3	**1.8**	5	5	1	3	**3.5**	**1.6**	**5.0**

GENERAL NOTES

1. Note lengths of piping, underground or buried yard piping and valves not evaluated or invent

2. Valve exercise not performed

3. Pumps and Associated Motors were accessed as one item.

4. Note that LS enclosures were not removed to access general piping and valves within the enc

Appendix E
Lift Station Detailed Asset Inventory

SITE TYPE	SYSTEM	POSITION	ASSET NO.	ANTICIPATED REPLACEMENT COST ($)
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	88	$1,000
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	70	$15,000
LIFT STATION NO 5 - MAREK ST	DRY PIT AREA	EQUIPMENT	71	$15,000
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	82	$100/LF
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	101	$100/LF
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	21	$170/LF
LIFT STATION NO 3 - 7TH ST	WET WELL AREA	WET WELL	22	$170/LF
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	66	$170/LF
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	1	$170/LF
LIFT STATION NO 2 - COLUMBUS ST	WET WELL AREA	WET WELL	2	$170/LF
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	36	$170/LF
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	86	$120/LF
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	87	$60,000
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	17	$60/SY
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	37	$60/SY
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	58	$60/SY
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	78	$60/SY
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	57	$1,500
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	15	$200/LF
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	16	$1,500
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	35	$1,500
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	ENCLOSURE	9	$60/SY
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	ENCLOSURE	29	$60/SY
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	ENCLOSURE	50	$60/SY
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	98	$70,000
LIFT STATION NO 5 - MAREK ST	WET WELL AREA	WET WELL	69	$5,000
LIFT STATION NO 6 - WESTGATE ST	WET WELL AREA	WET WELL	89	$5,000
LIFT STATION NO 4 - LEGION ST	DRY PIT AREA	PIPING	55	$2,000
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	19	$10,000
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	39	$10,000
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	60	$10,000
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	80	$10,000
LIFT STATION NO 6 - WESTGATE ST	FACILITY	SITE/GROUNDS	99	$10,000
LIFT STATION NO 2 - COLUMBUS ST	DRY PIT AREA	PIPING	14	$2,000
LIFT STATION NO 3 - 7TH ST	DRY PIT AREA	PIPING	34	$2,000
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	83	$100
LIFT STATION NO 2 - COLUMBUS ST	FACILITY	SITE/GROUNDS	18	$70,000
LIFT STATION NO 3 - 7TH ST	FACILITY	SITE/GROUNDS	38	$70,000
LIFT STATION NO 4 - LEGION ST	FACILITY	SITE/GROUNDS	59	$70,000
LIFT STATION NO 5 - MAREK ST	FACILITY	SITE/GROUNDS	79	$70,000

GENERAL NOTES

1. Note lengths of piping, underground or buried yard piping and valves not evaluated or invent

2. Valve exercise not performed

3. Pumps and Associated Motors were accessed as one item.

4. Note that LS enclosures were not removed to access general piping and valves within the enc

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APPENDIX F – CDBG-MIT Sanitary Sewer Collection System Improvements Record Documents

CITY OF WALLIS

SANITARY SEWER IMPROVEMENTS
HURRICANE HARVEY FLOODS STATE MITIGATION
CDBG-MIT PROJECT NO. 22-085-054-D311
CID 01

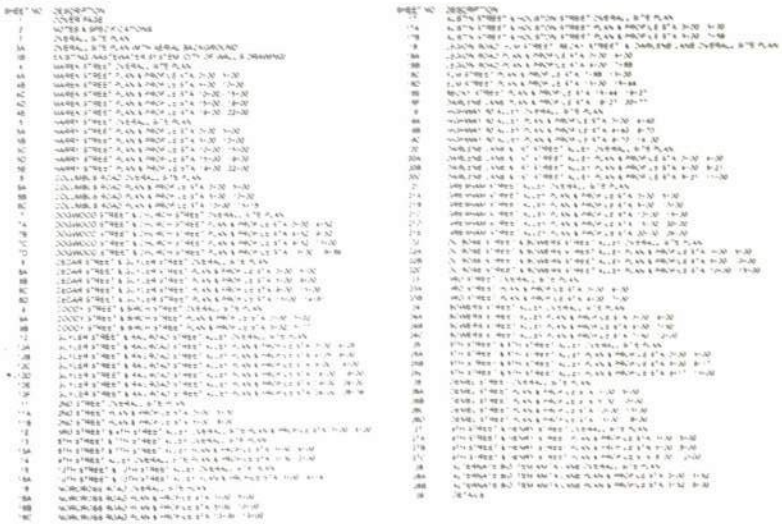
JUNE 24, 2022

WILSON ENGINEERING CO., PLLC
REGISTERED FIRM NO. 7678
208 FOWLKES STREET
SEALY, TEXAS 77474
(979) 885-3344
www.wilsonengr.com

WEISHUHN ENGINEERING, INC.
ENVIRONMENTAL & ENGINEERING SOLUTIONS
REGISTERED FIRM NO. 66
425 SPRING STREET SUITE 102
COLUMBUS, TEXAS 78934
(979) 732-6997
www.wei-eng.com

LOCATION MAP

INDEX



APPENDIX G – Wallis Operations, Maintenance, and Compliance Manual

OPERATIONS, MAINTENANCE, & COMPLIANCE MANUAL

CITY OF WALLIS WASTEWATER SYSTEM

November 2023

Prepared For:

The City of Wallis, Texas

Water Quality Permit No. WQ0010765001

TCEQ Regulated Entity No. (RN) RN101916245

EPA ID No. TX0025968

Prepared By:

11011 Richmond Avenue, Suite 200
Houston, TX 77042
Firm No. F-11278

HR Green Project No: 220004

Table of Contents

Attachments

1. TCEQ 530C Routine Reports and Logs
2. Manhole Accessibility Field Review Form
3. Manhole Physical Survey Form
4. Confined Space Entry Permit Form
5. Corrective Maintenance Record
6. Emergency Inventory Sheet
7. Equipment Data Card
8. Inventory Card
9. Master Inventory Card
10. Preventative Maintenance Record
11. Purchase Order Form
12. Vulnerability Analysis WS
13. Wastewater Treatment System Emergency Inventory
14. Project Tracking Form
15. Work Order Form
16. Discharge Monthly Effluent Report & Address and Signatory Authority
17. Start-Up and Operating Procedures Form
18. Soil Monthly Effluent Report
19. System and WWTP Site Map
20. ESRI ArcGIS Online Web and Field Maps App How-To Guide
21. TCEQ Regulatory Guidance on Imhoff System
22. WWTP Discharge Permit Issued 2019

1.0 GENERAL INFORMATION

1.1 Purpose

This Operation and Maintenance plan (O&M) is to be used as a guide for the City of Wallis (City) sanitary sewer system. The purpose of the manual is to instruct the operating and maintenance personnel in the proper understanding, techniques, references, and necessary procedures for operating and maintaining the City of Wallis sewage collection system, lift stations, and wastewater treatment plant (WWTP). The O&M will help in continuous operation in accordance with the rules and regulations of the Texas Commission of Environmental Quality (TCEQ). This manual will assist the City of Wallis effectively manage their wastewater collection system and achieve the following goals:

- Prevent public health hazards;
- Protect the environment;
- Comply with regulations;
- Minimize disruptions in service;
- Prevent unnecessary damage to public/private property;
- Reduce expenditures for emergency maintenance;
- Convey wastewater to the City WWTP with a minimum of infiltration, inflow and exfiltration;
- Provide a safe work environment for employees, employers, and residents in the City;
- Perform all operations in a safe manner to prevent personal injury; and
- Maintain and implement the asset management plan.

1.2 Manual User Guide

This O&M has been prepared to facilitate easy reference as a “Quick-Start” guide for the Operations of the collection system. Both new and senior City staff should study the manual’s Table of Contents to become familiar with the information presented in it. The chapters are arranged in a logical order beginning with a general introduction, collection systems management, collection systems operations and maintenance, WWTP operations and maintenance.

1.3 Operation and Managerial Responsibility

The Director of Public Works is the person in charge of the wastewater system and is considered as the manager of the system. The Director may choose to out-source licensed operators as need to maintain and operate the system.

The Director of Public Works and operators in charge will be thoroughly familiar with the City's sanitary sewer system. New and senior staff will know the function of each unit in the system; how each unit accomplishes its function; how to evaluate the operation of each lift station in the system; and how each unit fits into the overall sanitary sewer system. Complete and accurate records are vital to understanding the system of all phases of lift station operations and maintenance.

Proper maintenance leads to an efficient system. It is recommended for the Director and Staff to participate in continuing educational classes, attend seminars related to the proper operations and maintenance of the sanitary sewer system, and to review magazines, review manufacturers O&M manuals and equipment, journals and periodicals related to wastewater systems.

It is important for the City's public water and wastewater systems to remain financially, managerially, and technically sound so it provide clean and safe drinking water and wastewater services.

TCEQ has professional contractors that can provide help tailored to your specific needs. This is called the "Financial, Managerial, and Technical Assistance for Public Water and Wastewater Systems Program". The program's purpose is to help water or wastewater systems remain in compliance with regulations that protect human health and the environment. The web address for this group is https://www.tceq.texas.gov/drinkingwater/fmt and the group can be contacted via email at fmt@tceq.texas.gov.

1.4 Description of WWTP, Lift Stations, and Sewer Lines

WASTEWATER TREATMENT PLANT (WWTP) (PERMIT NO. WQ0010765001)

The City of Wallis operates a WWTP located in the northwest part of the City collection system located at 17403 Railroad Street, Wallis, Texas 77485 (Austin County). A gravel road provides access to the WWTP on Railroad Street. The WWTP is secured with a metal swing gate and fenced with chain linked fence topped with 3 strands of barbed wire.

The WWTP is permitted to treat an average daily flow of 0.498 million gallons per day (MGD) and a 2-hour peak of 1.5 MGD. There is one (1) on-site LS at the WWTP facility. The City currently has a third-party licensed operator (EDIC) that operates the LS and WWTP.

The WWTP is equipped with manual bar screens, (3) Imhoff Tanks, (2) Trickling Filters, (2) Clarifiers, (2) Chlorine Contact Basins, and (1) effluent box. The WWTP takes flow from the onsite LS which has two force mains (4-inch and 8-inch) that carries the flow to the manual bar screens. The WWTP discharges to the ditch on Railroad Street outside the WWTP fence line, to an unnamed ditch, thence to Tesch's Branch; thence to Allen's Creek, thence to Brazos River below Navasota River Segment No. 1202 of the Brazos River Basin.

LIFT STATIONS

The City has five (5) LS within the collection system and one (1) LS on-site within the WWTP facility as summarized in the following table.

LIFT STATION NUMBER/ NOMENCLATURE NAME	FORCE MAIN SIZE (INCH)	FORCE MAIN OUTFALL	GENERAL NOTES
LS #1 – INFLUENT LS (ON-SITE WWTP LS)	8" (Pump 3, 4) 4" (Pump 1, 2)	Headworks (Imhoff Tank #1,2,3)	This LS receives flow from the entire collection system and pumps to the headworks of the WWTP.
LS #2 – COLUMBUS ST	6"	MH160	This LS receives flow from LS#3 and areas north of FM1093 and south of Rogers Street.
LS #3 – 7TH ST	6"	MH156 (OLD WET WELL AT LS #2)	This LS receives flow from the northeast area of the City including the Lakeview neighborhood and south of HWY 36, in the southeast area of the City.
LS #4 – LEGION ROAD	4"	MH54	This LS receives flow from the south of HWY 36, in the southwest area of the City.
LS #5 – MAREK STREET	4"	MH10	This LS receives flow from the empty trailer park lots and some homes south on Marek Street. This LS receives minimal flows.
LS #6 – WESTGATE ST	4"		This LS receives flow from the Westgate community on the far southwest side of the City.

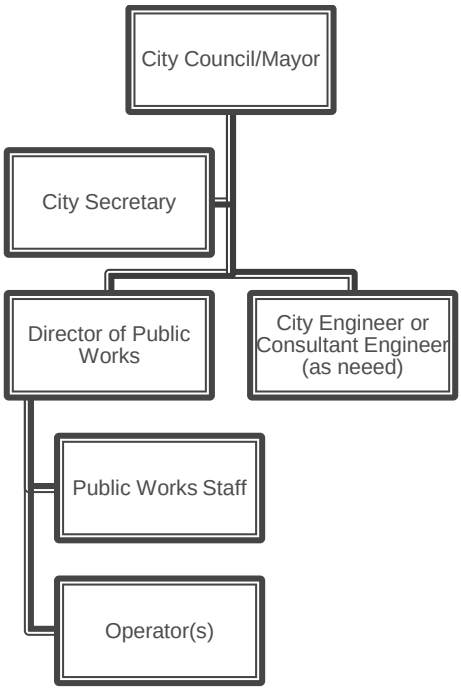
COLLECTION SYSTEM

There is a total of 64,800 LF of sanitary sewer line and 159 manholes in the City of Wallis. There is a major railroad right-of-way (ROW) and Texas State Highway SH-36 that runs east-west and divides the City. The sanitary system generally flows to the northwest towards the WWTP site, into the on-site LS. There are two sanitary sewer crossings that gravity flow from the south side of the City to the north side as shown on the map.

2.0 COLLECTION SYSTEM MANAGEMENT

2.1 Organization

The City's organizational chains of command for implementing the measures in its O&M Plan are as follows:



The City shall routinely consult with the Director to review the overall status of the City sewerage system and consult with an Engineer as needed (currently the City does not have an Engineer). Upcoming sewer maintenance repair and televising shall be determined and planned as necessary. Mapping updates shall be completed on an as needed basis. Future budgeting for upcoming sewer projects shall be reviewed with the City Council using Dashboard.

2.2 Training/Safety

The City is recommended to develop a program to formally train their staff and employees. Skills training for City staff and employees should include, but is not limited to:

- Routine Line Maintenance
- Heavy Equipment Operation
- Maintenance Equipment Operation
- Line Testing and Inspection
- Infrastructure Installation
- Lift Station Operation and Maintenance
- Electrical and Instrumentation
- Emergency Response
- Public Relations
- Safety

Safety training is obtained from training agencies include employee adherence to the following written safety policies and procedures.

- Confined Space Entry
- Hard Hat Policy
- Vehicle Operation Policy
- Seat Belt Policy
- Respiratory Protection Program
- Excavation Safety Policy and Program
- Shelter-in-Place Plans
- Chlorine Safety Policy
- Injury Reporting Policy
- Post-Accident Drug Testing Policy
- Safety Teams and Committee Policy
- Personal Protective Equipment (provided for the employee)
- First Aid, CPR and AED (First aid supplies are available in office areas and vehicles)
- Flaggers
- Hazard Communication Program
- Defensive Driving Program

Training records should be maintained for each employee. The Public Works Department maintains appropriate safety equipment including: protective clothing, safety glasses, hard hats, gloves, respirators, filters, harnesses, tripods, hoists, fire extinguishers and self-contained breathing apparatus. The Public Works Department also should maintain and calibrate atmospheric testing equipment. Lights, barricades, signage and exhaust fans are also available. The following table can be used to document safety training.

Name	Date of Safety Training

2.3 Customer Service

Communication and customer service are key components to the O&M Plan. Customers with concerns about the collection system can call the City offices with their issues. The calls shall be channeled to the Director, and the Director shall direct the appropriate personnel to investigate the caller's issue. Emergency calls after normal City business hours can be placed to the police department.

Complaints and requests could be received by various means (e.g., phone calls, e-mail, departments, and occasionally in person). Regardless of the nature or means of receipt, all complaints and requests should be recorded. Entries include the following detailed information about the complaint/request:

- Receiver of complaint / dispatcher
- Time and date of request
- Form number (Work Order)
- Complainant information (Name, address, call back phone number)
- Location of the problem
- Type of complaint (Codes, e.g. home back up, odor, manhole overflow, etc.)
- Specific request
- Personnel assigned to complaint
- Findings type, including cause of problem
- Complaint closeout information
- Date complaint closed

Once a complaint is assigned, field personnel perform an investigation. If the problem cannot be immediately resolved, the Public Works Department will generate a work order to take appropriate action for permanent correction of the problem. If the City is not responsible for correcting the problem, the Director of Public Works will provide the complainant with guidance on a recommended course of action.

2.4 Record-keeping and Information Management (Geographic Information Systems)

Records shall be kept of repairs to the collection system. These records include televising, repairs, preventive and routine maintenance. The files will be maintained by the City and retained at City facilities. Currently, a majority of hard copy records are found at the WWTP facility building.

The City should also maintain records, keep electronic copies, and update information on the Geographic Information Systems (GIS) database platform as appropriate for geographical assets (manholes, lines, etc.). The City is provided with an ESRI account to allow access to an interactive web application where they can view and edit a detailed map of the collection system assets through the ESRI ArcGIS. The City will be required to sign in to the ESRI account prior to viewing the Dashboard.

The GIS information is stored online so the data uploaded in the field during maintenance can be seen immediately on the Dashboard via a computer or smartphone. An associated ESRI ArcGIS mobile application will allow the Director and City staff to update and edit their system in the field during daily operation and maintenance, such as adding additional assets, updating the model numbers, re-evaluating the asset condition, tracking work orders, and uploading field photos. It is recommended to update the City's GIS database through the Dashboard as the City continues to improve its sanitary sewer assets. By continually updating the Dashboard, the City will eventually be able to manage its existing system through one platform. The City is encouraged to explore alternative applications under the ERSI platform for maintenance and operations, such as "Workforce".

Collection System Map Information included in the GIS Dashboard

Manholes Basic Map Information - ID number or other unique identifier - Location, with reference to streets and property lines - Depth - GPS coordinates - Size - Date built - Rim elevation - Invert elevation - Material Type	**Potential Future Information** - Worker safety information
Pipes Basic Map Information - ID number or other unique identifier - Size - Direction of flow - Length - Material type - Date built - Pipe invert elevations	**Potential Future Information** - Slope - Plan or as-built ID number - Service laterals - Location, with reference to streets, surface waters, property lines and manholes
Lift Stations Basic Map Information - ID number - Location - Capacity	**Potential Future Information** - Additional equipment information
Force Main Basic Map Information - ID number or other unique identifier - Location, with reference to streets, surface waters, and property lines - Direction of flow and lift station associated - Length - Material type - Date built - Capacity	**Potential Future Information** - Slope - Invert elevations - Plan or as-built ID number - Location of air release valves

2.5 Common Violations

The City is encouraged to familiarize themselves with the following common violations cited by the TCEQ in order to prevent potential violations. The TCEQ has identified common O&M violations as the following:

- Operator licensure levels and appropriate level of license, 30 TAC 30.350(d), 30 TAC 305.125(1);
- Compliance with permitted effluent limits, Texas Water Code 26.121(a)(10), 30 TAC 305.125(1) and (5);
- Flow measurements in accordance to permit requirements (measuring the flow and installing flow-measuring devices), 30 TAC 319.4, 30 TAC 305.125 (1) and (5), 30 TAC 217.33(c), 30 TAC 319.11(d);
- Effluent sample preservations, 30 TAC 319.11(b);
- Maintenance of records at the facility, 30 TAC 319.7(c); and
- Compliance with permit conditions, 30 TAC 305.125.

Equipment deterioration from lack of maintenance and lack of meter calibration records also lead to frequent violations.

PRETREATMENT PROGRAM FOR INDUSTRIAL USERS IN THE COLLECTION SYSTEM

All existing and future industrial users of the sanitary sewer system within the City are required to comply with the local or regulatory pretreatment program as outlined in 30 TAC 217.

2.6 Legal Authority

The City does not permit connections of surface storm water to the sanitary sewer system. The City requires that sewers and connections be properly designed and constructed as per the Unified Development Code (UDC) and Texas Administrative Code (30 TAC) Chapter 217.

3.0 OPERATIONS CHECKLIST

The City is recommended to use the following routine checklist as a tool to maintain and schedule their collection system work. The checklist contains items that are typical criteria considered by a TCEQ inspector to remain consistent during their investigations. This checklist is a modified version of that checklist provided in RG-530D-Compliance and therefore each criteria is utilized by TCEQ during their routine state inspections which will be useful for the City to remain in compliance as well providing a good foundation to maintaining the health of their wastewater system. It is recommended to keep a copy of this checklist at every facility and train each operator to use this checklist on a routine basis.

Additional routine checklists and logs from RG-530C are included in **Attachment 1**.

CHECKLIST NO. 1: WWTP OPERATION AND MAINTENANCE						
Note: Some O&M may currently not be applicable with the current WWTP configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
1.1	217.330 (a) and (b)	Checked backflow-prevention devices for operation and leakage?				Weekly
1.2	217.327	Checked “non-potable water” signs posted at all hydrants and outlets?				Monthly
1.3	See permit: Operational Requirement No. 1. Monitoring Requirement No. 5, and 319.11(d)	Checked calibration on chart recorders and flow meters?				Weekly
1.4	See permit: Operational Requirement No. 1	Checked if the chlorine tanks are full and lines functioning properly?				Weekly
1.5	See permit: Operational Requirement No. 1	Checked if chemical metering pumps are functioning properly?				Weekly
1.6	See permit: Operational Requirement No. 1	Checked if the alum/chemical tanks are full and lines functioning properly?				Bi-weekly
1.7	See permit: Operational Requirement No. 1	Checked if the non-potable water pumps, motors, and lines are functioning properly?				Monthly
1.8	See permit: Operational Requirement No. 1	Is the ultraviolet system operating properly? Do UV bulbs need to be replaced?				Monthly
1.9	See permit: Operational Requirement No. 1	Checked if blowers and motors are functioning properly?				Weekly
1.10	See permit: Operational Requirement No. 1	Checked if airlift pumps and motors are functioning properly?				Weekly
1.11	See permit: Operational Requirement No. 1	Checked if air diffusers are functioning properly?				Monthly
1.12	See permit: Operational Requirement No. 1	Checked clarifier drive and motor are functioning properly?				Monthly
1.13	See permit: Operational Requirement No. 1	Checked clarifier control panel and alarm are functioning properly?				Monthly

1.14	See permit: Operational Requirement No. 1	Checked on-site lift station pumps and appurtenances are functioning properly?				Weekly
1.15	See permit: Operational Requirement No. 1	Is there vector control for all screening receptacles?				Monthly
1.16	See permit: Operational Requirement No. 1 and No. 4	Checked that you have exercised your generators?				Monthly
1.17	See permit: Operational Requirement No. 1	Checked properly functioning clarifier-skimmer wiper?				Monthly
1.18	See permit: Operational Requirement No. 1	Have you exercised your slide gates?				Weekly
1.19	217.328	Checked fence/gate/lock integrity to remain intruder-resistant along with appropriate caution signs?				Daily
1.20	See permit: Operational Requirement No. 1	Checked clarifier saw-tooth weir for significant algal growth and functions properly (even flow with no short-circuiting)?				Daily
1.21	See permit: Operational Requirement No. 1	Checked for flow consistent throughout the aeration basin (no notable dead spots)?				Daily
1.22	See permit: Operational Requirement No. 1	Checked that flow-measuring devices functioning properly at influent and effluent?				Weekly
1.23	See permit: Operational Requirement No. 1	Checked/clean bar screens properly				Daily
1.24	See permit: Operational Requirement No. 4 and Permit Condition No. 2.g.	Check standby/portable generator(s) for proper function.				Monthly
1.25	See permit: Operational Requirement No. 4 and Permit Condition No. 2.g.	Checked electrical utilities feeder lines or substations and/or switchover for emergency electrical switchovers?				Monthly

CHECKLIST NO. 2: LIFT STATION MAINTENANCE						
Note: Some O&M may currently not be applicable with the current LS configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
2.1	217.63(b)*	Are the high-level alarms and level sensors installed at each lift station functioning properly?				Weekly
2.2	See permit: Operational Requirement No. 1	Clean grease trap at facility prevent excessive grease within each wet well at each lift station?				Weekly
2.3	217.60(h)(1)	Checked that each pumps are functioning properly?				Daily
2.4	217.60(h)(1)	Checked and exercise gate valves in the valve vault(s)?				Monthly
2.5	217.60(h)	Checked control panel and SCADA system is functioning properly?				Weekly
2.6	217.60(h)	Checked for any leakage on riser or discharge piping.				Daily
2.7	217.60(h)	Checked emergency generator connection is functioning properly?				Monthly
2.8	217.60(h)	Checked and clean for any presence of debris or rags in the wet well?				Weekly
2.9	See permit: Permit Condition No. 2	Record or log if there is any unauthorized discharges at each lift station?				Monthly
2.10	217.59(b)	Is each lift station secured in an intruder-resistant manner?				Daily

CHECKLIST NO. 3: LABORATORY OPERATIONS AND MAINTENANCE FOR SELF-REPORT DATA						
Note: Some O&M may currently not be applicable with the current configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
3.1	319.11(a) and (b)	Are the thermometers certified by the National Institute of Standards and Technology?				Annually
3.2	319.11(a) and (b)	Is there a NIST-certified thermometer in the sample-storage refrigerator and the composite sampler?				Annually
3.3	319.11(a) and (c)	Check if reagents are in acceptable condition (unexpired, contained properly, etc.)?Dispose of expired samples or reagents.				Monthly
3.4	319.11(a) and (c)	Update lab instrument calibration log and testing protocols as necessary.				Weekly
3.5	319.11(d)	Calibrate the flow meter and chart recorder been calibrated? Calibrate as needed.				Weekly
3.6	319.11(a)	Are all monitoring instruments (e.g., DO and pH meters) properly calibrated? Calibrate as needed.				Weekly
3.7	319.11(b)	Are samples properly preserved? Dispose of improperly preserved material.				Monthly
3.8	319.11(e) and (f)	Organized chain-of-custody documents for recordkeeping?				Monthly
3.9	319.11(c)	Checked if pH and DO are monitored appropriately?				Weekly
3.10	319.11(c)	Checked if chlorine is monitored appropriately?				Weekly
3.11	319.7	Checked that records of equipment calibration, accuracy checks and maintenance maintained and are available for review?				Monthly

CHECKLIST 4: TPDES MONITORING AND REPORTING REQUIREMENTS						
Note: Some O&M may currently not be applicable with the current configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
4.1	319.4–12	Checked that effluent sampling and reporting are conducted as specified in the permit or in accordance with 30 TAC 319.4–12?				Monthly
4.2	See permit: Monitoring and Reporting Requirement No.1	Submit monthly effluent reports to the Enforcement Division by the 20th day of the following month for each discharge outfall?				Monthly
4.3	305.128	Are monitoring results reported on an approved self-report form that is signed and certified as required by 30 TAC 305.128 (relating to Signatories to Reports)?				Monthly
4.4	319.11–12	Are test procedures for the analysis of pollutants in compliance with procedures specified in 30 TAC 319.11–319.12 or the permit?				Monthly
4.5	See permit: Monitoring and Reporting Requirement No. 1	Are measurements, tests, and calculations accurate and representative?				Monthly
4.6	305.125(11)(A)	Record location of monitoring samples and measurements taken at times and in a manner so as to be representative of the monitored activity?				Monthly
4.7	305.125(11)(B)	Are all monitoring and reporting records, including strip charts and records of calibration and maintenance, copies of all records required by the permit, records of all data used to complete the application for the permit, and the certification required by 40 CFR† 264.73(b)(9), retained for a period of **three years** and readily available for review by a TCEQ representative?				Monthly
4.8	305.125(11)(C) See permit: Monitoring Requirement No. 3.c	Checked if all records of monitoring activities include the following: a. the date, time, and place of sample measurement; b. the identity of the person who collected the sample or made the measurement; c. the date and time of analysis; d. the identity of the individual and laboratory who performed the analysis; e. the technique or method of analysis; and f. the results of the analysis or measurement and quality assurance–quality control records?				Monthly

4.9	See permit: Monitoring Requirement No. 4	Is there additional monitoring (more monitoring than required by the permit) results in the calculation and reporting of the values submitted on the approved self-report form?				NA
4.10	See permit: Monitoring Requirement No. 5	Are all automatic flow measuring or recording devices and all totalizing meters for measuring flows calibrated by a trained person at least annually? Verify in writing that the device is operating properly and giving accurate results, and copies of the verification are retained and made readily available for review by a TCEQ representative for a period of three years?				Monthly
4.11	See permit: Monitoring Requirement No. 7.a	Checked to ensure written reports submitted to the regional office and the Enforcement Division are within **five days** of the time being aware of the noncompliance?				NA
4.12	See permit: Monitoring Requirement No. 7.a	Do written noncompliance reports contain all information as required in the noncompliance submittal? This includes: • a description of the noncompliance and its cause; • the potential danger to human health or safety, or the environment; • the period of noncompliance, including exact dates and times; if the noncompliance has not been corrected, the time it is expected to continue; • steps taken planned to reduce, eliminate, and prevent recurrence of the noncompliance.				NA
4.13	See permit: Monitoring Requirement No. 7.c	Are all effluent violations that deviate from the permitted effluent limitations by more than 40 percent reported in writing to the regional office and the Enforcement Division within **five working days** of becoming aware of the noncompliance?				NA
4.14	See permit: Monitoring Requirement No. 7.b	For additional bypass, check to submit prior notice by applying for authorization for any needed bypass?				Monthly
4.15	See permit: Monitoring Requirement No. 9	Notify (orally or by fax) within 24 hours, both the Regional Office and the Enforcement Division in writing within five working days, after becoming aware of discharge of any toxic pollutant?				NA
4.16	305.128	Are all reports and other information requested by the TCEQ signed by the person required by 30 TAC 305.128?				NA
4.17	See permit: Monitoring Requirement No. 9 and 40 CFR 122.42(b)	Provide adequate notice to the TCEQ of the following: • any new introduction of pollutants into the WWTP from an indirect discharger; • any substantial change in the volume or character of pollutants being introduced into the WWTP by				NA

		an identified source; • the quality and quantity of effluent introduced into the WWTP, and any anticipated impact of the change on quality or quantity of effluent.				
4.18	See permit: Operational Requirement No. 1	Organized process control, maintenance, and operations records retained readily available for review by a TCEQ representative, for three years?				Monthly
4.19	Chapter 21	Pay an annual water quality fee to the TCEQ as required by 30 TAC 21?				Annually
4.20	See permit: Operational Requirement No. 8.a	Checked if flow measurements reach **75 percent** of the permitted daily average or annual average flow for three consecutive months? If so initiate engineering and financial planning for expansion or upgrading of the domestic wastewater treatment or collection facilities.				Monthly
4.21	See permit: Operational Requirement No. 8.a	Receive permit authorization from the TCEQ to begin building necessary additional treatment or collection facilities whenever the flow reaches **90 percent** of the permitted daily average or annual average flow for three consecutive months?				Monthly
4.22	See permit: Operational Requirements	Checked if facility achieves at least 85 percent removal of biochemical oxygen demand and total suspended solids (based on a 30-day average)?				Daily
4.23	See permit: Operational Requirement No. 9	Checked to confirm all operators are holding a valid license at the required level?				Monthly

CHECKLIST 5. REQUIREMENTS APPLYING TO SLUDGE DIPOSED IN MUNICIPAL SOLID WASTE LANDFILL						
Note: Some O&M may currently not be applicable with the current configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
5.1	See permit: Sludge Provisions	Checked that no sludge is disposed of by land application on property owned, leased or under direct control of the City as this is considered a violation of the permit unless otherwise authorized by TCEQ.				Weekly
5.2	See permit: Sludge Provisions, Section I.A.1, and Chapter 312	Does the permittee handle and dispose of sewage sludge in accordance with 30 TAC 312 which protects public health and the environment from any toxic pollutants that may be present in the sludge?				NA
5.3	See permit: Sludge Provisions, Section I.A.2	Does the permittee (who prepares the sludge for another person for land application) supply necessary information to the parties who receive the sludge to assure compliance with these regulations?				NA
5.4	See permit: Sludge Provisions, Section I.A.3	Provide prior notice (180 days) to the TCEQ of any change planned in sewage sludge disposal?				Semi-annually
5.5	See permit: Sludge Provisions	Checked to test the sewage sludge (using the TCLP) at least once during the term of the permit and passed the test?				Once per Permit
5.6	See permit: Sludge Provisions, Section I.B.1	Prepare and submit an annual report on the results of all sludge-toxicity testing by September 30 of each year?				Annually
5.7	312.82	Is all sewage sludge that is applied to a TCEQ approved site treated to ensure that the sludge meets Class B pathogen requirements?				Monthly
5.8	312.83	Is all bulk sewage sludge that is applied to a TCEQ approved site treated to reduce vector attraction?				Monthly
5.9	312.46(a)(1)	Are metal constituents and fecal coliform or *Salmonella* bacteria monitored according to 312.46(a)(1)?				Monthly
5.10	312.7	Are representative samples of sewage sludge collected and analyzed according to the methods in 30 TAC 312.7?				Monthly
5.11	See permit: Sludge Provisions, Section II, C.1	Checked that no bulk sewage sludge is being applied to agricultural land, forest, a public contact site, or a reclamation site that is flooded, frozen, or snow covered?				Monthly
5.12	312.48	Does the City report to the TCEQ by September 30 of each year the information required in 30 TAC 312.48?				Annually
5.13	See permit: Sludge Provisions, Section II, E	Are records maintained monthly and made available to the TCEQ upon request?				Monthly

CHECKLIST 6. PROCESS CONTROL FOR ACTIVATED SLUDGE						
Note: Some O&M may currently not be applicable with the current configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
6.1	See permit: Operational Requirement No. 1	Checked if the quality of the mixed liquor are within the recommended range?				Daily
6.2	See permit: Operational Requirement No. 1	Checked if the depth of the clarifier sludge blanket are within the recommended range?				Daily
6.3	See permit: Operational Requirement No. 1	Checked if the dissolved-oxygen level in the aeration basin are within the recommended range?				Daily
6.4	See permit: Operational Requirement No. 1	Checked if the results of the 30-minute settleability test are within the recommended range?				Daily
6.5	See permit: Operational Requirement No. 1	Checked if the pH, chlorine, and dissolved oxygen levels in the effluent compliant are with the permitted limitations on effluents?				Daily
6.6	See permit: Operational Requirement No. 9	Checked if the system has enough adequately licensed operators?				Weekly
6.7	See permit: Operational Requirement No. 1	Checked if the facility prevent solids from entering the chlorine contact chamber?				Daily
6.8	See permit: Operational Requirement No. 1	Checked if the facility prevent solids from discharging into the receiving waters?				Daily

CHECKLIST 7. TEXAS LAND APPLICATION MAINTENENCE						
Note: Some O&M may currently not be applicable with the current configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
7.1	See permit: General Description	Checked if the irrigated area has not changed from the area described and listed in the permit?				Daily
7.2	See permit: Special Provisions	Checked if irrigation practices are designed and managed to prevent ponding of final effluent or contamination of ground and surface waters?				Daily
7.3	See permit: Special Provisions	Are irrigation practices designed and managed to prevent nuisance conditions in the area?				Daily
7.4	See permit: Special Provisions	Is treated wastewater applied to the irrigation field only when there is no rainfall or when the ground is not frozen or saturated?				Daily
7.5	See permit: Special Provisions	Is treated wastewater applied to the irrigation field at or below the permitted application rate?				Daily
7.6	See permit: Special Provisions	Checked the installed equipment that measures application rates and update accurate records of the volume of final effluent applied to the irrigation field?				Monthly
7.7	See permit: Special Provisions	Checked if City maintains records of the application rates for three years?				Monthly
7.8	See permit: Special Provisions	Checked if holding ponds conform to the requirements for stabilization ponds under “Design Criteria for Sewerage Systems” with regard to construction and levee design?				Monthly
7.9	See permit: Special Provisions	Checked that there is at least 2 feet of freeboard in holding ponds.				Daily
7.10	See permit: Special Provisions	Are the holding ponds well maintained with regard to erosion control?				Weekly
7.11	See permit: Special Provisions	Are the holding ponds well maintained with regard to weed and tree control? Cut and trim as needed.				Weekly
7.12	See permit: Special Provisions	Are annual soil samples collected and analyzed each year?				Annually
7.13	See permit: Special Provisions	Is each soil boring separated into three samples according to the following depth zones: 0 to 6 inches, 6 to 18 inches, and 18 to 30 inches below the ground surface?				NA
7.14	See permit: Special Provisions	Are the soil samples analyzed for pH, total nitrogen, potassium, phosphorus, and conductivity?				NA
7.15	See permit: Special Provisions	Are the results of the soil samples submitted to the TCEQ regional office and to the Water Quality Compliance Monitoring Team of the				Annually

		Enforcement Division during September of each year?				
7.16	See permit: Special Provisions	Does the City maintain a long-term contract with the owner of the land-application site that is authorized in the permit, or own the land authorized for application of treated effluent to the land?				Annually
7.17	See permit: Special Provisions	If rechlorination of the final effluent is required in the permit, does the maintain a trace chlorine residual in the final effluent at the point of irrigation?				Monthly
7.18	See permit: Special Provisions	Checked for signs erected stating that the irrigation water is from a non-potable water supply?				Daily
7.19	See permit: Special Provisions	Do the non-potable water supply signs bear a red slash superimposed over the international symbol of drinking water accompanied by the message “DO NOT DRINK THE WATER” in both English and Spanish?				NA
7.20	See permit: Special Provisions	Checked that all piping transporting the final effluent clearly are marked with non-potable water supply signs?				Daily
7.21	See permit: Special Provisions	Checked that spray fixtures for the irrigation system are designed so that they cannot be operated by unauthorized personnel?				Daily
7.22	See permit: Special Provisions	Checked that final effluent are only applied to the land-application site when the area is not in use?				Daily
7.23	See permit: Special Provisions	Checked that the holding ponds for the retention of treated or untreated wastewater are adequately lined to control seepage?				Monthly
7.24	309.20(b)(5)(B)(iii)	Checked to make sure there is no cross-connection with a system supplying potable water?				Daily
7.25	See permit: Special Provisions	Checked that the cover crop of the irrigation field is harvested at least once per year?				Annually

CHECKLIST 8. SLUDGE OPERATION AND MAINTAINENCE						
Note: Some O&M may currently not be applicable with the current configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
8.1	312.142(a)	Is the sludge being hauled by a properly authorized transporter?				Bi-weekly
8.2	312.145(a)	Are transporter manifests complete and available for review?				Bi-weekly
8.3	See permit: Sludge Provisions	Does the facility complete annual sludge report(s) (with attachments) and submit them by September 30 each year?				Annually
8.4	See permit: Sludge Provisions, Section III	Have TCLP analyses been completed if sludge is being disposed at an authorized landfill? If yes, are TCLP results available for review?				Monthly
8.5	See permit: Operational Requirement No. 1	Checked if the sludge are contained within its drying beds (no spills at the centrifuge, belt press or roll-off)?				Daily
8.6	See permit: Operational Requirement No. 1	Are the drying beds free from excessive vegetation? Dispose of excessive vegetation as needed.				Daily
8.7	See permit: Operational Requirement No. 1	Checked if floor drains are discharged to the head of the plant?				NA
8.8	See permit: Operational Requirement No. 1	Checked if the digesters are properly maintained?				Weekly
8.9	305.125(4)	Checked if facility does not have sludge entering the receiving stream?				Daily

CHECKLIST 9. MANHOLE OPERATION AND MAINTAINENCE						
Note: Some O&M may currently not be applicable with the current configuration.						
Item No.	**Reference**	**Plant Operation and Maintenance**	**Yes**	**No**	**NA**	**Frequency**
9.1	217.55	Checked if manhole is covered by an appropriate cast iron manhole cover? Checked if the cover is in good condition? Update GIS database as needed.				Daily
9.2	217.55	Checked if the manhole frame is aligned properly?				Weekly
9.3	217.55	Checked if manhole shows signs of inflow or infiltration?				Weekly
9.4	217.55	Checked if any debris or roots in manhole?				Weekly
9.5	217.55	Checked if any signs cracks at joints?				Weekly
9.6	217.55	Checked for signs of surcharging?				Weekly
9.7	217.55	Checked for adjustment ring conditions?				Weekly
9.8	217.55	Checked for condition of inlet and outlet pipes in manhole?				Weekly
9.9	217.55	Update GIS database with all condition changes for each manhole.				Weekly

4.0 COLLECTION SYSTEM MAINTENANCE

This section should serve as a “quick-guide” for a concise plan of maintenance activities required to be completed by the City on a routine basis.

4.1 Planned Maintenance and Scheduling

Televising, manhole inspection and routine maintenance such as CCTV, root cutting, grouting are all part of planned maintenance. The City shall monitor its sewer system for capacity issues to properly plan for future development. Reporting from this program shall be used to located sources of infiltration/inflow to the sewer system.

The City will keep an up-to-date map of the sanitary sewers and manhole locations. Developers should submit as-built plans for all site plans and subdivisions in order to keep the mapping system updated. It is recommended that these plans are submitted as GIS Shape files that can easily be added to the existing mapping database.

DYE TESTING

The removal of illegal connections is an important step in reducing the amount of direct inflow into the sewer system. Direct inflow from roof leaders, driveway drains, and other connections increases the amount of flow to the sewer system. This additional flow increases the cost of treatment and reduces the capacity of the sewer system during wet weather events.

To assist in the permanent removal of these connections, it is recommended that the City consider an ordinance requiring all real estate title transfers be contingent upon dye test and defect inspection results. This ensures that these disconnections are permanent and will assist in the identification of any connections that have not previously been identified.

Failure of the dye test or inspection during a real estate transfer would prevent the purchaser from completing the transaction until the illegal connection is removed and or defects repaired. Inspections of the property after the dye testing results are submitted will ensure that the purchaser has permanently removed the connection or repaired the defect. The City can also inspect and confirm the accessibility of any manhole located on the property.

CCTV INSPECTIONS

Close-circuit television (CCTV) inspection programs are recommended to determine current sewer conditions and to aid in planning a maintenance strategy. Ideally, sewer line inspections need to take place during low flow conditions. If the flow conditions can potentially overtop the camera, then the inspection should be performed during low flow times between midnight and 5 AM, or the sewer lines can be temporarily plugged to reduce the flow.

CCTV inspections are recommended for sewer lines with diameters of 4-48 inches. The CCTV camera must be assembled to keep the lens as close as possible to the center of the pipe. In larger sewers, the camera and lights can be attached to a raft, which is floated through the sewer from one manhole to the downstream manhole. An appropriate camera can swivel both vertically and horizontally. In smaller sewers, the cable and camera are attached to a sled, to which a parachute is attached and floated from one manhole to the next. Documentation of inspections is very critical to a successful operation and maintenance. CCTV inspections produce a video record of the inspection that can be used for future reference.

SMOKE TESTING

Smoke testing is a method of inspecting both the main lines and laterals. Smoke travels throughout the system, identifying problems in all connected lines. Even sections of line that were not known to exist or thought to be independent or unconnected. Smoke testing is a critical part of successful inflow and infiltration (I&I) studies. Smoke testing can aid in documenting sources of inflow and should be part of any maintenance program.

Smoke testing is the process that involves of blowing smoke mixed with air into the sanitary sewer line made through the manhole. The smoke travels the path of least resistance and is shown at sites that allow surface water inflow. Smoke will identify broken manholes, illegal connections, sump pumps and yard drains, uncapped lines and cracked mains and laterals, providing there is a passage for the smoke to travel to the surface.

The general steps for smoke testing sanitary sewer lines include:

1. Locate areas of the sanitary sewer system that experience I&I during wet weather.
2. 48-hours prior to smoke testing, notify the residents of the upcoming test. Provide a detailed list of precautions to prevent smoke from getting into residential property. Ensure that all crews wear the proper safety clothing and vests for easy identification.

3. While smoke testing, the tester will be looking for smoke coming out of a home's roof vent. That indicates that the home is tied on to the sanitary sewer system. The most common defects on the private side are: broken clean-out caps, downspouts, broken service laterals, sump pumps, and crawl spaces. Detection on the public side include sanitary manholes with open pick holes, manholes that lie in low areas, and broken main lines.
4. The next step is to identify defects that need to be rehabilitated or corrected. Use a non-toxic liquid smoke that is in compliance with the Substance Control Act. Use remote plugs that can be inflated from above grade without entering the sewer. This eliminates confined space entry and keeps crews efficient and productive. This also helps isolate segments of sewers without affecting other areas.
5. Document and identify smoke-testing defects by placing flags or marking with spray paint, and then document on location and observations. Utilize GIS to pinpoint the location and record all pertinent data for a given defect.
6. Gather all data and photos together and generate a list estimating the amount of inflow and infiltration along with cost estimates to correct the defects.

MANHOLE INSPECTION

Accessibility to the sewer system is required in order to evaluate and maintain the system. A primary initial objective of the O&M program will be to evaluate the accessibility of each manhole in the system. The City should visit each of the manhole structures located in the system to verify the following:

- The manholes are accessible;
- The tops of the manholes are not buried or paved over;
- The manhole lids have not been displaced, removed or damaged.

Any change in status of the manhole accessibility should be noted and a photograph can be uploaded to the Dashboard system.

As noted in the 2023 Assessment Management Report, it is recommended that each manhole in the system be re-inspected every 2-5 years. A physical inspection of each manhole will assist in proactively identifying defects. The City has approximately 37 sanitary sewer manholes. Based on this number, the City should aim for inspecting at a minimum of 8 sanitary manholes every year. The goals of the physical survey are to:

1. Prevent the premature failure of the structures;
2. Identify collection system maintenance needs;

3. Identify any system surcharging/bypassing; and
4. Maintain each manhole structure in a proactive manner.

Personnel working on the survey program should be properly trained if confined space entry is required during MH inspections. For preventative regular inspections, confined space entry into the manholes is not necessary. Each manhole inspection should be recorded and updated on the GIS Platform for all fields as needed. As an alternative, the City can use the provide sample templates (**Attachment 2, 3, and 4**) for record keeping purposes. Photographs of any areas that require repair and other deficiencies should be noted and ranked for repair scheduling. The Dashboard can be updated after the repairs are made.

Manhole overflows must be properly reported to regulatory agencies. The cause of the overflow shall be analyzed to determine if improvements can be made to prevent further overflows.

SANITARY SEWERS LINES

Overflows occurring at manholes, as mentioned above, indicate there may be a capacity issue in the downstream mainline sewers. The pipes should be analyzed for blockage or inadequate capacity and the cause of the overflow should be immediately corrected.

It is recommended that the City implement a sewer televising, repair, and I&I testing programs. Sewer lines can be televised to establish the baseline for identifying segments that require immediate and potentially on-going attention relative to routing re-current cleaning. Major trunk lines and interceptor sewers with known issues are recommended for televising every three years. In addition, sewer lines located in remote areas or within City easements can be walked for visual inspection annually, if possible. Condition assessments and televising document the following details and deficiencies:

- Characteristics including pipe diameter, and age and type of material
- Dips in line
- Grease build-up
- Root intrusion
- Sediment accumulation and encrustation
- Structural condition, including cracks, corrosion and erosion
- Joint alignment and movement
- Reverse slope

- Obstructions
- Deformations in line

4.2 Manhole and Sewer Cleaning

The cleaning, inspection and assessment efforts are performed by the City staff or third-party contractors if necessary. All data is entered into an inspection spreadsheet (see **Attachment 3 Sample Form – Manhole Physical Survey Form**) or in the Dashboard. All cleaning records are kept in a log form or GIS that tracks the following:

- date, time and location of cleaning activity;
- specific lines cleaned;
- equipment used;
- identity of cleaning crew;
- number of passes needed to clean the line;
- presence of root, grease, or debris; and
- problems identified or other follow up actions necessary.

Each line segment cleaned is identified by an upstream and downstream manhole number.

It is recommended that the City consider an annual cleaning and root removal program after lines have been inspected and assessed. For record keeping, **Attachments 2 and 4** would be useful to the City.

4.3 Preventative Maintenance

Fats, Oils and Grease, otherwise known as “FOG”, can be a significant cause of sewer blockages. Specific areas with FOG issues should be identified for priority cleaning; these areas are typically near restaurants, food service facilities, and apartments. Grease and grease-like products can significantly increase the likelihood of sewer overflows. Grease can also cause blockages or aggravate blockages due to roots or structural deficiencies. It is recommended the City develop and implement a FOG program to regulate and prevent the inflow of FOG into the sanitary system, as possible. The FOG program can include education for commercial /industrial facilities and residents, annual inspection and periodic sewer cleaning.

Roots can be a significant cause of sewer blockages in some areas of your collection system. Identification of these blockage “trouble spots” and their causes is usually based on blockage history and

line investigation. Mechanical removal is the most common form of root control. Cutting a tree's roots is like pruning the tree, and stimulates root growth into the system. Consequently, mechanical treatment must be repeated every couple of years.

4.4 Maintenance of Right-of-Ways and Easements

Sewer lines are located within the right-of-ways or easements. Bi-annual review of sanitary easements is recommended to maintain access to the sewer lines.

4.5 Lift Station Maintenance

All moving parts of any type of machinery must be kept clean, well lubricated and properly adjusted. If equipment is not maintained properly, wear will increase, efficiency will decrease and eventually the equipment will fail. A well planned and implemented preventive maintenance program will be effective in assuring maximum efficiency and long life for each item of equipment installed in the lifting stations.

PREVENTIVE MAINTENANCE

Manufacturer's catalogues and literature furnished with the equipment generally include basic preventive maintenance requirements. Use **Attachments 5 and 10** as templates for filling out corrective and preventative maintenance records. This type of maintenance generally consists of lubrication, cleaning, adjusting, and replacing worn parts.

It is recommended that each lift station be inspected daily to take readings, observe any changes in the equipment, and monitor lift cycles for the general maintenance of each lift station. Some types of maintenance can be scheduled on a yearly basis. There are seasonal items to be scheduled such as lawn/landscaping work and exterior painting. Other items may be needed in five-year intervals, such as paving/driveway repairs, electrical system.

WORK ORDER SYSTEM

A work order aids in identifying work to be accomplished, procedure priority, and information on any special aspects of the job. A log of the work orders provides a record of when the work order was initiated and completed. The work order forms could be numbered to provide a means of maintaining accountability, provide a brief description of the work performed, and identify staff completing the work. Use **Attachment 15** as a template for filling out Work Order Forms as necessary. As an alternative, the Dashboard can be used as a platform to track and keep records of work orders performed by the City.

By keeping records on a database such as Dashboard, the records can be transferred to another software than can be installed in the future.

LIFT STATION OPERATION: RECORD KEEPING

Proper record keeping will be essential to the successful implementation of this O&M Manual. Records include flows, call-outs, routine and preventive maintenance and major capital improvements. Records include dates when maintenance is performed. Specific data on the number of man-hours, cost and material or supplies consumed should be noted whenever any unusual preventive maintenance is performed. Routine maintenance may be documented simply by date and initial of the person doing the work.

BUDGET DEVELOPMENT SYSTEM

It is beneficial to collect all information relative to costs of maintenance (e.g., man-hours, wages, cost of spare parts, contract costs, etc.) chronologically for each fiscal year. This information will be used annually in compiling a budget for the following year. Use **Attachment 11** as a tool to keep records of purchase orders. Use **Attachment 14** as a template to aid in tracking ongoing wastewater projects.

EQUIPMENT RECORD KEEPING

An equipment record system is recommended for lift stations. This data should be completed and verified on a monthly basis. See **Attachment 7** Sample Equipment Data Card:

- Name and number given to the item
- Name of manufacturer or supplier
- Name of telephone number of representative
- Cost and installation date
- Model number, serial number, size, type, etc.
- Equipment data
- Maintenance item on hand
- Spare parts on hand

4.6 Equipment and Tool Inventory

The City shall keep the necessary equipment and tools on-hand to operate its collection system efficiently and in cases of emergency. Use **Attachment Nos. 8 and 9** as templates to fill out the inventory of equipment. This excludes heavy equipment such as a vacuum or roll-out truck. Use of vacuum trucks or other specialized pieces of equipment may be rented on an as needed basis.

5.0 PERMIT AND CONTACT INFORMATION

5.1 Facility Permit and Permit Modifications

Water Quality Permit No. WQ0010765001

TCEQ Regulated Entity No. RN1019162455

EPA ID No. TX0025968

A copy of the permit should be kept at the WWTP facility at all times, it is also included as **Attachment 1**.

5.2 Regulatory and Emergency Contacts

TCEQ Region 12, Houston

Regional Director:	Nicole Bealle
Assistant Regional Director:	Andy Goodridge
Executive Assistant:	La'Trenda McClellan
Main Line:	713-767-3500
Fax:	713-767-3520
Water Section Manager:	Westin Massey
Spill Reporting (24 Hour)	800-832-8224
SBLGA Hotline	713-767-3510

EPA Region 6 –Dallas

General Information	800-887-6063
NPDES Compliance	214-665-7521

Other Contact Information:

Emergency Services	911

Wallis Police Department

Police Department	David Moseley, Chief of Police
Non-emergency line	(979) 478-7111

Austin County Emergency Management Services

Station 4	(207 Cedar Street, Wallis, Texas 77485)
Non-emergency line	(979) 478-7151

Wallis Volunteer Fire Department

Non-emergency line	979-478-6712

Wallis County Sheriff

Non-emergency line	(979) 865-3111

Phone and Internet Services, HughesNet

(Residential) Non-emergency line	855-612-1807
(Business) Non-emergency line	855-612-1807

Texas Pride Disposal

Garbage service	(281) 342-8178

5.3 Licensed Operators

Licensed water or wastewater operators in City of Wallis can be found using the following link along with their license type/level, license number, and expiration date.

https://www2.tceq.texas.gov/lic_dpa/index.cfm

The current list of operators and licenses according to TCEQ is tabulated below:

LICENSEE	LICENSE TYPE	LICENSE LEVEL	LICENSE NUMBER	LICENSE STATUS	EFF DATE	EXPIR DATE
FRICKE, JORDAN	WASTEWATER TREATMENT OPERATOR	D	WW0070734	CURRENT	09/29/2022	09/29/2025
HAVEMANN, CHARLES A	WASTEWATER COLLECTION OPERATOR	I	WW0039412	CURRENT	04/15/2021	05/14/2024
KULHANEK, DENNIS J	WASTEWATER TREATMENT OPERATOR	C	WW0012255	CURRENT	03/31/2020	05/23/2023
MARESH, JOHN WILLIAM	WASTEWATER TREATMENT OPERATOR	C	WW0021367	CURRENT	10/07/2021	11/12/2024
POTTER, STEVEN L	WASTEWATER TREATMENT OPERATOR	B	WW0065458	CURRENT	08/12/2020	08/12/2023
WITTE, ROBERT A	WASTEWATER COLLECTION OPERATOR	II	WW0008984	CURRENT	03/19/2021	04/02/2024

5.4 Discharge Monitoring Report (DMR) Address and Signatory Authority

Form TCEQ-20431 appears in **Attachment 16**. It can also be downloaded at:
https://www.tceq.texas.gov/downloads/assistance/water/wastewater/20431.pdf

5.5 Process-Control Tests

Wallis's WWTP is an conventional wastewater treatment facility that uses biological processes to treat wastewater, which general process consists of Lift Station>Manual Bar Screens>Imhoff Tank>Trickling Filter>Clarifier>Chlorine Contact>Effluent Outfall. These processes require regular monitoring and adjustments. Performing process-control tests help ensure the facility stays within the effluent permit (i.e., to avoid effluent quality violations).

The TCEQ's Licensing Program and the Advisory Committee for Water Utility Operator Licensing developed recommendations for minimum process-control tests. These tests are listed in Process Control Tests for Domestic Wastewater Treatment Facilities (RG-002), and included in the **Attachment 17 the as WWTP Monitoring Forms – Startup and Operating Procedures**.

COMMONLY USED ABBREVIATIONS

BOD	biochemical oxygen demand
Cl_2	chlorine gas
COD	chemical oxygen demand
DO	dissolved oxygen
F/M	food-to-microorganism ratio
GPD	gallons per day
GSA	Gould sludge age
MCRT	mean cell-residence time
MGD	million gallons per day
Mg/L	milligram(s) per liter
MLSS	mixed-liquor suspended solids
N	nitrogen
NH_3	anhydrous ammonia
NH_3-N	ammonia nitrogen
RAS	return-activated sludge
SV30	settleability test, or the 30-minute settling test
SVI	sludge-volume index
TCLP	toxicity characteristic leaching procedure
TSS	total suspended solids
VSS	volatile suspended solids
WAS	waste-activated sludge

5.6 Process-Control Daily Activity Report and Operator's Daily Activity Reports

Sample reports for process-control testing and for recording the daily and monthly activities appear in **Attachment 1**. The City's TPDES permit indicates the frequency of monitoring and is also provided in the Compliance Section 6b.

5.7 Summary of Plant Information

Plant Capacity: 0.498 MGD

Maximum: 1.5 MGD

Flow Capacity: 1042 GPM

The City of Wallis operates a WWTP located in the northwest part of the City collection system (17403 Railroad Street, Wallis, Texas 77485 (Austin County). A gravel road provides access to the WWTP on Railroad Street. The WWTP is secured with a metal swing gate and fenced with chain linked fence topped with 3 strands of barbed wire.

The WWTP is permitted to treat an average daily flow of 0.498 million gallons per day (MGD) and a 2-hour peak of 1.5 MGD. There is one (1) on-site LS at the WWTP facility. The City currently has a third-party licensed operator (EDIC) that operates the LS and WWTP.

The WWTP is equipped with manual bar screens, (3) Imhoff Tanks, (2) Trickling Filters, (2) Clarifiers (2) Chlorine Contact Basins, and (1) effluent box. The WWTP takes flow from the onsite LS which has two force mains (4-inch and 8-inch) that that carries the flow to the manual bar screens. The WWTP discharges to the ditch on Railroad Street outside the WWTP fence line, to an unnamed ditch, thence to Tesch's Branch; thence to Allen's Creek, thence to Brazos River below Navasota River Segment No. 1202 of the Brazos River Basin.

See **Attachment 19** for the wastewater system map and WWTP site map. See **Attachment 21** for TCEQ Regulatory Guidance on Imhoff system.

NUMBER AND LOCATIONS OF LIFT STATIONS

The City has five (5) LS within the collection system and one (1) LS on-site within the WWTP facility as listed in the table below.

LIFT STATION NUMBER/ NOMENCLATURE NAME	FORCE MAIN SIZE (INCH)	FORCE MAIN OUTFALL	GENERAL NOTES
LS #1 – INFLUENT LS (ON-SITE WWTP LS)	8" (Pump 3, 4) 4" (Pump 1, 2)	Headworks (Imhoff Tank #1,2,3)	This LS receives flow from the entire collection system and pumps to the headworks of the WWTP.
LS #2 – COLUMBUS ST	6"	MH160	This LS receives flow from LS#3 and areas north of FM1093 and south of Rogers Street.
LS #3 – 7TH ST	6"	MH156 (OLD WET WELL AT LS #2)	This LS receives flow from the northeast area of the City including the Lakeview neighborhood and south of HWY 36, in the southeast area of the City.
LS #4 – LEGION ROAD	4"	MH54	This LS receives flow from the south of HWY 36, in the southwest area of the City.
LS #5 – MAREK STREET	4"	MH10	This LS receives flow from the empty trailer park lots and some homes south on Marek Street. This LS receives minimal flows.
LS #6 – WESTGATE ST	4"		This LS receives flow from the Westgate community on the far southwest side of the City.

TYPE OF EMERGENCY POWER SOURCE

Each lift station has a natural gas generator with direct connection to a gas line. The WWTP lift station has a diesel generator and tank. Use **Attachment 13** as a template to populate your emergency equipment inventory.

LOCATION OF EMERGENCY POWER SOURCE (WWTP)

On-site at WWTP next to influent lift station, on slab and weather protection canopy

5.8 Soil Monthly Effluent Report

The WWTP is permitted to dispose of sludge only at a TCEQ authorized land application site or co-disposal landfill. The disposal of sludge by land application on property owned, leased or under the direct control of the City is a violation of the permit unless the site is authorized with the TCEQ. The TCEQ does not authorize distribution and marketing of this sludge or land application of Class A Sludge. This permit does not authorize the City to land apply sludge on property owned, leased or under the direct control of the City. Use **Attachment 18** as a template for monthly soil monitoring requirements to send to the TCEQ. Further requirements for sludge and land application can be found in Section 6 Compliance.

6.0 COMPLIANCE MANUAL

This section provides guidance to help the City understand their obligations under TCEQ wastewater discharge requirements; however, for a complete understanding of all legal requirements, you must refer to the state statutes and regulations as found in the state regulatory website below:

https://www.tceq.texas.gov/permitting/wastewater

This checklist is a compliance assistance tool, and does not substitute for any applicable legal requirements or dismiss the responsibilities of the City to maintain compliance with state laws.

This section covers compliance with the TCEQ rules and the TPDES permit. Specifically covered are:

i. Training management and staff on monitoring, reporting, and record-keeping requirements.
ii. TCEQ investigations and enforcement process.
iii. Supporting TCEQ Documents and Frequency-Asked-Questions

6.1 Training, Monitoring, Reporting, and Record-keeping Requirements

TRAINING

GIS Integration

The City has access to their system equipment information through the ESRI ArcGIS Online asset database platform. The asset data on the GIS platform contains useful parameters collected as part of the data collection process. These parameters include model number, series number, material, size, age, or condition. The combined use of this O&M manual and the GIS platform will provide the City with organization and ease-of-use for adding new assets, recordkeeping, inventorying, condition assessments, future planning, as well as operations & maintenance and remaining in compliance. The How-To document in **Attachment 20** will provide a step-by-step training guide to using the web and mobile applications during routine wastewater system operations and maintenance. The wastewater system GIS information can also be shared if the City allows access to the data. This information can be shared with TCEQ investigators during their inspections for ease-of-use.

The How-To training guide document describes how to use the Web Mapping Application for adding or modifying additional assets, filtering or querying results of interest, viewing system analysis widgets, etc. The guide document also explains how to use the mobile application Field Maps for ArcGIS on a

smartphone so that field data can be added or modified in real-time out in the field by Staff. The method is a convenient tool for City Staff to maintain their recordkeeping in compliance.

MONITORING

Based on the City Wallis TPDES discharge permit, the WWTP monitoring frequency requirements of each parameter at the defined Outfall Number 001 can be found in the table below, along with the required reports to submit to the state regulatory agency.

Compliance Schedule Reports

Monitoring Requirement	Frequency	Type
Discharge Monitoring Reports* (DMR) - NetDMR	Monthly	
• Flow	5/week	Instantaneous
• CBOD5	1/week	Grab
• TSS	1/week	Grab
• E coli	1/month	Grab
• Chlorine Residual	5/week	Grab
• pH	1/month	Grab
• DO	1/week	Grab
Solid Sludge Monitoring Report*	Monthly	
• Toxicity Characteristic Leaching Procedure	Once	Grab
• PCBs	Once	Grab
• Metal constituents	Annually	Grab
• Fecal coliform	Annually	Grab
• Salmonella	Annually	Grab
Sludge Land Application Testing Report*	Annually	
• Irrigation	Annually	Grab
• Flow	5/week	Grab
• BOD5	1/month	Grab
• pH	1/month	Grab
Quarterly Progress Report - Include discussion of the interim requirements and progress towards attaining final effluent limitations	Quarterly	

*****The parameters provided in the table are required as part of the corresponding report(s) but is not a complete list of all requirements to be provided in the report submittals to TCEQ. For a complete list of all requirements in the report, refer to the existing TPDES discharge permit.

Test procedures for the analysis of pollutants should comply with procedures specified in 30 TAC§319.11-319.12.

Measurements, tests, and calculations shall be accurately accomplished in a representative manner to comply with these requirements. Monitoring samples and measurements shall be taken at times and in a manner to be representative of the monitored activity.

FLOW MEASUREMENT AND CALIBRATION

All automatic flow measuring or recording devices and all totalizing meters for measuring flows should be accurately calibrated annually at a minimum (unless authorized by the Executive Director for a longer period), by a trained person at plant start-up and as often thereafter as necessary to ensure accuracy. Such person should verify in writing that the device is operating properly and giving accurate results. Copies of the verification should be retained at the facility site or should be readily available for review by a TCEQ representative for a period of three years.

All laboratory tests submitted to demonstrate compliance with this permit must be tested by a laboratory that is accredited and certified. The laboratory must meet the requirements of 30 TAC§25, Environmental Testing Laboratory Accreditation and Certification.

REPORTING REQUIREMENTS

Monitoring results shall be provided at the intervals specified in the permit as referenced in the table above. The City shall conduct effluent sampling and reporting in accordance with 30TAC §319.1-319.12. This chapter details the correct process and procedures to follow.

Unless otherwise specified, a monthly effluent report shall be submitted each month, to the Enforcement Division (MC 224), by the 20th day of the following month for each discharge which is described by in permit whether or not a discharge is made for that month. For convenience, the TCEQ has provided a Reporting, Fee, and Renewal Due Date table to assist municipalities with submitting reports, such as the monthly effluent report, in a timely manner. The following hyperlink provides access to the common due dates webpage:

https://www.tceq.texas.gov/assistance/resources/due-dates.html

Monitoring results must be reported on an approved self-report form that is signed and certified as required by Monitoring and Reporting Requirements No. 10. The monthly schedule below can also be referenced to help the City keep track of general permit due dates.

Due Dates for General Discharge Reports

Month	Action
January	• Complete sampling by January 31. • Submit December DMR by January 20. • Submit biomonitoring DMR by January 20, if applicable.
February	• Complete sampling by February 28. • Submit January DMR by February 20.
March	• Complete sampling by March 31. • Submit February DMR by March 20.
April	• Complete sampling by April 30. • Submit March DMR by April 20. • Submit biomonitoring DMR by April 20, if • applicable.
May	• Complete sampling by May 31. • Submit April DMR by May 20.
June	• Complete sampling by June 30. • Submit May DMR by June 20.
July	• Complete sampling by July 31. • Submit June DMR by July 20. • Submit biomonitoring DMR by June 20, if • applicable.
August	• Complete sampling by August 31. • Submit July DMR by August 20.
September	• Complete sampling by September 30. • Submit August DMR by September 20. • Submit annual sludge report by September 30, • including addenda.
October	• Complete sampling by October 31. • Submit September DMR by October 20. • Submit biomonitoring DMR by October 20, if • applicable.
November	• Complete sampling by November 31. • Submit October DMR by November 20.
December	• Complete sampling by December 31. • Submit November DMR by December 20.

Discharge Monitoring Reports (DMRs) can be submitted online via NetDMR. The benefits of using the online tool can help:

- reduces the paperwork burden;
- improves data quality by automatically error-checking and validating data before submission to the TCEQ;
- aids in the timeliness of DMR submissions;
- sends an immediate confirmation of submission;
- allows access to five years of electronic copies;
- allows data import for multiple outfalls at the same time;
- accepts electronic signatures; and
- allows submission of attachments such as lab data, photographs, or other documentation relevant to the DMR.

The TCEQ should have prepared Monthly Effluent Report (MER) forms for the required facilities such as wastewater reuse and land application facilities. The City is required to submittal those forms monthly as required by the permit. These can include wastewater reuse and land-application facilities.

The City should be aware of administrative, civil and criminal penalties, as applicable, for negligently or knowingly violating the Clean Water Act (CWA); TWC § 26, 27, and 28; and THSC §361, including but not limited to knowingly making any false statement, representation, or certification on any report, record, or other document submitted or required to be maintained including monitoring reports or reports of compliance or noncompliance, or falsifying, tampering with or knowingly rendering inaccurate any monitoring device or method required or violating any other requirement imposed by state or federal regulations.

SELF-REPORTING

Any noncompliance which may endanger human health or safety, or the environment should be reported to the TCEQ. This includes, but not limited to the following violations under the Monitoring and Reporting Requirement 7.a:

- Unauthorized discharges
- Unanticipated bypass that exceeds any effluent limitation in the permit
- Exceeded maximum daily discharge limit for pollutants listed in the permit
- Changes in discharges of toxic substances

Report of such information should be provided orally or faxed to the Regional Office within 24 hours of becoming aware of the noncompliance. A written submission of such information should also be provided by the permittee to the Regional Office and the Enforcement Division (MC 224) within five working days of becoming aware of the noncompliance. The written submission should contain:

- A description of the noncompliance and its cause;
- The potential danger to human health or safety, or the environment;
- The period of noncompliance, including exact dates and times;
- If the noncompliance has not been corrected, the time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance, and to mitigate its adverse effects.

RECORD-KEEPING

The City should retain the following documents at a facility site or make it readily available for review by a TCEQ representative for a period of **three (3) years** from the date of the record or sample, measurement, report, application or certification. However, this period could be extended at the request of the Executive Director:

- Monitoring and reporting records, including strip charts and records of calibration and maintenance,
- Copies of all records required by the permit,
- Records of all data used to complete the application for the permit,
- All laboratory, testing, and operator certification required by 40 CFR § 264.73(b)(9)
- Records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which should be retained for a period of **at least five years** (or longer as required by 40 CFR Part 503),

The records of monitoring activities as mentioned in the previous section should include the following data:

- date, time and place of sample or measurement;
- identity of individual who collected the sample or made the measurement.
- date and time of analysis;
- identity of the individual and laboratory who performed the analysis;

- the technique or method of analysis;
- the results of the analysis or measurement and quality assurance/quality control records.

SLUDGE PROVISIONS

The City should keep management records for all sludge (or other waste) removed from their wastewater treatment process. These records should fulfill all applicable requirements of 30 TAC § 335 and must include the following, as it pertains to wastewater treatment and discharge:

- Volume of waste and date(s) generated from treatment process;
- Volume of waste disposed of on-site or shipped off-site;
- Date(s) of disposal;
- Identity of hauler or transporter;
- Location of disposal site; and
- Method of final disposal.

The above records should be maintained on a monthly basis. The records should be retained at the facility site, or shall be readily available for review by authorized representatives of the TCEQ for at least five (5) years.

Note that the period during which records are required to be kept should be automatically extended to the date of the final disposition of any administrative or judicial enforcement action that may be instituted against the City.

6.2 TCEQ Investigations and Enforcement Process

INVESTIGATIONS

TCEQ conducts investigations throughout the state to ensure compliance with state environmental regulations. Investigations can be initiated routinely or at any point with or without preceding violations or complaints. The checklists are only intended as a guide to allow consistent criteria for investigation. These checklists are made available online to allow the City to prepare for the investigations and can be found here:

https://www.tceq.texas.gov/compliance/investigation/checklists/waterchecklists

These checklists are also a good way for the City to maintain routine compliance by using the checklists as a guideline to properly maintaining the City wastewater system.

During TCEQ investigation process, the City should be able to assist the TCEQ representative with the system data, such as the location and record-keeping procedures to remain complaint. These also include O&M records and procedures, laboratory and sampling records, and self-monitoring records. Some critical components to comply with TCEQ during investigations or enforcement include:

- An available copy of the current TPDES permit at the WWTP.
- Operators should review the permit to understand requirements. Record keeping for permit requirements: The City can use the standard forms attached to this document or as modified by the City.
- Understand where records are kept, and keep a filing system. All monitoring and reporting activities should be kept by month and year. Some records may be online.
- Train staff so all understand the permit, requirements of the permit, and filing/record-keeping system.

The City's record-keeping system should keep records related to operational or process-controls, operator daily logs, maintenance records for equipment, laboratory reports, sampling records, monitoring forms (such as DMRs and Monthly Effluent Reports), correspondence with the TCEQ, calibration records, backflow prevention assembly certifications, operator certification records. Unless otherwise directed by the TCEQ, records should be kept for a minimum of three (3) years.

TCEQ reporting is completed monthly (unless otherwise specified in the permit) with the Discharge Monitoring Reports (DMRs). Monthly Effluent Reports also should be submitted as directed by TCEQ.

Checklists as provided within TCEQ Publication RG-530d are included in the appendix. These checklists include O&M data, self-reported data, permit data, process-control, and lift station data.

A general schedule of TCEQ monitoring and reporting is as follows:

- DMRs, includes supporting data, submit monthly, in accordance with permit.
- MERs, includes supporting data, submit monthly (if applicable)
- Non-Compliance (i.e., bypasses, unauthorized discharges, overflows, effluent violations deviating 40% from permit)
    - Within 24-hours (orally) to regional office,
    - Within 5 days (written) to regional office

Should the WWTP have a discharge flow of 75% permitted daily or annual average flow for three consecutive months, the City will need to obtain a waiver or initiate expansion and/or upgrades to the plant; reference 30 TAC 305.126(a). If 90% of the permitted daily or annual average flow occurs for three consecutive months, authorization is needed from the TCEQ to start construction or apply for a variance, reference 30 TAC 305.63.

The City's permit may have other reporting or monitoring requirements, see the "Other Requirements" section.

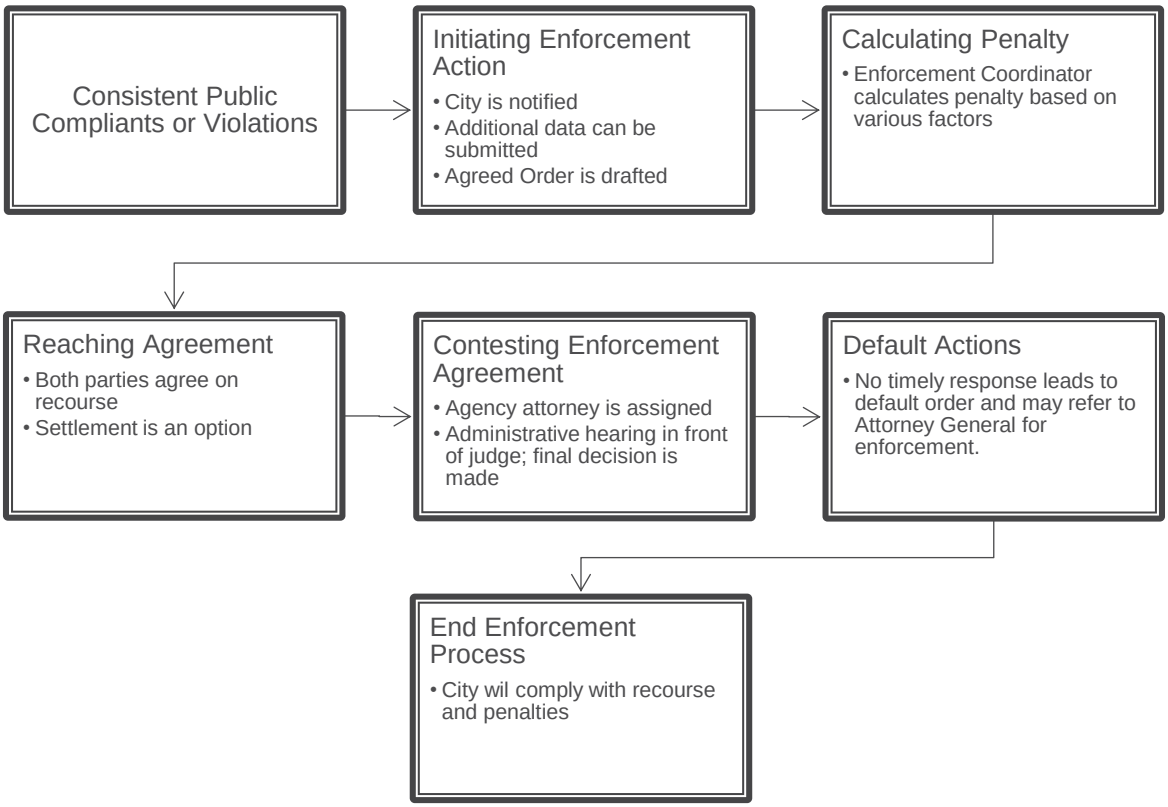
Additional information is provided in the TCEQ publication RG-530d and includes information on monitoring, reporting, recording keeping, due dates and monitoring tips, sanitary sewer overflow questions and answers, and other compliance frequently asked questions. The document also includes information regarding TCEQ investigations. It is recommended for the City to be familiar with the procedures of compliance to help fill out the correct forms before, during, and after the regulatory compliance investigations.

ENFORCEMENT

The City should be familiar with the enforcement process if it finds itself in the scenario. Familiarizing yourself with the enforcement process will allow the City to be proactive with the regulatory entity and can potentially reduce the enforcement penalty.

Enforcement is the process in which the TCEQ responds to serious or continuing environmental violations by requiring corrective actions to be taken and/or by assessing monetary penalties against businesses or individuals for those violations. The TCEQ enforcement process summarized as follows:

General Enforcement Process



1. Documenting Violations and Determining Appropriate Action

Consistent public complaints filed through TCEQ or routine investigations can trigger violation either at the City's location or through a review of records at TCEQ offices. In general, most violations are quickly corrected in response to notices of violation. *A Notice of Violation* (NOV) documents the violations discovered during the inspection, specifies a time frame to respond, and requires documentation of compliance.

If serious violations are identified during an investigation and meeting the Enforcement Initiation Criteria, the TCEQ will initiate a Notice of Enforcement (NOE) to the City. The Notice of Enforcement (NOE) would documents the violations and alert the City that it has been referred to for enforcement

This notice should let the City know that they can appeal the NOE by requesting an enforcement review meeting if they believe the violations were cited in error.

2. Initiating Enforcement Action

The enforcement case is handled through the administrative order process. The investigation is verified for accuracy and the City will be offered the opportunity to submit additional information. An *Agreed Order* is drafted to describe the alleged violations and any corrective actions, along with a calculated penalty.

3. Calculating the Penalty

An enforcement coordinator will calculate the penalty based on the following information:

- Compliance history
- Culpability
- A good-faith effort to comply
- Economic benefit
- Other factors as justice may require
- Whether the site of the violation is considered a major or minor source of potential pollutants;
- Whether the violation harmed the environment or human health, or has the potential to cause harm
- Whether the violation was programmatic (usually stemming from errors in paperwork).

4. Reaching an Agreement

If the City agrees to the Agreed Order, the case would be set for approval with the TCEQ commissioners. In this stage, a settlement is still an option.

5. Contesting an Enforcement Agreement

If the City contests the enforcement action, an agency attorney is assigned, and the City can request an administrative hearing, which is held in front of an administrative law judge with the State Office of Administrative Hearings. Note a settlement could still occur at any time prior to a final decision on the order.

After the hearing, the judge makes a recommendation to the TCEQ commissioners about an enforcement order. The commissioners consider this recommendation and then make the final decision whether to issue, deny, or modify the judge's decision.

6. Default Actions

If the City defaults on the enforcement action or does not file a timely answer to the executive director's petition, the TCEQ commissioners may issue a default order. If the respondent fails to comply with the default order, then the executive director may refer the case to the Office of the Attorney General for civil enforcement in a court of law.

7. The End of the Process

The enforcement process ends once the City complies with the Agreed Order, which includes payment of any penalty attached to the enforcement.

ADDITIONAL INFORMATION FOR THE ENFORCEMENT PROCESS

The process of enforcement can sometimes cause confusion to Cities and Owners so the TCEQ has complied commonly asked questions that are asked before, during, and after the enforcement process. The questions are extensive and can be found via the following webpage link starting on Page 6, or can be found as an attachment to this document:

https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg-530d.pdf

6.3 Supporting TCEQ Documents and Frequency-Asked Questions

The following hyperlink has documents and forms and are referenced directly from the TCEQ official site. This is provided as part of this manual for the City's convenience. The documents include additional information on monitoring, reporting, record-keeping, dues dates and monitoring tips, sanitary sewer overflows questions and answers, and other frequently asked compliance questions.

www.tceq.texas.gov/goto/wwtp-compliance

ATTACHMENT 1 – TCEQ 530C Routine Reports and Logs

CITY OF WALLIS
LIFT STATION NUMBER/NAME:

DAILY PROCEDURES AND CHECKLIST

MONTH **YEAR**

	PUMP 1		PUMP 2				OPERATOR
DATE	HRS	RUNTIME	HRS	RUNTIME	PRESSURE (PSI)	COMMENTS/ISSUES NOTED	NAME/INITALS
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

Table 1: Daily Activity Report for Process-Control Tests

As applicable, use this chart for recording process-control tests performed on each unit in your system. Make additional copies as needed for each unit.

Month: _____, 20_____ Unit: _____

Date	Flow	Sludge Temp.	Blanket Level	SV30	SVI	F/M Ratio	MCRT	GSA	WAS Rate	RAS Rate	DO	COD	pH	NH_3-N	BOD_5	TSS/ VSS	MLSS
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
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29																	
30																	
31																	

Additional comments:

Table 2: Operator's Daily Log

Use this chart for recording daily flow, sample results, and meter calibration. Make additional copies as needed for each unit.

Month: _____, 20_____

Date	Effluent Flow (MGD)	DO (mg/L)	pH (SU)	TSS (mg/L)	BOD_5 (mg/L)	Cl_2 (mg/L)	NH_3 (mg/L)	Fecal/ *E. coli* (CFUs/100) (mL)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

Date	Effluent Flow (MGD)	DO (mg/L)	pH (SU)	TSS (mg/L)	BOD_5 (mg/L)	Cl_2 (mg/L)	NH_3 (mg/L)	Fecal/ *E. coli* (CFUs/100) (mL)
25								
26								
27								
28								
29								
30								
31								
Min.								
Max.								
Avg.								

Meter Calibration

Use this chart to record calibrations of your meters or equipment as recommended.

Date	pH	DO	Cl	Flow Meter				

Table 3: Sludge-Disposal Record

Use this chart to track sludge-management activities. Make copies as needed.

Date	Passed paint filter test? (yes or no)	Amount disposed of (dry tons)	Disposal-site name and permit number	Transporter name and registration number	Land-application rates and area	TCLP test? (yes or no)

Records (including laboratory test results and quality assurance–quality control) must be maintained according to your permit.

Additional operational issues:

Below are more tables you may choose to use to record your backup-power-supply tests, and your backflow-prevention-device annual testing and certification. We also encourage you to keep a daily log book at the plant to note any weather information, notes and instructions for other staff members or any process or equipment changes.

Table 4: Backup Power Tests

Backup power supplies should be tested regularly to ensure operation when needed. Remember to test under load for accurate operation in an emergency.

Date	Type of Supply	Location of Supply	Length of Test (min.)	Comments

Table 5: Backflow-Prevention Device: Annual Testing and Certification

Date	Device Location	Inspector's License No.	Notes	Initials

ATTACHMENT 2 – Manhole Accessibility Field Review Form

Accessibility Field Review Form
City of Wallis, Texas

Inspector Name:		Date of Field Review:	

	Manhole Structure Number	Manhole Status		Photograph Taken	Description of Accessibility Problem
		No Action Required	Corrective Action Required		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

ATTACHMENT 3 – Manhole Physical Survey Form

Manhole Physical Survey Form
City of Wallis, Texas

Inspector Name:						Date of Physical Survey:											
Manhole Number:		Location Description:															
Weather Conditions:																	
Casting/Lid:																	
Type: ☐ Vented	☐ Solid		Buried:	☐ Yes	☐ No		How Deep?		FT								
Ladder Bars:																	
Type:	☐ Steel	☐ PVC	☐ Cast Iron	☐ None													
Condition:	☐ Good	☐ Fair (some repair required)	☐ Poor (extensive repair required)	☐ Replace													
	Description of Repair Work																
Barrel:																	
Construction	☐ Brick	☐ Precast:	☐ Other:														
Condition:	☐ Good	☐ Fair (some repair required)	☐ Poor (extensive repair required)	☐ Replace													
	Description of Repair Work																
Bottom:																	
Construction	☐ Brick	☐ Precast:	☐ Cast-in-place														
Condition:	☐ Good	☐ Fair (some repair required)	☐ Poor (extensive repair required)	☐ Replace													
	Description of Repair Work																
Debris:																	
Additional Observations: (include a description of materials needed for repair, access, traffic, and other issues that the repair crew will need to know prior to arriving at the site.)																	

ATTACHMENT 4 – Confined Space Entry Permit Form

SAMPLE CONFINED SPACE ENTRY PERMIT FORM

CONFINED SPACE ENTRY PERMIT
DATE: _____
Area of Equipment to be entered: _____
Location: _____
Purpose of entry: _____
Testing instrument(s) used: _____
Ventilation equipment used: _____
Safety and Rescue equipment provided: _____

Periodic Checks	Time	Oxygen Per Cent	% Reading	Tested By	Comment
Prior to Entry: 1. 2. 3. 4. 5. 6. 7. 8.					

This confined space has been inspected and found safe for entry for the period covered.

Signed: _____ _____ _____
(Person in Charge) (Date) (Time)

ATTACHMENT 5 – Corrective Maintenance Record

SAMPLE CORRECTIVE MAINTENANCE RECORD

NAME OF EQUIPMENT ITEM: _____ INVENTORY NUMBER: _____

WORK PERFORMED	SPARE PARTS CONSUMED			COST OF OR HOURS FOR COMPLETION	COMPLETED BY	DATE
	ITEM	NUMBER	QUANTITY			

ATTACHMENT 6 – Emergency Inventory Sheet

SAMPLE EMERGENCY INVENTORY SHEET

LOCATION	PUMPS	PIPE	CHLORINATORS	GENERATORS	HEAVY EQUIPMENT	COMMUNICATIONS	CHEMICALS	MISC.	PERSONNEL

ATTACHMENT 7 – Equipment Data Card

SAMPLE EQUIPMENT DATA CARD

Card No. 1 Side No. 1

NAME OF EQUIPMENT ITEM:_____INVENTORY NUMBER_____

MODEL NUMBER:_____SERIAL NUMBER:_____SIZE:_____

MANUFACTURERS NAME AND ADDRESS:_____

PURCHASER'S NAME, ADDRESS AND TELEPHONE:_____

DATE PURCHASED:_____PURCHASE PRICE:_____

EQUIPMENT DATA:_____
_____
_____
_____
_____
_____
_____

MAINTENANCE ITEMS ON HAND

SPARE PARTS ON HAND

ITEM	QUANTITY	PART	QUANTITY

ATTACHMENT 8 – Inventory Card

SAMPLE INVENTORY CARD

INVENTORY ITEM

_____ _____
Item Description Item Number

Quality in Inventory _____ Date _____
Last Purchase Date _____ Purchase Cost per Item_____
Vendor's Name & Address _____
Delivery Waiting Period _____ Telephone _____

ATTACHMENT 9 – Master Inventory Card

SAMPLE MASTER INVENTORY CARD

MASTER INVENTORY

Description

Inventory Card Number

ATTACHMENT 10 – Preventative Maintenance Record

SAMPLE PREVENTATIVE MAINTENANCE RECORD

NAME OF EQUIPMENT ITEM: _____ INVENTORY NUMBER: _____

WORK PERFORMED	SPARE PARTS CONSUMED			COST OF OR HOURS FOR COMPLETION	COMPLETED BY	DATE
	ITEM	NUMBER	QUANTITY			

ATTACHMENT 11 – Purchase Order Form

SAMPLE PURCHASE ORDER

NO. MRSTP _____

THIS ORDER NUMBER MUST APPEAR ON ALL PACKAGES, INVOICES, AND SHIPPING PAPERS

PURCHASE ORDER

City of Wallis, Texas

VENDOR

S
H
I
P

T
O

DATE:	DATE REQ:	TERMS:	F.O.B.	SHIP VIA:	ITEM DESTINATION:	DATE REC'D

QUANTITY	DESCRIPTION	UNIT COST	TOTAL COST

ATTACHMENT 12 – Vulnerability Analysis WS

SAMPLE VULNERABILITY ANALYSIS WORKSHEET

TREATMENT SYSTEM: _____

ASSUMED EMERGENCY: _____

DESCRIPTION OF EMERGENCY: _____

_____

SYSTEM COMPONENT	EFFECTS OF EMERGENCY TYPE AND EXTENT	PREVENTION RECOMMENDATIONS
COLLECTION SYSTEM		
PRETREATMENT		
SEWAGE PUMPING		
SECONDARY TREATMENT		
DISINFECTION		
DISINFECTION		
COMMUNICATIONS		

DATE: _____ ANALYST: _____

ATTACHMENT 13 – Wastewater Treatment System Emergency Inventory

WASTEWATER TREATMENT SYSTEM
EMERGENCY INVENTORY

SYSTEM: _____

PREPARED BY: _____
(SIGNATURE)

DUPLICATE EQUIPMENT IN STOCK

DESCRIPTION	MAKE	SIZE	TYPE	VOLTAGE	HP	CAPACITY	NO.

PARTS AND COMPONENTS IN STOCK

DESCRIPTION	SIZE	NO.	APPLICATION IN SYSTEM

EMERGENCY EQUIPMENT AND REPAIR TOOLS

DESCRIPTION	NO.	APPLICATION IN SYSTEM

PIPE	SIZE					
	TYPE					
	LENGTH					

AVERAGE CHEMICAL STOCK	TYPE					
	FORM					
	QUANTITY					

COMMUNICATIONS EQUIPMENT

DESCRIPTION	LOCATION

MAPS AND FACILITY LAYOUT DETAILS

_____
OFFICIAL AUTHORIZING INVENTORY

ATTACHMENT 14 – Project Tracking Form

Project Tracking Form
City of Wallis, Texas

Project Number:					
Date of Complaint (if any) or Work Order:		Name of complainant (if any):			
Address:					
Location Description:					
Complaint Tracking Number (if any):					
Description of reported condition or Maintenance Request:					
Manhole from:		Manhole to:			
Charge to:		Project Classification:			
Contractor:					
Project Engineer:					
Project Inspector:		**Work Type**			
Crew Foreman:		☐	Main Line New Installation		
Project Summary Information:		☐	Main Line Replacement		
Start Date:		☐	Main Line Repair		
Completion Date:		☐	Main Line Bulk Head		
Estimated Days to completion:		☐	Main Line Fill, Seal Abandon		
Cut Size (feet):	Length	Width	☐	Manhole New Installation	
			☐	Manhole Replacement	
Average Depth		☐	Manhole Repair		
Permit Number:		☐	Manhole Rehabilitation		
Utilities Phone Numbers	Gas		☐	Manhole Raise	
	Electric				
	Phone		☐	Encasement Installation	
	Cable			Encasement Report	
	Water				
Project Notes (include description of equipment used, number of personnel required and any difficulties encountered):		☐	Force Main Replacement		
		☐	Force Main Repair		
		☐	Force Main Valve Replacement		
		☐	Force Main Valve Repair		
One Call Serial Numbers and Dates:		☐			
		☐	Low Pressure Force Main Replacement		
		☐	Low Pressure Force Main Repair		
		☐	Low Pressure Force Main Valve Replacement		
		☐	Low Pressure Force Main Valve Repair		
		☐			
		☐	Building Lateral New Installation		
		☐	Building Lateral Replacement		
		☐	Building Lateral Repair		
		☐	Building Lateral Relocate		
Project Difficulty Rating:		☐	Other (describe):		
(Easy, Moderate, Difficult)					

ATTACHMENT 15 – Work Order Form

City of Wallis, Texas

WORK ORDER

WORK ORDER NO. _____ DATE:_____

WORK TO BE PERFORMED:

MATERIALS TO BE PURCHASED:

WORK PERFORMED BY:

1._____ _____ HOURS

2._____ _____ HOURS

3._____ _____ HOURS

4._____ _____ HOURS

WORK COMPLETED:

SIGNED:_____

DATE:_____

COMMENTS:

ATTACHMENT 16 – Discharge Monthly Effluent Report & Address and Signatory Authority

Texas Commission on Environmental Quality

P.O. Box 13087 • Austin, TX 78711-3087

MONTHLY EFFLUENT REPORT

PERMIT NUMBER	SET	YEAR	MO	EID

This report to be used for _____

Please retain a photocopy for your records.

Parameter Code/ Parameter		Effluent Condition		No. Ex	Frequency of Analysis	Sample Type
		Value	Units			
3101024 BOD_5	Permitted		mg/L		2/week	Grab
	Reported					
800821024 CBOD5	Permitted		mg/L		2/week	Grab
	Reported					
820796624 Turbidity	Permitted		NTU		2/week	Grab
	Reported					
31643730 E. coli	Permitted		MPN/100 mL		2/week	Grab
	Reported					
316403724 E. coli	Permitted		MPN/100 mL		2/week	Grab
	Reported					
316393724 Enterococci	Permitted		MPN/100 mL		2/week	Grab
	Reported					
316393730 Enterococci	Permitted		MPN/100 mL		2/week	Grab
	Reported					
4006030 pH	Permitted		Std units		2/week	Grab
	Reported					
500507124 Flow	Permitted		MGD		2/week	Grab
	Reported					
	Permitted					
	Reported					

COMMENTS AND EXPLANATIONS (Reference all attachments here.)

I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THIS REPORT AND THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF SUCH INFORMATION IS TRUE, COMPLETE AND ACCURATE.

PLANT OPERATOR NAME	PLANT OPERATOR SIGNATURE	MONTH	DAY	YEAR
EXECUTIVE OFFICER NAME	EXECUTIVE OFFICER SIGNATURE	MONTH	DAY	YEAR
Telephone Number				
		Area code		Number

Texas Commission on Environmental Quality

Monthly Effluent Report Form

Completion Instructions

This Domestic Reuse Monthly Effluent Report is a self-reporting form that shows all the possible parameters that could be reported. Report those required by your permit. Extreme care should be taken to ensure that this report is used for only the plant or outfall described and for the year and month you specify on this the form. Measurements or test results must be reported in the following manner:

1. "Effluent Condition" column - Enter permitted limit in the shaded space and test results in the unshaded space under VALUE for each parameter using the units specified for that parameter in your permit. If the UNITS specifies MGD (million gallons per day), then a measured flow of 100,000 gallons per day should be reported as 0.100 MGD.

2. "NO EX" column - In the unshaded spaces, enter the exact number of times during the month that the given permitted limit was exceeded. If an effluent value reported as daily average is found to exceed the permitted daily average, enter a "1" in the box regardless of the number of single readings above the permitted limit

3. "Frequency of Analysis" and "Sample Type" columns - These columns reflect your permit requirements for the sampling of each parameter. This form includes many possible permit requirements. Use the frequency of analysis and sample type for each parameter as specified in your permit.

4. If no discharge is made during the reporting month enter a "0" under VALUE and enter the PARAMETER as "Discharge Days/Month." Leave the remainder of the form blank, except for reporting requirements under number 5 below.

5. Each form must contain two original signatures, the dates the forms were signed and the telephone number of the executive officer. Send the completed form to the Water Compliance Monitoring Team (MC 224), Enforcement Division, Texas Commission on Environmental Quality, PO Box 13087, Austin, Texas 78711-3087.

PLEASE RETAIN A PHOTOCOPY OF THE REPORT FOR YOUR RECORDS.

The following are definitions of terms and abbreviations used on the report:

DLY. AVG.	Daily Average will be the arithmetic average of all test or measurement results obtained during the reporting period
DLY. MAX.	Daily Maximum will be the largest of all the test or measurement results obtained during the reporting period.
IND. GRAB	Individual Grab will be the largest test or measurement result obtained during the reporting period from a grab sample.
DLY. MIN.	Daily Minimum will be the smallest test or measurement result obtained during the reporting period.
GRAB	A sample collected in less than 15 minutes.
GRAB PKLOAD	Grab sample collected at peak loading.
3 PRT COMP	3-part composite
6 PRT COMP	6-part composite
12 PRT COMP	12-part composite
Parameter	A physical property whose values determine the characteristics or behavior of something (i.e. temperature, BOD, pH)

If you have questions on how to fill out this form or about the self-reporting program, please contact us at 512/239-2545. Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

Parameter Name	Parameter Code	Sample Type / Units
pH	4006030	Ind Grab
Turbidity	820796624	Daily Average
BOD5	3101024	Daily Average
CBOD5	800821024	Daily Average
E. coli	316403730	Ind Grab
E. coli	316403724	Daily Average
Enterococci	316393724	Daily Average
Enterococci	316393730	Ind Grab

ATTACHMENT 17 – Start-Up and Operating Procedures Form

Use the following document to describe the Startup and Operating Procedures.

Describe startup activities such as the sequence of turning on pumps and equipment. Describe your daily, weekly, and monthly procedures such as testing effluent, checking chemical feeds, and cleaning filters. Describe all emergency procedures such as notification procedures for chemical spills, or threats like an active shooter on the premises. Describe all shut-down procedures for taking the plant off-line.

Startup Procedures

_____
_____
_____
_____
_____

Daily Procedures

_____
_____
_____
_____
_____

Weekly Procedures

_____
_____
_____
_____
_____

Emergency Operating Procedures

_____
_____
_____
_____
_____

Shut down Procedures

_____
_____
_____
_____
_____

Sludge Maintenance

Explain the method and expected volumes in which solids return to aeration or are wasted.

_____
_____
_____
_____
_____

What are the expected concentrations of solids in each unit?

_____
_____
_____
_____
_____

What are the expected overflow rates of solids in each unit?

_____
_____
_____
_____
_____

What are the expected disinfectant and dechlorination usage and dosage amounts during normal and emergency operating conditions?

_____
_____
_____
_____
_____

Lab Analyses and References

Describe the types and frequencies of routine in situ and laboratory analyses to be performed and include a list of references to standard literature on testing procedures.

_____
_____
_____
_____
_____

_____
_____
_____
_____
_____

_____
_____
_____
_____
_____

References

_____
_____
_____
_____
_____

_____
_____
_____
_____
_____

_____
_____
_____
_____
_____

ATTACHMENT 18 – Soil Monthly Effluent Report

Texas Commission on Environmental Quality

P.O. Box 13087 • Austin, TX 78711-3087

MONTHLY EFFLUENT REPORT

PERMIT NUMBER	SET	YEAR	MO	EID

This report to be used for SOIL MON 301 ANN 18-30

Please retain a photocopy for your records.

Parameter Code/ Parameter	Effluent Condition			No. Ex	Frequency of Analysis	Sample Type
		Value	Units			
Example 4006080 pH Maximum	Permitted	*permitted #*	*Std Units*		*1/year*	*24-hour comp*
	Reported	*result*	*units*	#		
	Permitted					
	Reported					
	Permitted					
	Reported					
	Permitted					
	Reported					
	Permitted					
	Reported					
	Permitted					
	Reported					
	Permitted					
	Reported					
	Permitted					
	Reported					
	Permitted					
	Reported					
	Permitted					
	Reported					

COMMENTS AND EXPLANATIONS (Reference all attachments here.)

I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THIS REPORT AND THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF SUCH INFORMATION IS TRUE AND COMPLETE AND ACCURATE

PLANT OPERATOR NAME	PLANT OPERATOR SIGNATURE	MONTH	DAY	YEAR
EXECUTIVE OFFICER NAME	EXECUTIVE OFFICER SIGNATURE	MONTH	DAY	YEAR
Telephone Number				
		Area code		Number

Texas Commission on Environmental Quality

Monthly Effluent Report Form

Completion Instructions

This Soil Monthly Effluent Report is a self-reporting form for annual soil sampling from 18 to 30 inches. This form is blank, and the parameter names, codes, and sample types are provided in the accompanying spreadsheet file. Extreme care should be taken to ensure that this report is completed accurately. Measurements or test results must be reported in the following manner:

1. "Parameter Code/Parameter" column – Enter the parameter code and parameter name that is specified in your TLAP.

2. "Effluent Condition" column - Enter your permit limit in the shaded space and test results in the unshaded spaces under VALUE for the parameters using the units specified in your permit. If the UNITS specifies MGD (million gallons per day), then a measured flow of 100,000 gallons per day should be reported as 0.100 MGD.

3. "NO EX" column - Enter in the unshaded spaces, the exact number of times during the month that the given permitted limit was exceeded. If an effluent value reported as daily average is found to exceed the permitted daily average, enter a "l" in the box regardless of the number of single readings above the permitted limit

4. "Frequency of Analysis" and "Sample Type" columns - These columns reflect your permit requirements for the sampling of each parameter. If you have previous MER forms, transfer the frequency of analysis and sample type for each parameter.

5. If no discharge is made during the reporting month enter a "0" under VALUE and enter the PARAMETER "Discharge Days/Month." Leave the remainder of the form blank, except for reporting requirements under number 6 below.

6. Each form must contain two original signatures, the dates the forms were signed and the telephone number of the executive officer. Send the completed form to the Water Compliance Monitoring Team (MC 224), Enforcement Division, Texas Commission on Environmental Quality, PO Box 13087, Austin, Texas 78711-3087.

PLEASE RETAIN A PHOTOCOPY OF THE REPORT FOR YOUR RECORDS.

The following are definitions of terms and abbreviations used on the report:

DLY. AVG.	Daily Average will be the arithmetic average of all test or measurement results obtained during the reporting period
DLY. MAX.	Daily Maximum will be the largest of all the test or measurement results obtained during the reporting period.
IND. GRAB	Individual Grab will be the largest test or measurement result obtained during the reporting period from a grab sample.
DLY. MIN.	Daily Minimum will be the smallest test or measurement result obtained during the reporting period.
GRAB	A sample collected in less than 15 minutes.
GRAB PKLOAD	Grab sample collected at peak loading.
3 PRT COMP	3-part composite
6 PRT COMP	6-part composite
12 PRT COMP	12-part composite
Parameter	A physical property whose values determine the characteristics or behavior of something (i.e. temperature, BOD, pH)

If you have questions on how to fill out this form or about the self-reporting program, please contact us at 512/239-2545. Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

Parameter Name	Parameter Code	Sample Type/Units
pH	4006030	Ind Grab
Electrical Conductivity	941830	Ind Grab
Nitrate-Nitrogen	6201430	Ind Grab
Ammonia-Nitrogen	6101430	Ind Grab
Total Kjeldahl Nitrogen (TKN)	6251430	Ind Grab
Total Nitrogen	6001430	Ind Grab
Plant-Available Phosphorus	6641430	Ind Grab
Plant-Available Potassium	9381430	Ind Grab
Plant-Available Calcium	9171430	Ind Grab
Plant-Available Magnesium	9281430	Ind Grab
Plant-Available Sodium	9321430	Ind Grab
Plant-Available Sulfur	801081430	Ind Grab
Plant-Available Manganese	10561430	Ind Grab
Plant-Available Copper	10431430	Ind Grab
Plant-Available Iron	10461430	Ind Grab
Plant-Available Zinc	10931430	Ind Grab
Water-Soluble Sodium	462361030	Ind Grab / mg/L
Water-Soluble Calcium	462341030	Ind Grab / mg/L
Water-Soluble Magnesium	462351030	Ind Grab / mg/L
Water-Soluble Sodium	462361430	Ind Grab / meq/L
Water-Soluble Calcium	462341430	Ind Grab / meq/L
Water-Soluble Magnesium	462351430	Ind Grab / meq/L
Sodium Absorption Ratio (SAR)	9316079	Per Event

ATTACHMENT 19 – System and WWTP Site Map

HRGreen

CITY OF WALLIS, TEXAS
SANITARY SEWER COLLECTION SYSTEM MAP

City of Wallis, Texas
AMPSS – Wastewater System
Project No.: 220004

ATTACHMENT 20 – ESRI ArcGIS Online Web and Field Maps App How-To Guide

Editing in ArcGIS Online

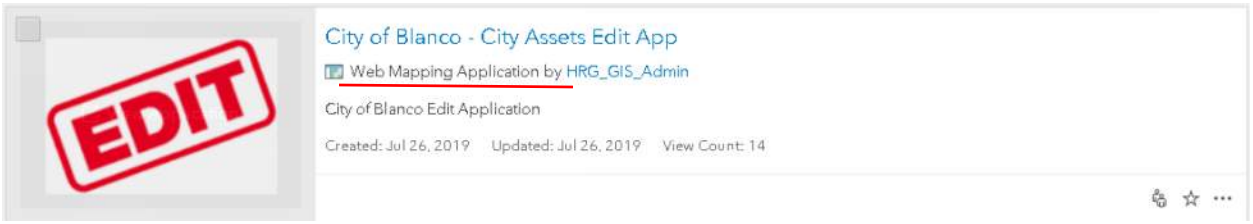
There is more than one type of ArcGIS Online application that can be used for editing GIS data. This instructional guide will detail three types – 1) the Web Mapping Application, 2) the Web Map, and 3) the Collector Map.

The first two of these are designed for use on a web browser (Chrome is strongly recommended) and are generally better suited for work performed at the office or at home. Access ArcGIS Online from a Chrome browser by entering your login credentials at https://www.arcgis.com/home/signin.html.

The third application type – the Collector Map – is designed for use on GPS-enabled smart phones or tablets and is generally used as a field application. The Collector app can be used on iOS, Android, and Windows 10 devices, but updates are not always applied simultaneously across all three. The functionality is comparable between the three mobile operating systems, but the user interface can be quite variable. This instructional document uses screen captures from iOS, which also has tended to be the operating system that first sees Collector update rollouts.

Web Mapping Applications

When browsing through your ArcGIS Online organization's Content section, Web Mapping Applications are identified as such beneath the application title (underlined in the graphic below). Web Mapping Applications can vary greatly, offering a wide range of functionality that may or may not include editing capabilities. Usually, when reviewing your organization's content, you can identify an editable web mapping application based on its title (e.g. "Utilities Edit App") or accompanying graphic (as shown below).

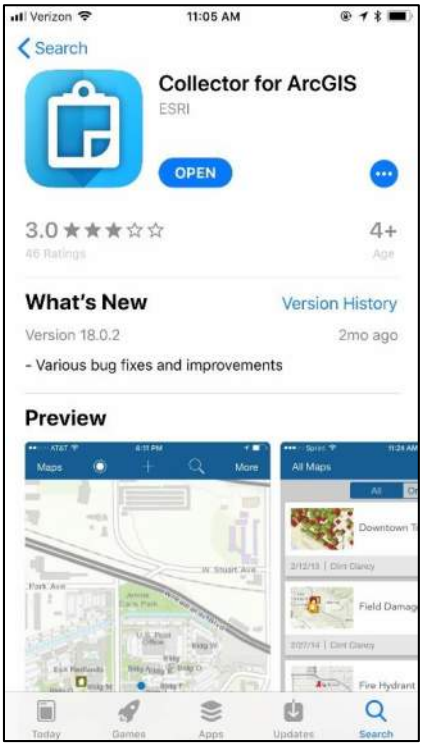


Web Maps

When browsing through your ArcGIS Online organization's Content section, Web Maps are also identified as such under the title (underlined in the graphic below). Editing is usually but not always enabled for web maps. If an editable Web Mapping Application has been developed for your organization, it is generally recommended that you use it over a Web Map for desktop editing.

Collector Maps

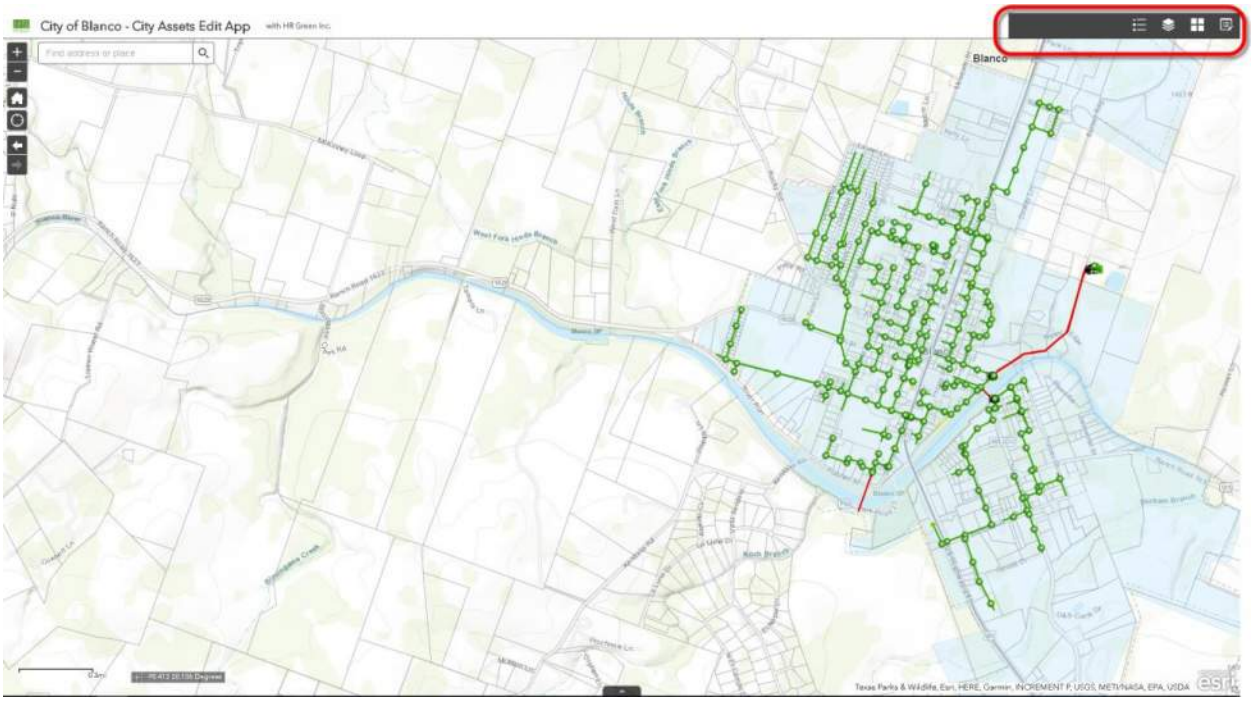
Access Collector Maps from the Collector for ArcGIS app. This free app can be found in the Apple Store (as shown below) for iOS or in the Google Play Store for Android devices. Collector Maps always include at least one map layer that is editable.



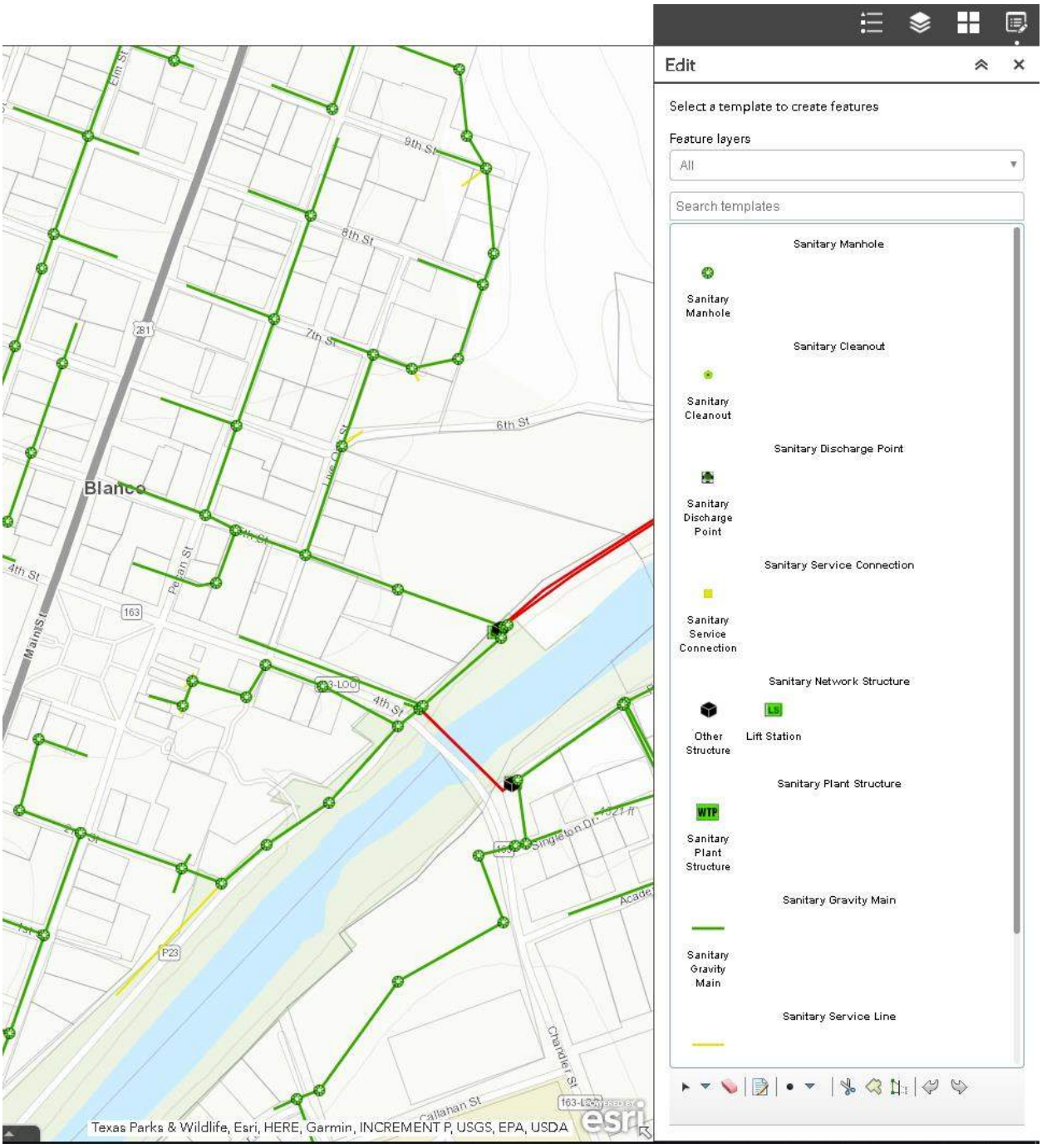
Editing in Web Mapping Applications

In Web Mapping Applications, editing functionality is made available for use by selecting an edit icon, similar to the following…

…that activates an editing toolbar. This Edit icon or Edit "widget" may be grouped with other widgets in a box like the one circled below or as a series of widgets docked along the edge of the page.



Click on the Edit widget icon and an editing window should open, like the one shown in the image below that is occupying the right edge of the page.



In the editing window, you should see a listing of map layers that are available for editing as well as a toolbar for performing editing functions. In the example above, a Feature layers dropdown allows you to navigate through the available layers and then select from different layer symbol options in the space below. Often, most maps have defined layers that will only appear at certain extents, so by zooming in or out on the map, more layers will appear that you can create. In the Web Mapping Application shown in

the image above, if there is more than one option for a layer to create, such as manholes, it may be necessary to choose between multiple symbol options, such as ssManhole (active) or Abandoned.

In the Web Mapping Application example shown above, the editing toolbar is located at the bottom of the Edit window. The image below provides a closer look at this toolbar.

Editing Toolbar: 

Feature Selection from Edit Widget

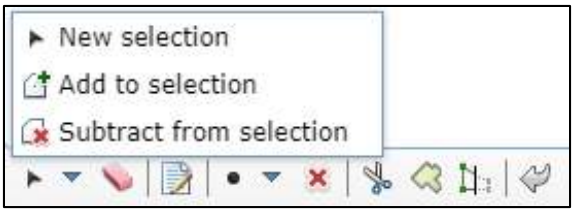
On the Edit toolbar, the first tool, from left to right, is **the Select tool**.

The Select tool can be used to select existing map features for the purpose of editing their attributes or their location/geometry. It is well-suited for selecting multiple features at once. The selection of single features (or multiple features occupying the same location) can be made by clicking a map location without having this tool selected.

Use the Select tool to select one or more map features by clicking, holding and dragging a box across the screen over the desired area.

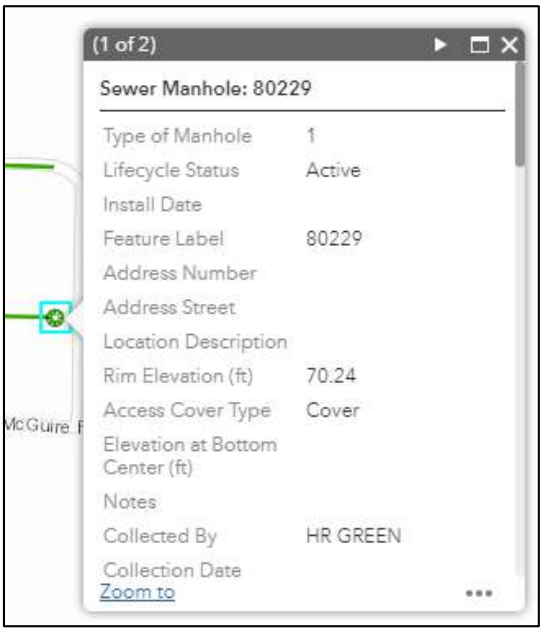
After releasing the click, you will see selected map features highlighted, as shown below. Selected lines are shown in light blue and points are shown as red.

In addition to making a new selection, as shown above, one can click the downward facing arrow beside the Select tool (as shown in the image below) to access related tools that allow you to use the same process to add or subtract features from an existing selection set.

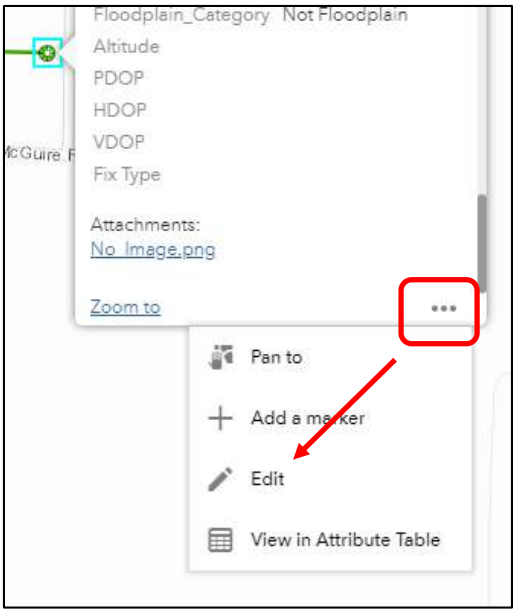


Alternative Way to Select Features for Editing

Another way to select a feature for editing is by simply clicking on the feature without having activated the Edit Widget. When this is done for a point feature, a light blue box will surround the point (as shown in the image below) and an attribute form will appear.



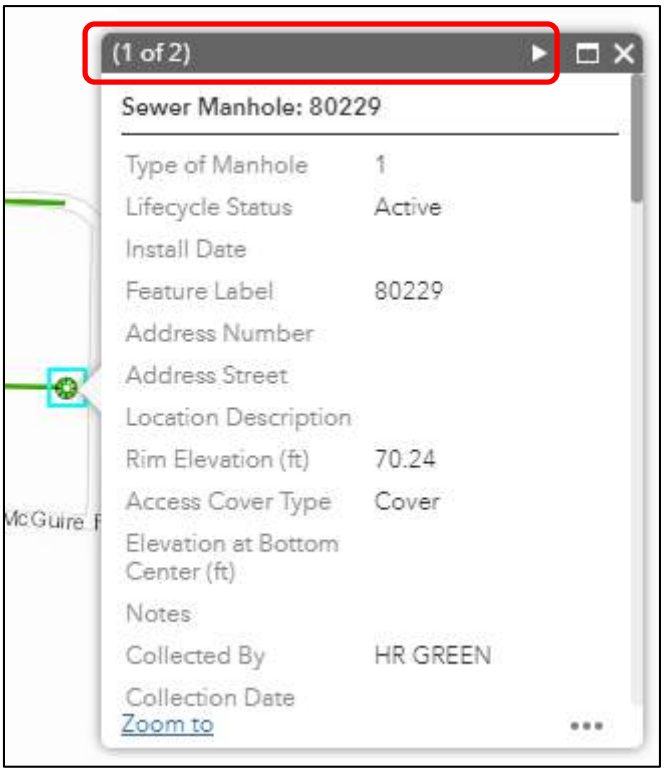
This form is view-only by default but can be made editable by clicking on the ellipses (…) icon located at the bottom of the feature's pop-up window and selecting the Edit option (see image below).



Clicking on the Edit option will replace the light blue box with a red circle over the feature point.

Caution Before Editing a Selected Feature

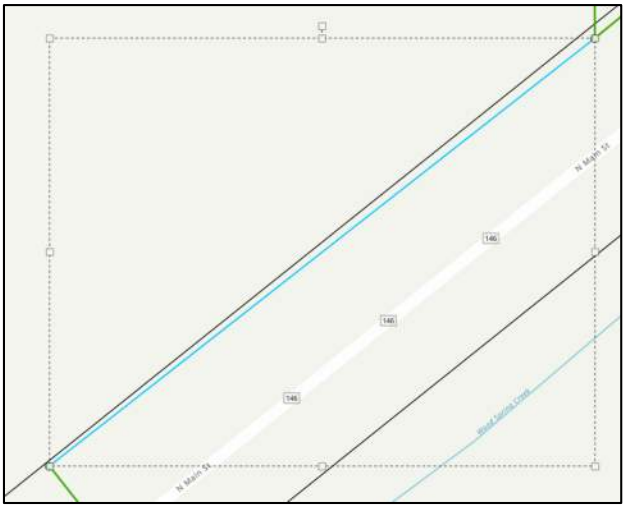
However you make a feature selection, make sure that the feature selected is the one you want to edit prior to editing attributes in a pop-up window. It is advisable to double-check the feature type/ID displayed in the pop-up before making changes. If multiple features are selected, you will see left and/or right-facing arrows at the top of the pop-up window along with text indicating how many features have been selected. In the image below, for example, the feature record displayed is the first of two (1 of 2) selected. The arrows allow you to navigate to the other selected features.



Changing Geometry for Existing Map Features

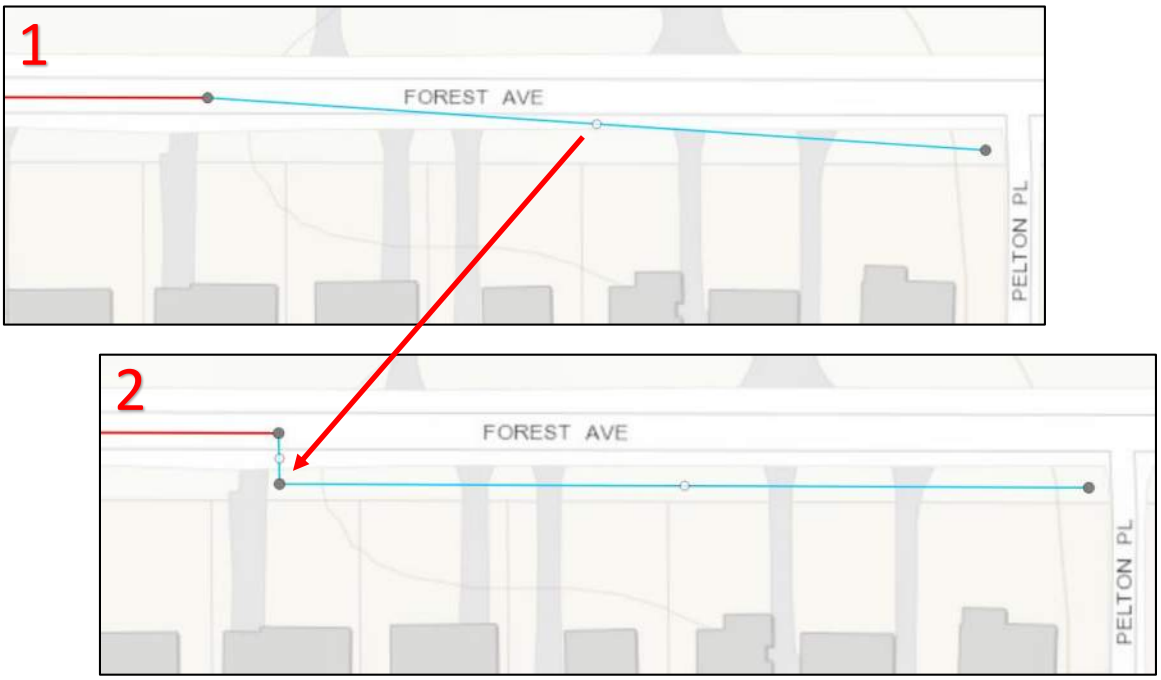
Once selected for editing and showing as a red circle, a point feature can be moved by clicking on the feature and dragging to the desired location. A pointing hand will take the place of the normal arrow cursor when your cursor moves over the selected feature. This hand indicates that the point feature can be moved if you click on that location.

A line feature selected for geometry editing will first show a dashed editing box around it (see image below). This editing environment allows you to rotate and reorient entire line features at once and is generally ill-suited for most line editing. *It is* **NOT** *recommended that you edit a line in this environment.*

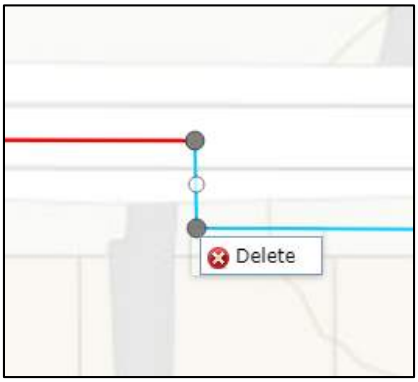


Instead of editing when this dashed box appears, hover your cursor over the line feature until the pointing hand appears and then click on the line. The dashed box will disappear, the line will remain blue in color, and the line's vertices will now appear as gray circles with line segment midpoints appearing as smaller white circles (see image below). This is the preferred environment for line editing.

To edit a line in this preferred editing environment, click and hold a line vertex or segment midpoint and then drag to the desired location and release the click. Performing this operation on a segment midpoint will result in a new line vertex and two new segment midpoints on either side of it. The series of two images below demonstrates this action, where the segment midpoint in the first image is dragged to a new location, generating a new line vertex in the second image.



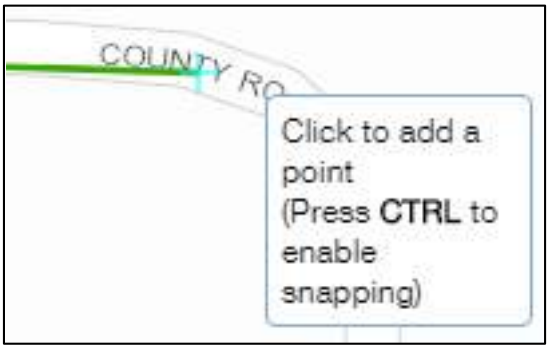
A line vertex can be deleted by right-clicking on it, which activates a Delete button, and then clicking on the Delete button.



Snapping Map Features

In many cases, it is important that your map feature "snap" or align precisely with an adjacent existing feature. One example would be snapping sanitary lines to manhole features.*

In the image below, the CTRL key on the keyboard is being held down while navigating the cursor to the desired location with the mouse. As the cursor nears an existing feature that can be used for snapping (e.g. a pipe segment end as shown below), a light blue crosshair appears. Clicking when this crosshair is visible (while continuing to hold down the CTRL key) will snap a point feature (or, similarly, a vertex for a line or polygon feature) to the existing feature. This snapping functionality can be used both when moving an existing point/vertex or adding a new feature.



It is possible to snap points to lines as well as lines to points. It is also possible to snap lines to other lines and points on top of points, although the latter is not standard practice. When snapping to a line feature, it is possible to snap to vertices as well as along the length of the line. When snapping to or near a vertex, the light blue crosshair will "stick" to the vertex for a preset tolerance distance. If you need to snap to the line within that distance but not on the vertex, it will be necessary to zoom further in on the map before executing the snap.

*A best practice editing workflow is to first use the Collector app, perhaps paired with a high-accuracy external receiver and a real-time correction network (RTN), to collect above ground point features (e.g. manholes, valves, hydrants). The field collection effort would be followed by the creation or re-aligning of system line features (e.g. mains, laterals) that snap to the GPS-collected point features. This second step is to be performed using an editable Web Mapping Application or a Web Map. The Collector app is not well suited for this second step of the workflow, in part because of the limited screen real estate for doing this work on a mobile device but mainly because snapping functionality is not available in Collector.

Clearing a Selection from the Edit Widget

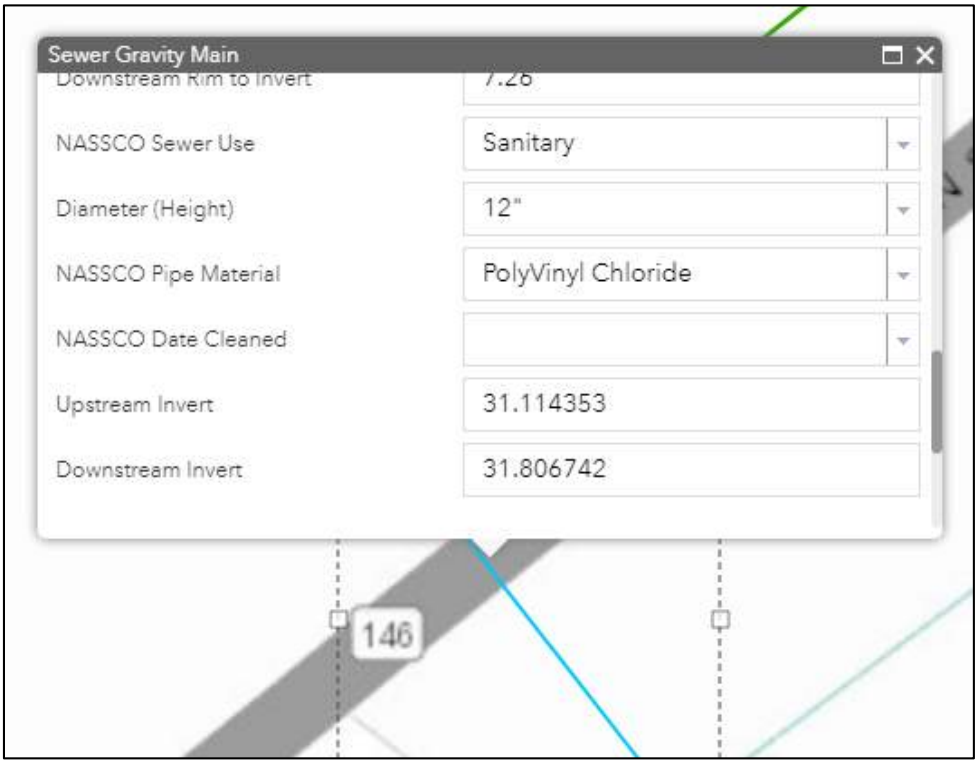
The second tool on the Edit toolbar, from left to right, is the **Clear Selection tool**.

Clicking on this tool clears any selections made by the first tool.

Attribute Editing

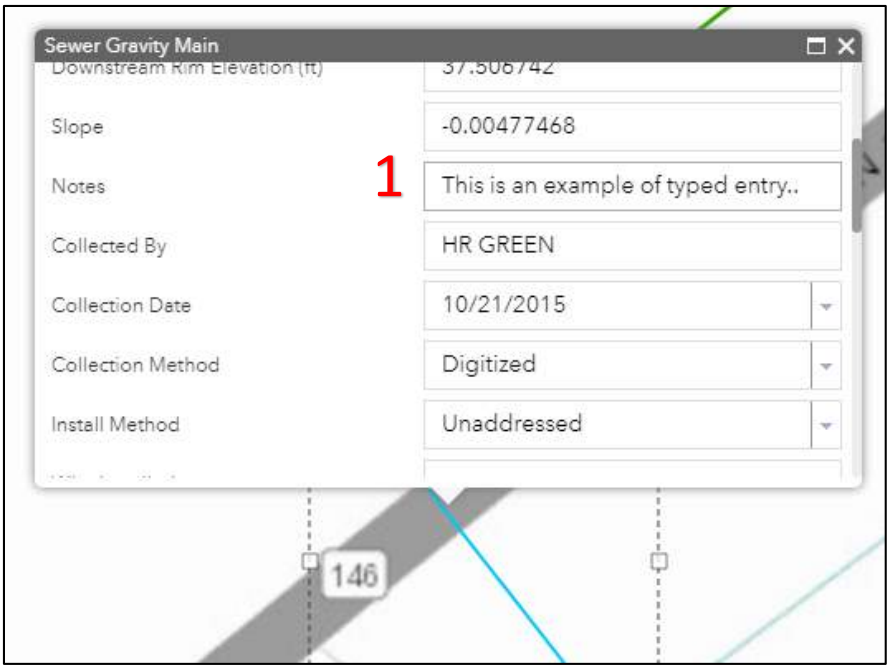
The third tool on the Edit toolbar, from left to right, is the **Attributes tool**.

Clicking on this tool after making a feature selection will display the attributes of the feature in an editable pop-up window. The pop-up window will allow data entry and selection of drop-down options (see image below).

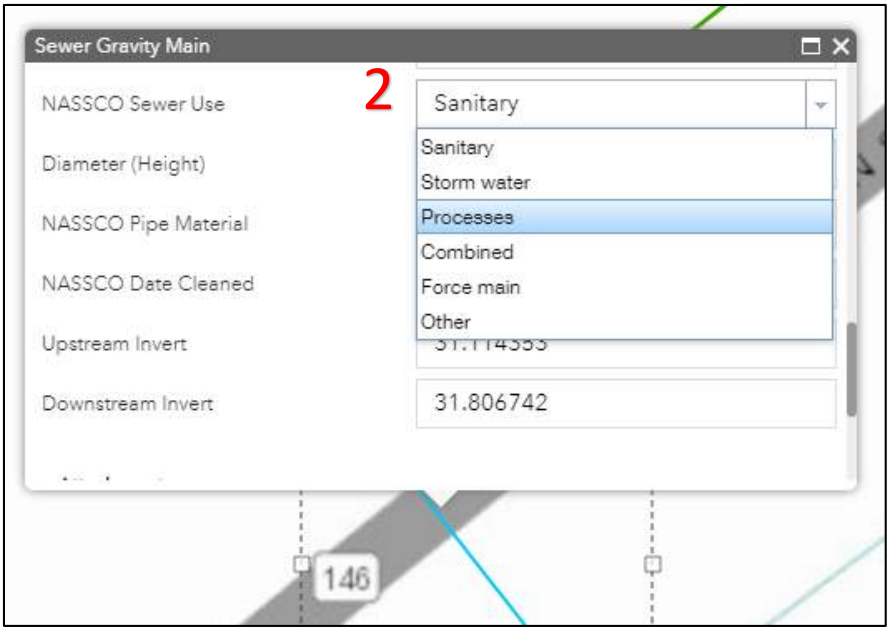


Click inside a data entry box to (1) type in information or to (2) select from a dropdown menu.

(1)

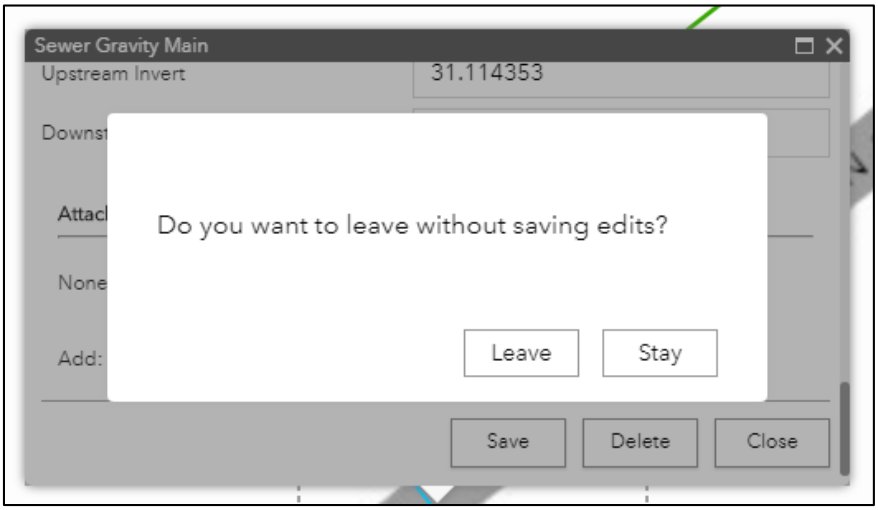


(2)



You may also add attachments (e.g. photos, asset diagrams, etc.) to the map feature by scrolling to the bottom of the edit menu and clicking the Choose File button (circled in image below) to locate a file on your device/network to attach.

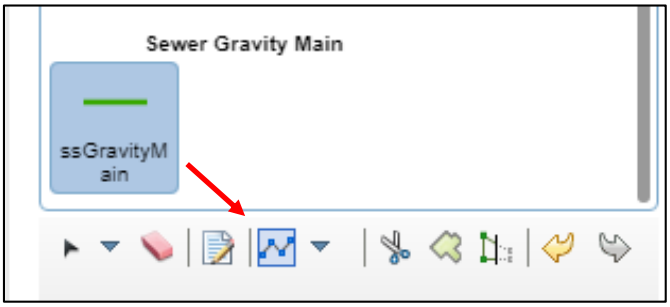
Note the three buttons at the bottom of the feature pop-up window shown in the image above. Select the Save button to save any edits you have made. This button will only be available after edits have been made in an edit session. It will otherwise appear grayed out. Select the Delete button to delete the feature entirely. Select the Close button to close the pop-up window, erasing any unsaved edits. If you choose to do this, you will be prompted will the message below in case you forgot to save edits you wish to keep.



Adding Features using the Edit Widget

The fourth tool on the Edit toolbar, from left to right, is the **Add Feature tool**.

The default icon for this tool is a point, but it can change to a line or a polygon depending on the map layer selected for adding new features. Rather than clicking on this icon to change the feature type, you must select the desired map layer template from the template menu, which will change the icon automatically. In the example below, selecting the ssGravityMain line layer template changes the Add Feature icon from a point to a line.



Upon selecting a map layer from the edit menu, a message will follow your cursor as you move it across the map. If you've selected a point layer, the message will read "Click to add a point (Press CTRL to enable snapping)". If you've selected a line layer, the message will read "Click to start drawing (Press CTRL to enable snapping)". For line layers, once you've added the first vertex, the message will change to "Click to continue drawing," which you will do to add each subsequent vertex except the last. After the second line vertex has been added, the message will change to "Double-click to complete." Upon double-clicking, the new line will remain selected and its pop-up form will load for data entry.

Deleting Features using the Edit Widget

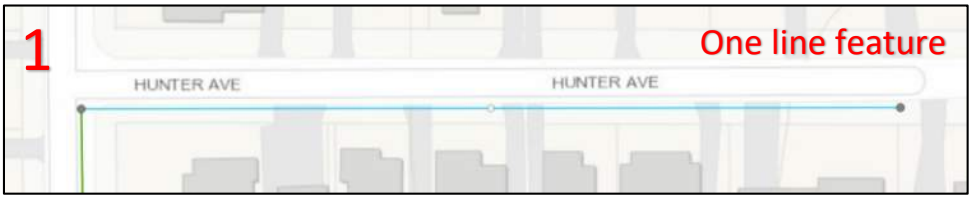
Accompanying the Add Feature tool is the **Delete tool**.

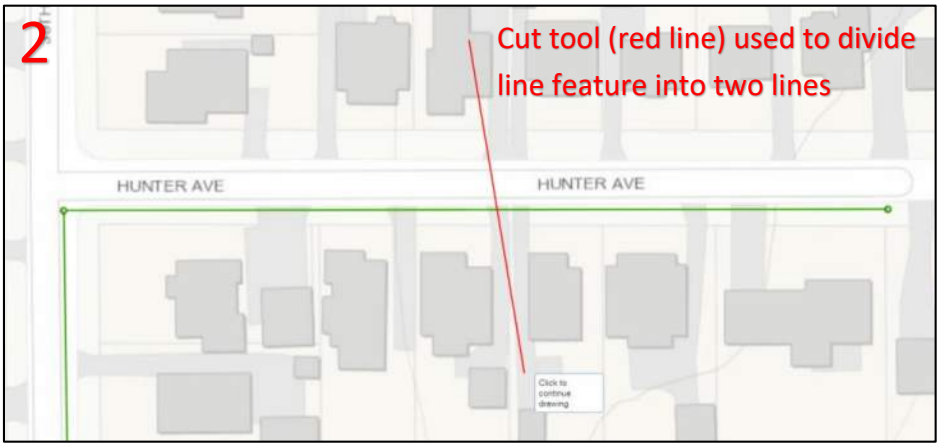
The delete tool does not appear on the Edit toolbar at all times. It only appears after map features have been selected for editing, at which time it appears to the right of the Add Feature tool as shown above. As the name suggests, the Delete tool is used to delete features and will do so for any selected map features when clicked.

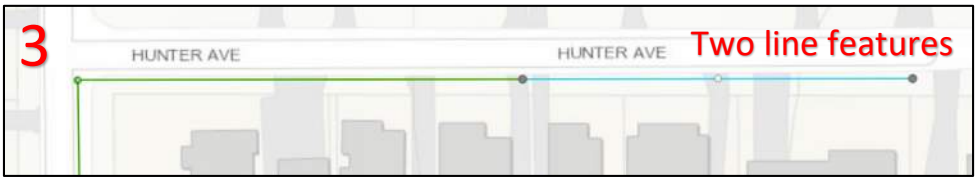
Cutting Line Features using the Edit Widget

The fifth tool on the Edit toolbar, from left to right, is the **Cut tool**.

This tool can be used to split a line into two parts. Similar to when adding a line feature, the "Click to start drawing" message follows the cursor when the Cut tool is selected. Unlike the Add Feature tool, however, the Cut tool is not used to draw in a new feature. It is used to draw a line of intersection that will cut an existing line feature into two line features at the point of intersection (as shown in the series of images below). Any attributes entered for the original line feature are retained in both resultant line features.







Joining Multiple Polygon Shapes into a Single Map Feature using the Edit Widget

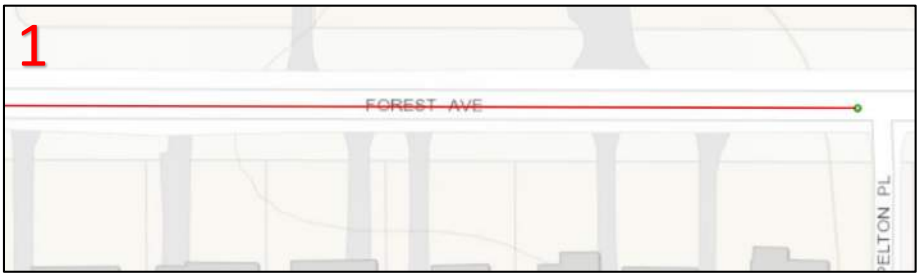
The sixth tool on the Edit toolbar, from left to right, is the **Union tool**.

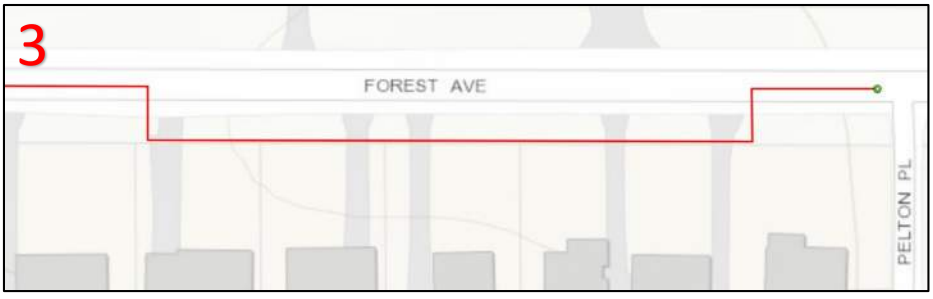
If the Web Mapping Application includes a polygon map layer, this tool can be used to merge multiple polygon shapes into a single feature with one set of shared attributes. It cannot be used in a Web Mapping Application that only consists of point and line editable map layers.

Reshaping Line Features using the Edit Widget

The seventh tool on the Edit toolbar, from left to right, is the **Reshape tool**.

This tool can be used to change the shape of existing line or polygon features. Like with the Cut tool, a line is drawn not to create a new feature but to alter an existing feature. In the series of images below, the Reshape tool is used to create two bends in an existing line feature.





Undo and Redo Edits from the Edit Widget

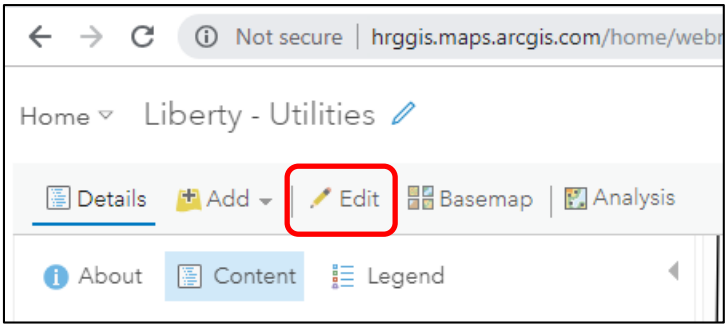
The final two tools in the Edit toolbar are the **Undo and Redo tools**.

The Undo tool is the arrow pointing left. It can only undo an edit after an edit has been performed. Once an edit has been made, the color of the Undo arrow will change from gray to yellow.

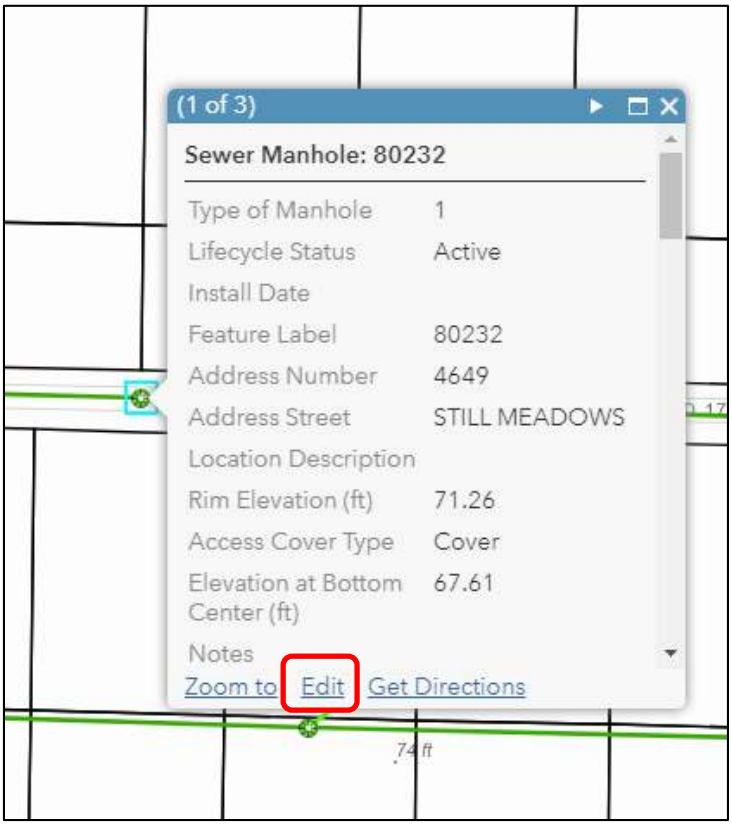
The Redo tool is the arrow pointing right, at the far end of the toolbar. It can only redo, or reinstate, an edit that has been removed by the Undo tool. It is also only available for use when it appears yellow in the toolbar.

Editing in Web Maps

When working in a Web Map, editing functionality can be accessed in two ways. One way is to click on the Edit option in the main toolbar, as shown in the image below.

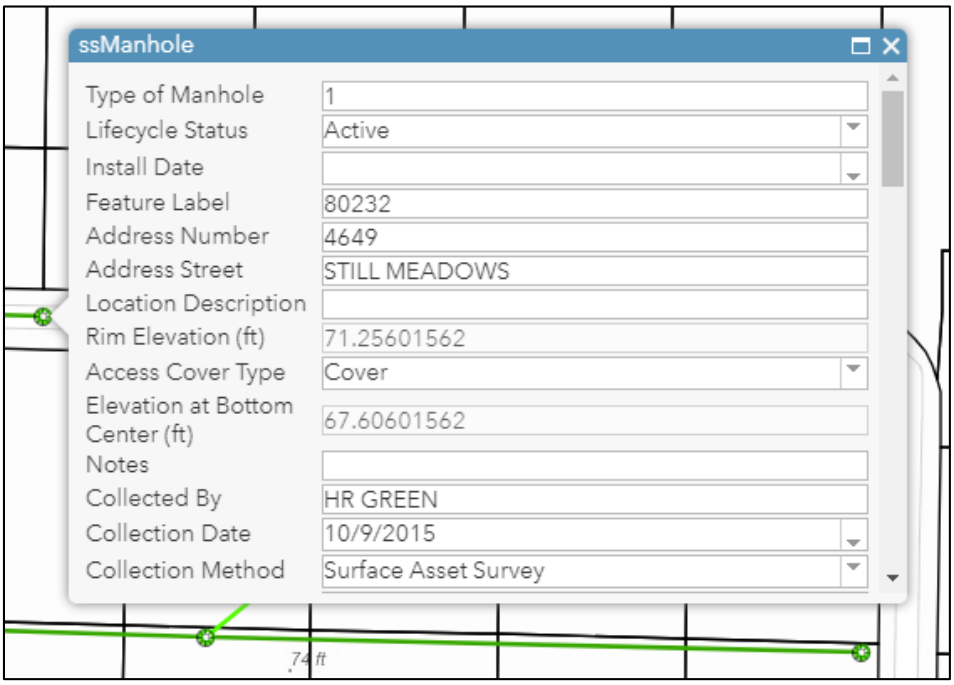


The other way to access editing functionality is to click on the map feature you want to edit, which will generate a pop-up window displaying attributes for the map feature (see image below).



You will notice the blue Edit link at the bottom of the pop-up window. Click on this link to enable editing on this feature.

After clicking the Edit link, the pop-up window will change to one allowing data entry and selection of drop-down options (see below).

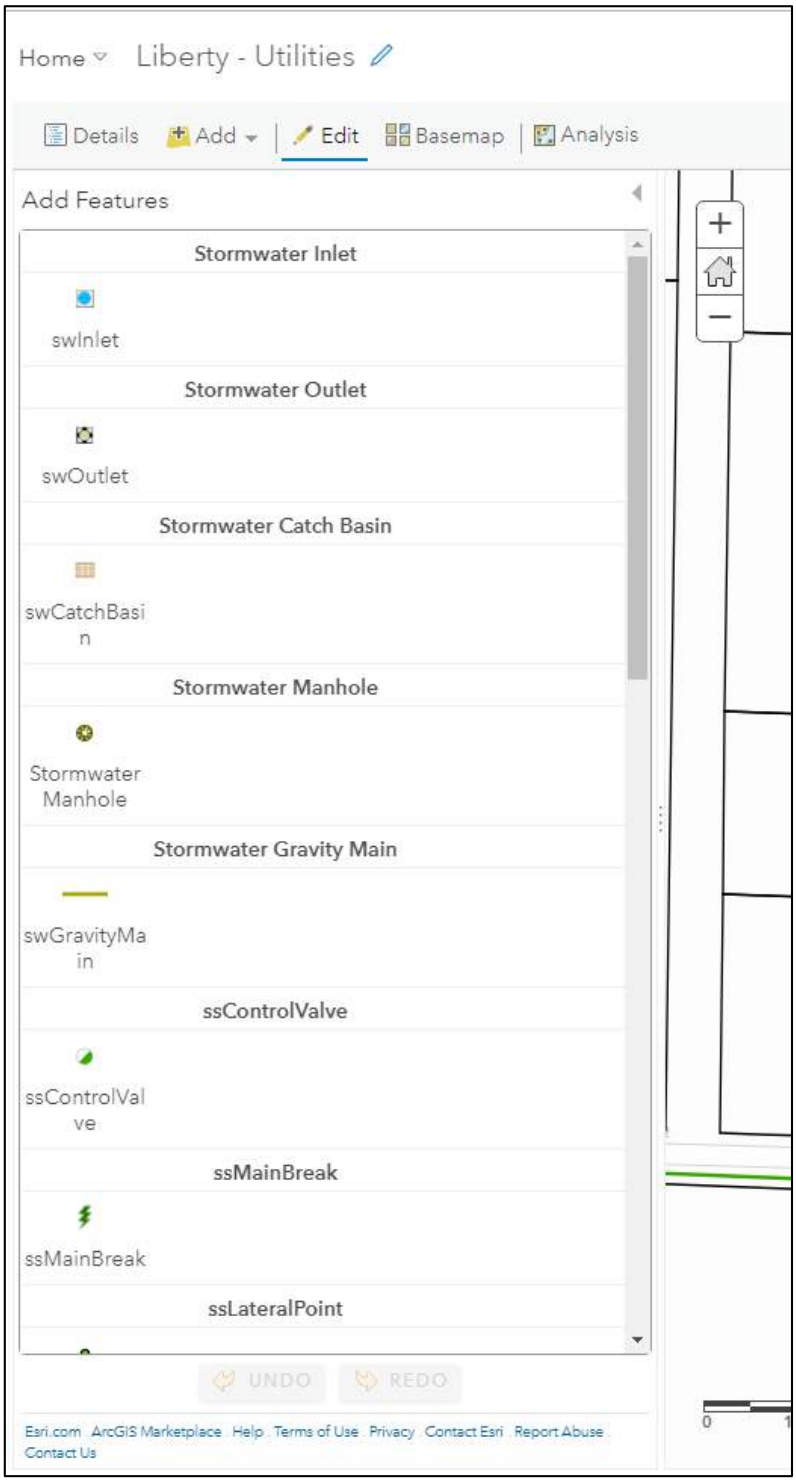


To edit attributes and add attachments from this pop-up window, refer to the instructions above for the Web Mapping Application's Attribute tool as the same functionality is offered in both.

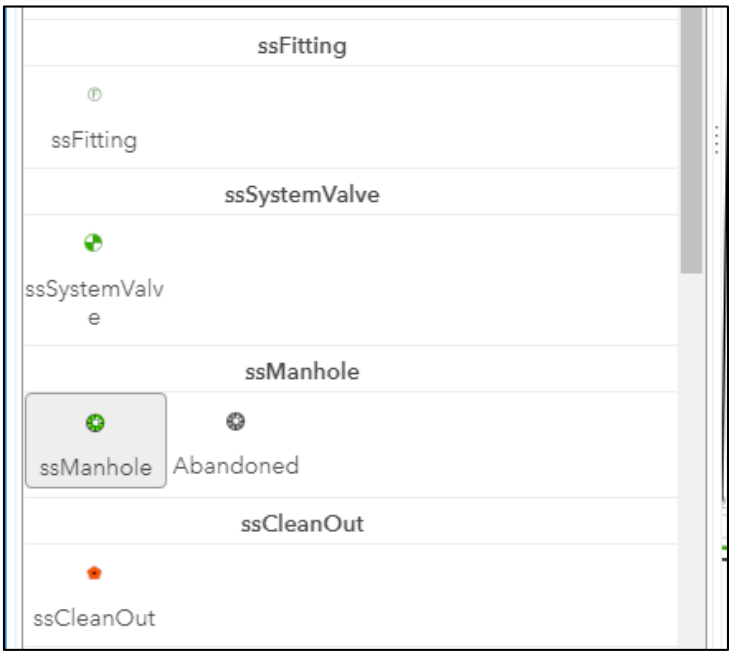
As with attribute editing in the Web Mapping Application, be aware that clicking on a desired feature may select several features within the click tolerance distance. Review the feature type/ID and check to see if multiple records have been selected (e.g. presence of arrows on the pop-up to navigate between selected records; indication that selection is one of multiple records selected) before making edits.

Add Features Menu for Web Maps

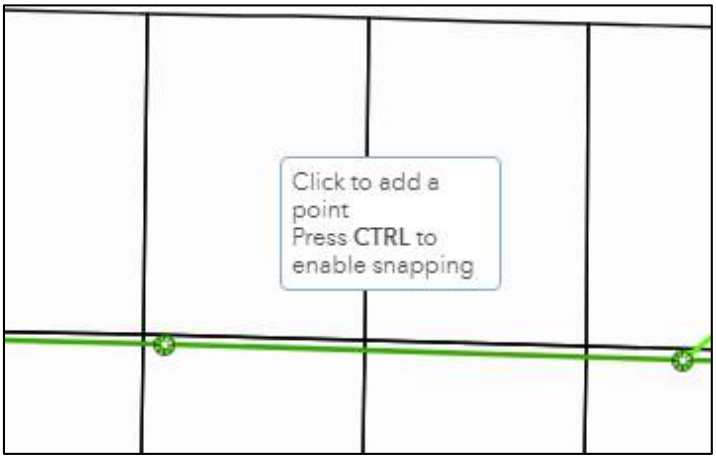
Regardless of which of the two ways you've use to access editing functionality, once editing has been enabled you should see an Add Features menu docked to the left side of the Web Map with a list of the map layers available for editing (see image below).



Use the Add Features menu to select a map layer for which you wish to add features. First, click on the map layer from the menu. In the image below, the ssManhole layer has been selected.



Next, drag your cursor over the map. You will see a message following your cursor that reads "Click to add a point. Press CTRL to enable snapping" (see image below).



Refer to the Select Tool and Add Feature Tool sections on Web Mapping Applications above for editing the geometry of points and lines as this functionality is shared with Web Maps. This shared functionality includes snapping.

Note that for Web Maps, the UNDO / REDO buttons are located at the bottom of the Add Features menu.

ArcGIS Field Maps Application (iOS)

https://doc.arcgis.com/en/field-maps/ios/help/quick-reference.htm

Table of Contents

Quick reference

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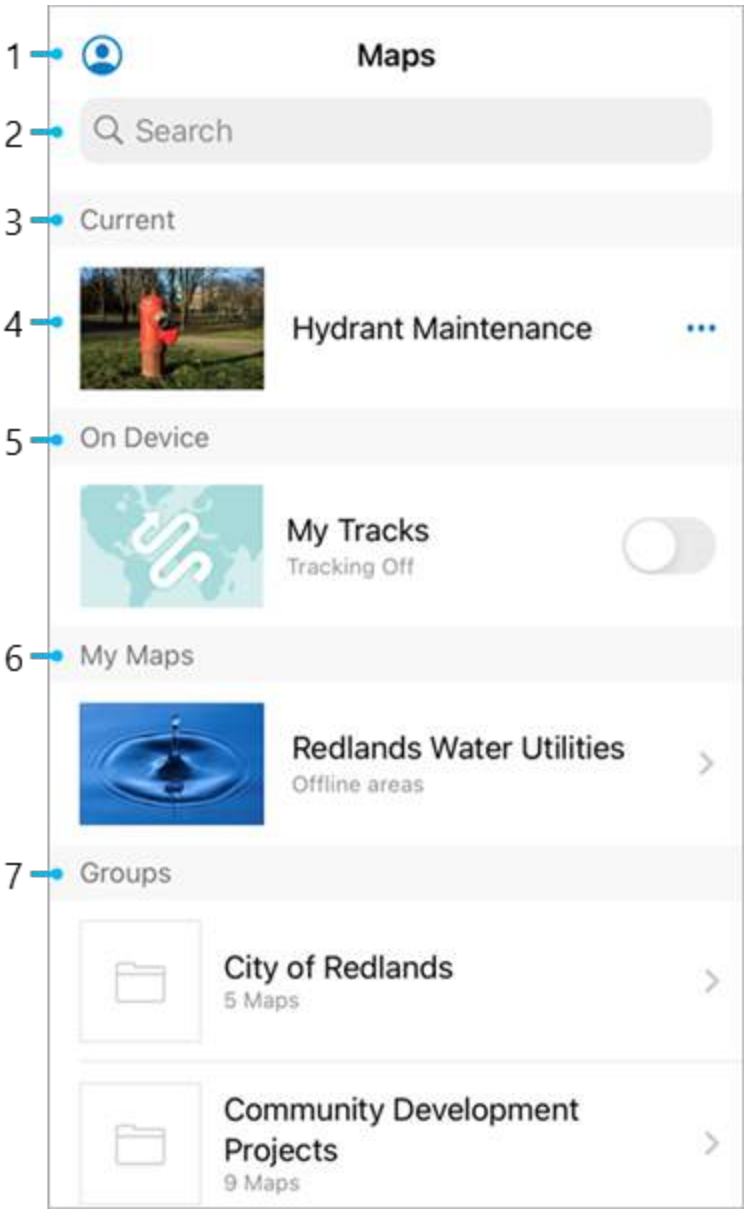
ArcGIS Field Maps allows you to access your maps, collect data, track your location, and annotate your maps, all in one app on your mobile device, even when disconnected. You can communicate your ideas and share information with others with maps enabled for editing or the included markup tool. Use Field Maps alone or in combination with other ArcGIS field apps for greater efficiency in your field activities. The maps and capabilities you can access in ArcGIS Field Maps depend on what licenses you have. See Requirements to learn more about what licenses and privileges are required for collecting data and location tracking.

When using ArcGIS Field Maps, you'll work with the following:

- Maps list—Find and open the maps that matter to you, and toggle location tracking on and off.
- Map and panel—Visualize and interact with your data, including initiating data collection.
- Data collection form and location target—If you're working with an editable map, you can use the form and location target when capturing a new asset or observation or performing an inspection and updating an existing asset or observation.

Maps list

Find the maps you want to work with through browsing and searching. The available maps include those you've made or that are shared with a group of which you are a member. If you don't have a data connection, only on-device maps are included.



1. **Profile**—View your currently signed-in account and the data collection, location tracking, and general settings associated with it.
2. **Search**—Enter text to find a map. You can tap **Read-only** or **Editing** to limit the list to maps with these capabilities. Your search term is used to filter the maps in the list.

   The search function searches the maps displayed in the categories shown, as well as all publicly accessible maps on your portal (ArcGIS Online or ArcGIS Enterprise). Your search term is used to filter the maps on your screen as well as one or two additional categories—one titled with your organization's name and another titled ArcGIS Online. If you are using an Enterprise portal without the ability to search ArcGIS Online for content, you won't see the ArcGIS Online category.

   Tip:

If search isn't visible, pull down to display it.

3. **Current** section—Shows the open map. Tap the map card to return to the map. This section displays if you have an open map.
4. Map card—Open the map or access map areas. If the map has the text **Offline areas** on the map card, it has offline map areas.
    - Maps without offline map areas can be opened and used without downloading the map to your device. You can add an offline map area if the map supports offline use.
    - Maps with offline map areas must be downloaded before they can be used. Tap the map to view, download, and manage the available offline map areas, or to add your own.

    A map area with a download icon can be downloaded to your device. A map area with an **Overflow** menu is already on your device and can be synced or removed. If it is a map area you defined on the device, you can also rename it.

5. **On Device** section—Shows mobile map packages (MMPKs) and maps with map areas downloaded to your device. If location tracking is enabled for your organization, the first map under **On Device** is titled **My Tracks**. You can toggle tracking on or off to set the tracking duration and tap the map card to view the map of tracks collected on your device. See Track mobile users to learn more about location tracking.

    Note:

    The **On Device** section only displays if MMPKs or map areas are downloaded to your device, or if location tracking is enabled for your organization.

    The **My Tracks** map card will move to the **Current** section when it's the currently open map.

6. **My Maps** section—Shows maps you own.
7. **Groups** section—Shows groups of which you are a member that have shared maps. This only displays if you are a member of any such groups. Tap on a group card to view the maps in a group.

Note:

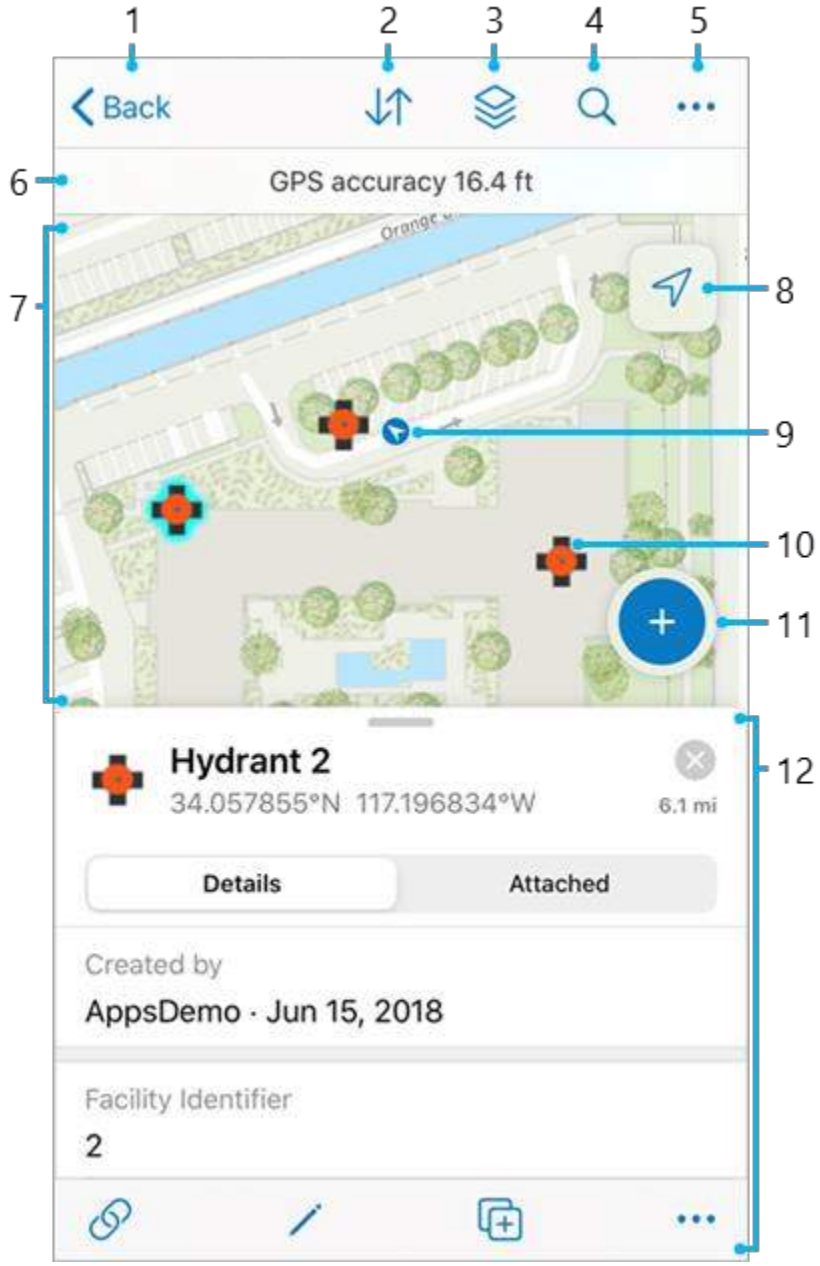
If you are using the app without signing in, your screen appears slightly different. You'll see the **Sample Maps** category, and the search function will search **Sample Maps** and ArcGIS Online. You can tap **Profile** to sign in.

Map and panel

Open a map to interact with it. Find, view, and capture assets or observations, mark up the map, and share notes with others. Tap on an asset or observation to view the panel and use it to view information and start capturing assets or observations or performing inspections. Use the **Maps** list to open a map.

Note:

The capabilities available in a map depend on the licenses you have and how the map is configured.



1. **Back**—Go back to the **Maps** list. If you opened the map from a group or list of map areas, the arrow takes you to the group or list of map areas in the **Maps** list.
2. **Sync**—The **Sync** icon appears if you are working in an offline map area that's part of a map that has been enabled for editing. Tap **Sync** to send your changes. When the sync icon has a dot, you have pending edits. See Sync your work.

   Depending on the configuration of the map you are using, sync may get changes that were made since your download and copy them to your device. See Optimize download and sync.

3. **Layers**—View the layers in the map, change their visibility, and see any errors.
4. **Search**—Find addresses, places, assets, and observations. Search honors what is configured in the map. See Configure feature search in ArcGIS Online or Configure feature search in ArcGIS Enterprise. Finding addresses and places requires an internet connection. You can search for assets, observations, and coordinates without a connection.

   Tip:

   Start a search and tap **Scan Barcode or QR code** to use its value to search.

   You can search using multiple coordinate formats.

5. **Overflow**—Change the basemap, view and use bookmarks, view the legend, measure on the map, add markup to the map, or share a link to the map. If the map is enabled for editing, the option to **Edit Multiple** features appears.

   Note:

   When using markup, different tools are available. For more information, see Markup.

6. GPS banner—See information about your GPS. Tap the banner to see additional details, including the accuracy, time the position was received, and location provider. If location tracking is enabled for your organization, you can toggle **Track my location** on and off and set the tracking duration.
7. Map—View and interact with your assets and observations. Tap an asset or observation to view its form.

   You can pan, zoom in and out, and rotate the map. Long press to use a magnifier and drop a pin at a location of interest or search to get result pins on the map. Tap a pin to view its details.

   Tip:

If you rotate the map, the rotation angle is shown by a compass in the upper right corner of the map. Tap that icon to remove the rotation and orient the map north.

8. **GPS** button—Display where you are. It has three modes: your location displayed on the map ( ), the map automatically centering on your location while oriented north ( ), and the map automatically centering on your location and oriented the direction you are facing ( ). Tap it to switch between the centered modes. Pan the map to stop centering on your location. If your current location is unavailable, the icon is gray ( ).
9. Your location—Where you are. Recenter it on the screen by tapping the **GPS** button. This displays while your location is in the current extent and ArcGIS Field Maps can access your location.
10. Features—View your assets as features on the map. Tap a feature on the map to see its details in the panel, including any attachments, related records, or media (including charts and images).
11. **Add**—The **Add** icon appears on maps that are enabled for editing. Start capturing an asset or observation at your location. This shows the data collection form and tools. See Capture.
12. Panel—Tap on an asset, observation, or markup to view additional information. Swipe the panel down to view less information or up to view more. Here, the panel shows the form for the selected asset and the actions that can be taken with it. The panel can also show details of other items, such as search results and dropped pins, or it can show a list of results, such as the assets and observations selected on the map or search results. The panel is also used to display some specialized content, such as available basemaps or outstanding edits that can be synced.

    When the panel displays a list, tap an item of interest to view its form (for assets and observations) or details (for pins). When displaying a single item (not a list or specialized content), the panel provides access to actions. Depending on the amount of information displayed, actions are available either in-line or on a toolbar.

    Actions include **Directions** , **Compass** (to get distance and bearing to the location), and **Add to My Places** .

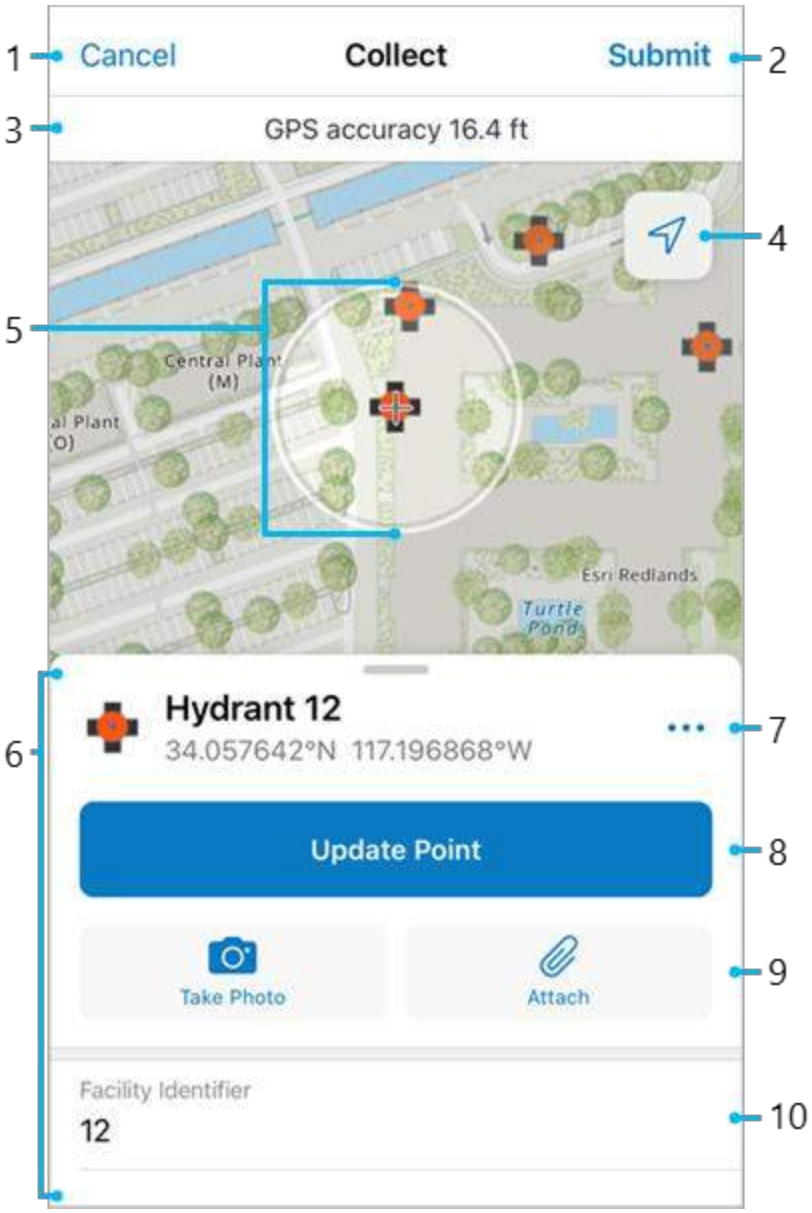
    Forms include the details about the asset or observation and access to any attachments. In addition to photos, videos, and audio clips, you can view attached PDFs, Microsoft Word documents, and Excel spreadsheets. From the form, you can save attachments to your device. Tap the asset or observation's symbol to zoom to it. Depending on the editing permissions, you may also see actions for **Edit** , **Copy** , **Delete** , and **Collect Here** . If there are related assets, observations, or reports, you can jump to the **Related** items. See Capture and Inspect.

Tip:

A related asset, observation, or inspection (report) is accessed through the form of the asset or observation to which it is related. Use the **Related** section of the form to select a related asset, observation, or inspection. Depending on what is supported by your relationship, you can add new related items, view read-only forms, and start editing. See Capture an asset or observation related to another and Add a related report.

Data collection form and location target

If the currently open map has been enabled for editing, you can collect data using the data collection form. The data collection form opens when you start capturing a new asset or observation or inspect an existing one. When filling out a form, use the location target to update the asset or observation's location. To start filling out a form and providing location, use the map and read-only form.



1. **Cancel**—Stop capturing a new asset or observation, or discard edits made to an existing one during an inspection.
2. **Submit**—Save the new asset or observation, or save the changes made to an existing one. If you're working online, others immediately see your edits. If you're working offline, your edits are available to others once you sync ⇵ them.
3. GPS banner—See information about your GPS. Tap the banner to see additional details, including the accuracy, time the position was received, and location provider. If location tracking is enabled for your organization, you can toggle **Track my location** on and off.
4. **GPS** button—Recenter the location target on your location. This displays when the location target isn't centered on your location.
5. Location target—Where an asset or observation (or a point in the location of a length or area) will be placed on the map. It is composed of a circle and crosshairs. It displays if

your layer allows updates to the location. See Capture, including the Edit location section.

If the **GPS** button doesn't display, the map is already centered over your location and the location target moves with you. If the GPS meets the required accuracy, the circle of the location target is blue, as is the text in the GPS banner. Otherwise, the circle and text are red. If the location target isn't centered over your location, the **GPS** button displays, the circle of the location target is gray, and the text in the GPS banner is gray.

Note:

The circle isn't an accuracy indicator. Use the GPS banner for accuracy information.

6. Form—Fill out entries to provide information. You can expand the panel to see more of the form while filling out entries. See Fill out forms.
7. **Overflow**—Edit the location, such as undoing changes, updating and deleting points, and streaming.
8. **Update Point** (single places)—Move the asset or observation under the location target. This displays if your layer allows updates to the location.

   It is replaced by **Add Point** for lengths and areas, which adds a point to the asset or observation under the location target.

9. **Take Photo** and **Attach**—Add photos, videos, or audio files. This displays if your layer supports attachments.
10. Form entry—An entry in the form where information can be provided.

Note:

When working with the map outside of data collection, a blue dot on the map shows your location. This is intentionally hidden during data collection when the map is centered over your location—the dot obscures the area around you, which is often your area of interest.

Capture

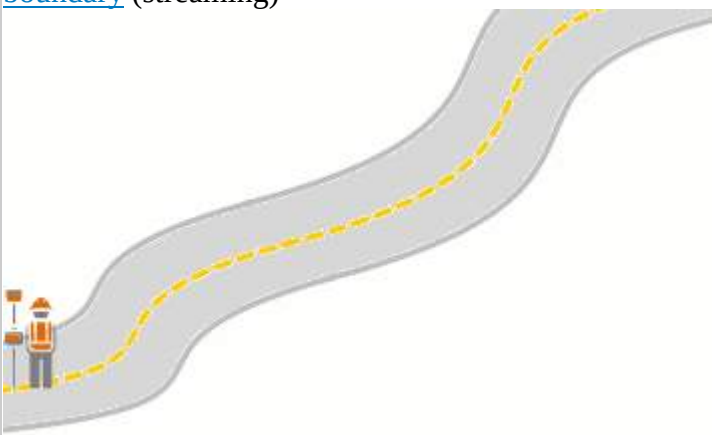
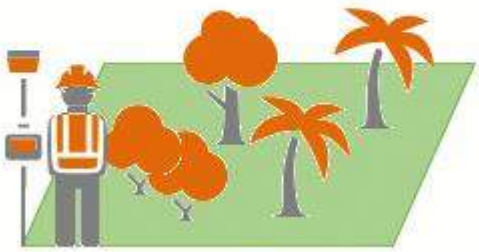
iOS | Other versions

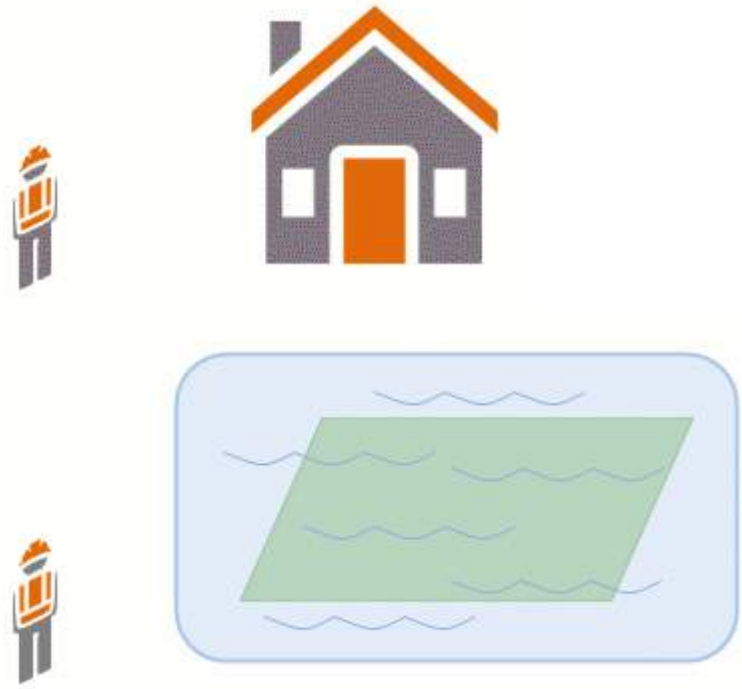
ArcGIS Field Maps allows you to capture asset inventories and observations in the field on maps enabled for editing. Each asset and observation you capture has both a location and a form. You'll provide the location and fill out the form.

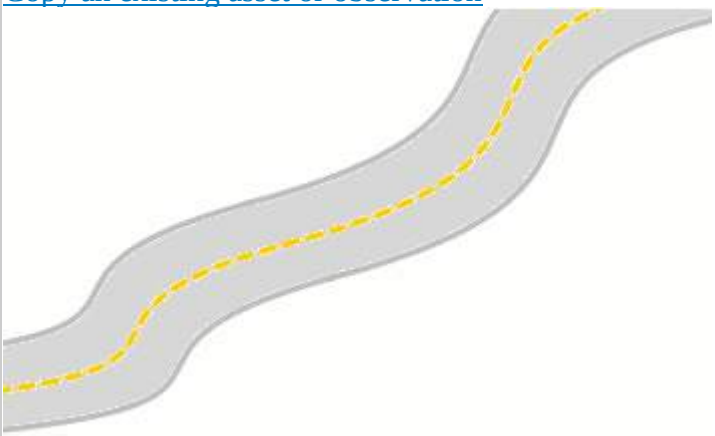
Note:

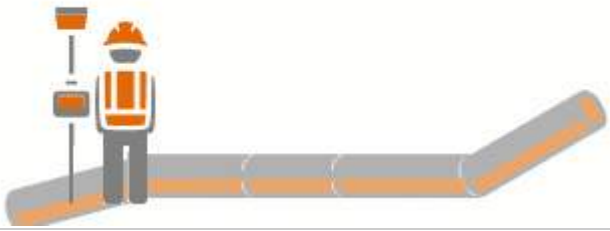
If you're inspecting, updating, or editing existing assets or observations, see Inspect.

Are you at the location of the asset or observation?	
Capture at your location 	
	Capture an asset or observation you can be at as a hydrant, pipeline, or football field. This is useful when a length or area has straig sections. Use your location to define the ends straight sections and Field Maps connects the This is supported for single places, lengths, a areas.
 Capture at your location with GPS averaging	Take multiple GPS readings and average the to get a more precise location. This is commo

Are you at the location of the asset or observation?	
 [Capture automatically while walking or driving the length or boundary](#) (streaming) 	high-accuracy workflows, such as capturing t location of an underground valve. This is supported for single places, lengths, a areas.
 [Copy an existing asset or observation to your location](#) 	Capture an asset or observation you can be at a smooth line or has a smooth boundary, such path or flower bed. Use your location as you or drive the length or boundary to create smo sections matching the shape of the asset or observation. This is supported for lengths and areas. Capture an asset or observation with the sam as an existing one—the form matches and ca updated. This is useful when capturing the sa similar things, such as a row of newly planted spruce trees. This is supported for single places, lengths, a areas.

Are you at the location of the asset or observation?	
[Capture at a location offset from your location](#) 	Capture an asset or observation you can see b be at while measuring how far away you are laser rangefinder. For example, you are captu the building corners but need centimeter accu and can't obtain it while against the building. This is supported for single places, lengths, a areas.
Are you using the map to find the location?	
[Capture at a location chosen on the map](#) 	Capture an asset or observation you can see b be at, such as a damaged building when the l must be placed at the structure, or a flooded f Use the map and its basemap or reference lay place points. Lengths and areas use the points to define the of straight sections and Field Maps connects This is supported for single places, lengths, a areas. Tip: If you only need to measure a length or area create an item on the map, use the measure to
Do you have the coordinates of the asset or observation?	
[Capture at a coordinate location](#)	Capture an asset or observation at known coordinates. Examples include a location communicated via radio during a search and rescue mission or weather observation a handheld weather meter. This is supported for single places or the first point of a length or area.

Do you have the coordinates of the asset or observation?	
	
Is the location the same as that of a point of interest?	
Capture using a point of interest 	Capture at the same location as a point of interest, sharing the location, but getting empty form. For example, search for an address to start capturing data. This is supported for single places or the first point of a length or area.
Are you copying an existing asset or observation?	
Copy an existing asset or observation 	Copy an existing asset or observation, sharing th location, shape, or form. For example, copy a roa use it for managing repaving.
Are you capturing an asset or observation that is related to an existing asset or observation?	
Capture an asset or observation from the form of an existing related asset or observation	Capture an asset or observation that is related to existing asset or observation. You can use your l or choose a location on the map. For example, re taken along a pipeline are often associated with t pipe, but have their own location along it. This is supported for single places, lengths, and a

Are you copying an existing asset or observation?	
	

At your location

You are at the location of the asset or observation you want to capture. Use the GPS to capture its location.

1. Open the map of your assets or observations.
2. Tap **Add** .

   The location target appears on the map, centered on your location.

3. Choose the type of asset or observation to capture.

   Note:

   If you're not prompted to choose, you only have a single type available, and it is selected automatically.

   The asset or observation (or its first point, if it's a length or area) is placed on the map at your location (assuming your GPS accuracy is within the limits you've set), marked by the location target. If the circle of the location target is red, your location accuracy isn't good enough (based on your required accuracy setting), and you must override the accuracy by tapping **Add point**, manually place the point, or wait for better accuracy. Once placed, the point doesn't move as your GPS location updates.

4. If you need to update the location, you can do so either using the GPS or manually.
   - To manually set the location, move the map so that your desired location is under the location target.
   - To use the GPS, tap the GPS button and the location target is centered on your location.

   Tap **Update point** (**Update selected point** from the **Overflow** menu for lengths and areas) and the point moves to the current position of the location target.

5. If you're capturing a length or area, move to the next place you want to add a point (the location target follows you) and tap **Add point**. Repeat until your asset or observation's location is complete.

   Tip:

   You can manually place a point on the map by moving the map so that your desired location is under the location target and tapping **Add point**. To center the location target over your location again, tap the GPS button .

   You can also stream sections of the asset, if desired. Use **Start streaming** (in the **Overflow** menu) to create a section of the asset by traveling along it. Tap **Stop streaming** to continue to place points without streaming. See At your location while traveling (streaming).

   If you need to place a point with an offset from your location, see Offset from your location.

6. Fill out the form, including adding any attachments (photos, videos, or audio files).
7. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

At your location with GPS averaging

You are at the location of the asset or observation you want to capture. Capture multiple GPS points and average them to capture its location.

1. Enable GPS averaging in the settings in Field Maps.
2. Open the map of your assets or observations.
3. Tap **Add** .

   The location target appears on the map, centered on your location.

4. Choose the type of asset or observation to capture.

   Note:

   If you're not prompted to choose, you only have a single type available, and it is selected automatically.

GPS averaging begins, and once the required number of locations are captured, the asset or observation (or its first point, if it's a length or area) is placed at the averaged location on the map.

5. If you need to update the location, tap **Start averaging** (for single places) or **Update selected point** (in the **Overflow** menu ••• for lengths and areas) to redo the GPS averaging and calculate a new location.

   Tip:

   If you pan away from your GPS location, you can tap **Update point** (**Add point** for lengths and areas) and tap **Use target location** to add a point at that location on the map. To use GPS averaging instead, tap **Update point** (**Add point** for lengths and areas) and tap **Start averaging**.

6. If you're capturing a length or area, move to the next place you want to add a point (the location target follows you) and tap **Add point**. Repeat until your asset or observation's location is complete. An average is calculated when placing each point.

   Tip:

   You can also stream sections of the asset, if desired. Use **Start streaming** (in the **Overflow** menu •••) to create a section of the asset by traveling along it. Tap **Stop streaming** to continue to place points without streaming. See At your location while traveling (streaming).

7. Fill out the form, including adding any attachments (photos, videos, or audio files).
8. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

At your location while traveling (streaming)

Walk or drive along the asset or observation you are capturing and create its geometry based on your path. By automatically adding points based on the time or distance since the last point was added, you create the location by traveling along it instead of adding each point manually. This involves less hands-on interaction, but it can also result in less-accurate locations (for example, when rounding corners).

Note:

Streaming to collect lengths and areas and GPS averaging are mutually exclusive: you can't average values and stream at the same time.

1. Open the map of your assets or observations.
2. Tap **Add**  .

   The location target appears on the map, centered on your location.

3. Choose the type of asset or observation to capture.

   Note:

   If you're not prompted to choose, you only have a single type available, and it is selected automatically.

   The first point is added to the location of the asset or observation at your location (assuming your GPS accuracy is within the limits you've set), marked by the location target. If the circle of the location target is red, your location accuracy isn't good enough (based on your required accuracy setting), and you must override the accuracy by tapping **Add point**, manually place the point, or wait for better accuracy. Once placed, the point doesn't move as your GPS location updates.

4. From the **Overflow** menu ⋯, tap **Start streaming**.

   The location target is removed from the map and the blue GPS dot appears. The first streamed point is placed on the map at your current location (assuming your GPS accuracy is within the limits you set).

5. Walk or drive along or around the asset or observation.

   As your GPS location updates, additional points are added to the location. The frequency at which they are added depends on the streaming settings.

   While you are streaming, you can't manually add or update points. To do this, stop streaming, make your updates, and start streaming again.

6. Fill out the form, including adding any attachments (photos, videos, or audio files).
7. When you finish traveling the asset or observation, tap **Stop streaming**.
8. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

At your location with a duplicated form

Copy an existing asset or observation's form to a new asset or observation at your location. This is useful when capturing similar assets or observations.

1. Open the map of your assets or observations.
2. Select the asset or observation you want to copy by doing one of the following:
    - Tap the asset or observation on the map to select it manually.
    - Do a search for the asset or observation, and choose it from the search results.
    - From a pin dropped at its location, go to **What's here** and choose the asset or observation from the list.

    If there is more than one asset or observation at that location, choose the one to update from the list that appears.

    The asset or observation is highlighted on the map and its form displays in the panel.

3. Tap **Copy**  .

    Note:

    If the asset or observation is read-only, this copies the form and location.

    The asset or observation (or its first point, if it's a length or area) is placed on the map at your location (assuming your GPS accuracy is within the limits you've set), marked by the location target. If the circle of the location target is red, your location accuracy isn't good enough (based on your required accuracy setting), and you must override the accuracy by tapping **Add point**, manually place the point, or wait for better accuracy. Once placed, the point doesn't move as your GPS location updates.

    The type of asset or observation and its form are populated to match those you are copying.

4. If you need to update the location, you can do so either using the GPS or manually.
    - To manually set the location, move the map so that your desired location is under the location target.
    - To use the GPS, tap the GPS button  and the location target is centered on your location.

    Tap **Update point** (**Update selected point** from the **Overflow** menu for lengths and areas) and the point moves to the current position of the location target.

5. If you're capturing a length or area, continue providing the location. You can use your location to add individual points (including offset points), add multiple points based on your location while traveling (streaming), place individual points on the map, or do a combination of the three. Continue adding points until your asset or observation's location is complete.
    - Use your location to add individual points—Move to the next place you want to add a point (the location target follows you) and tap **Add point**. If you are

doing GPS averaging, an average is calculated when placing each point. You can capture the location offset from your location.

- Use your location while traveling (streaming)—From the **Overflow** menu ⋯, tap **Start streaming**. Walk or drive along or around the asset or observation and points are automatically added to the location. The frequency at which they are added depends on the streaming settings.
- Place individual points on the map—Move the map so that the next place you want to add a point is under the location target and tap **Add point**.

  Tip:

  You can use the location of an existing point (including one that is part of a length or area). Move the map so that the point with the location you need to use is near the location target such that an orange dot appears over the existing point, and lift your finger from the map. The location target moves (snaps) to the existing point.

6. Update the form, including adding any attachments (photos, videos, or audio files).
7. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

Offset from your location

You are near the location of the asset or observation you want to capture, but can't be at the exact location, and you are using a laser rangefinder to determine where it is relative to your location. Use the GPS, Eos Tools Pro, and a Lasertech rangefinder to capture its location.

1. Configure Field Maps to capture offset locations if you haven't already.
2. Open the map of your assets or observations.
3. Tap **Add**  .

   The location target appears on the map, centered on your location.

4. Choose the type of asset or observation to capture.

   Note:

   If you're not prompted to choose, you only have a single type available, and it is selected automatically.

5. To provide the offset for the location, tap the **Overflow** menu ⋯ and tap **Offset from location**.

Eos Tools Pro opens.

6. In Eos Tools Pro, follow the prompts to calculate the offset. Tap **Send** to pass the location to Field Maps and return to the asset or observation you are capturing in Field Maps.

   In Field Maps, the asset or observation is moved to the offset location, or if capturing a length or area, a new point is added at the offset location. The offset metadata is also returned to Field Maps, and if your layer is configured to record it, it is recorded. Once placed, the point doesn't move as your GPS location updates in Field Maps.

7. If you're capturing a length or area, continue providing the location. You can use your location to add individual points (including offset points), add multiple points based on your location while traveling (streaming), place individual points on the map, or do a combination of the three. Continue adding points until your asset or observation's location is complete.
   - Use your location to add individual points—Move to the next place you want to add a point (the location target follows you) and tap **Add point**. If you are doing GPS averaging, an average is calculated when placing each point. You can capture the location offset from your location.
   - Use your location while traveling (streaming)—From the **Overflow** menu •••, tap **Start streaming**. Walk or drive along or around the asset or observation and points are automatically added to the location. The frequency at which they are added depends on the streaming settings.
   - Place individual points on the map—Move the map so that the next place you want to add a point is under the location target and tap **Add point**.

     Tip:

     You can use the location of an existing point (including one that is part of a length or area). Move the map so that the point with the location you need to use is near the location target such that an orange dot appears over the existing point, and lift your finger from the map. The location target moves (snaps) to the existing point.

8. Fill out the form, including adding any attachments (photos, videos, or audio files).
9. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

At a location chosen on the map

Use the map to specify its location. Perhaps you can't get to the location of your asset or observation, or it would be dangerous to do so.

1. Open the map of your assets or observations.
2. Long press on the map at the location of the asset or observation you want to capture.

   A pin is dropped on the map and its form displays in the panel. Tap **Details** if not already viewing them.

3. Tap **Collect here**.

   The location target appears on the map at the pin's location.

4. Choose the type of asset or observation to capture.

   Note:

   If you're not prompted to choose, you only have a single type available, and it is selected automatically.

   It (or its first point, if it's a length or area) is placed on the map under the location target.

5. If you need to update the location, move the map so that the desired location is under the location target and tap **Update point** (**Update selected point** from the **Overflow** menu ••• for lengths and areas).

   Tip:

   You can use the location of an existing point (including one that is part of a length or area). Move the map so that the point with the location you need to use is near the location target such that an orange dot appears over the existing point, and lift your finger from the map. The location target moves (snaps) to the existing point.

6. If it's a length or area, provide the next point by moving the map so that the next place you want to add a point is under the location target and tap **Add point**. Continue adding points until your asset or observation's location is complete.
7. Fill out the form, including adding any attachments (photos, videos, or audio files).
8. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

At specific coordinates

Use **Search** to find a location and capture an asset or observation at that location. Perhaps coordinates were provided to you, or you know the exact location of your asset or where the observation is made.

1. Open the map of your assets or observations.
2. Tap **Search** , enter the coordinates where you want to place the asset or observation, and tap **Search**. If there are multiple search results, tap the search result matching your coordinates.

   Coordinates can be entered in the following formats:

Format	Example	Notes
Decimal degrees (DD)	34.057814 -117.196475 34.057814N 117.196475W	Specify latitude and then longitude.
Degrees decimal minutes (DDM)	34 3.47N 117 11.79W	Specify latitude and then longitude.
Degrees minutes seconds (DMS)	34 3 28N 117 11 47W	Specify latitude and then longitude.
Military Grid Reference System (MGRS)	11S MT 81868 68583	
United States National Grid (USNG)	11S MT 81868 68583	
Universal Transverse Mercator (UTM)	11S 481868 3768583	

   A search pin is dropped on the map and its form appears in the panel.

3. Tap **Collect here**.

   The location target appears on the map at the pin's location.

4. Choose the type of asset or observation to capture.

Note:

If you're not prompted to choose, you only have a single type available, and it is selected automatically.

It (or its first point, if it's a length or area) is placed on the map under the location target.

5. Fill out the form, including adding any attachments (photos, videos, or audio files).
6. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

At a point of interest

Use a point of interest on the map as the location for a new asset or observation. You can search for a new point of interest on the map or use a saved location from **My places**.

1. Open the map of your assets or observations.
2. Select the point of interest by doing one of the following:
   - Tap **Search** , enter the place or address where you want to place the asset or observation, and tap **Search**. If there are multiple search results, tap the search result matching your desired location.
   - Tap **Overflow** and then tap **Bookmarks**. Tap **My Places** and select the point of interest where you want to place the asset or observation.
3. Tap **Collect here**.

   The location target appears on the map at the pin's location.

4. Choose the type of asset or observation to capture.

   Note:

   If you're not prompted to choose, you only have a single type available, and it is selected automatically.

   It's placed on the map under the location target.

5. Fill out the form, including adding any attachments (photos, videos, or audio files).
6. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

By copying an existing asset or observation

Copy the form, shape, and location of an existing asset or observation. This allows you to create a copy with a different type or in a different layer, but retain the location, shape, and any matching attributes.

Tip:

If you need to use part of the location of an existing asset or observation to define the location of a new (or updated) asset or observation, consider snapping instead of copying the entire location as shown in these steps. To snap, start capturing your asset or observation based on any of the workflows in this topic. While providing its location, use the location of an existing point (including one that is part of a length or area) by moving the map so the point with the location you need to use is near the location target and an orange dot appears over the existing point, and lift your finger from the map. The location target moves (snaps) to the existing point. Snapping must be enabled to do this.

1. Open the map of your assets or observations.
2. Select the asset or observation you want to copy by doing one of the following:
    - Tap the asset or observation on the map to select it manually.
    - Do a search for the asset or observation, and choose it from the search results.
    - From a pin dropped at its location, go to **What's here** and choose the asset or observation from the list.

    If there is more than one asset or observation at that location, choose the one to update from the list that appears.

    The asset or observation is highlighted on the map and its form displays in the panel.

3. Tap **Copy** . Depending on the copy settings configured in the Field Maps web app, you can choose from the following options:
    - **Copy Attributes**—Copy the feature's attributes to a new feature.
    - **Copy Shape**—Copy the feature's shape to a new feature.
    - **Copy All**—Copy the feature's attributes and shape to a new feature.
4. Choose the type of asset or observation to capture.

    The types you can choose are limited to those of the same geometry type (for example, length or area) as the feature you are copying.

    Note:

    If you're not prompted to choose, you only have a single type available, and it is selected automatically.

    The form and location are copied and displayed. If you selected **Copy Shape** or **Copy All**, the shape of the feature is also copied. If you selected **Copy Attributes** or **Copy All**, entries in the new form that have the same name and type as entries in the copied form are populated to match the copied form.

5. Edit the location as needed.

   This doesn't affect the location of the original, copied asset or observation.

6. Fill out the form, including adding any attachments (photos, videos, or audio files).
7. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

Related to another asset or observation

Use the form of an existing asset or observation to capture a related asset or observation.

Note:

If you're collecting a related inspection or other nonspatial form, see the Add a related report inspection workflow.

1. Open the map of your assets or observations.
2. Select the asset or observation to which you're adding related information by doing one of the following:
   - Tap the asset or observation on the map to select it manually.
   - Do a search for the asset or observation, and choose it from the search results.
   - From a pin dropped at its location, go to **What's here** and choose the asset or observation from the list.

   If there the is more than one asset or observation at that location, choose the one to update from the list that appears.

   The asset or observation is highlighted on the map and its form appears in the panel.

3. In the form, scroll to the **Related** section. Tap the layer to which you are adding an asset or observation.

   A list of existing forms appears if there are any.

4. Tap **Add** to add a new asset or observation.
5. Choose the type of asset or observation to capture.

   Note:

   If you're not prompted to choose, you only have a single type available, and it is selected automatically.

The asset or observation (or its first point, if it's a length or area) is placed on the map at your location (assuming your GPS accuracy is within the limits you've set), marked by the location target. If the circle of the location target is red, your location accuracy isn't good enough (based on your required accuracy setting), and you must override the accuracy by tapping **Add point**, manually place the point, or wait for better accuracy. Once placed, the point doesn't move as your GPS location updates.

6. If you need to update the location, you can do so either using the GPS or manually.
    - To manually set the location, move the map so that your desired location is under the location target.
    - To use the GPS, tap the GPS button and the location target is centered on your location.

    Tap **Update point** (**Update selected point** from the **Overflow** menu for lengths and areas) and the point moves to the current position of the location target.

7. If you're capturing a length or area, continue providing the location. You can use your location to add individual points (including offset points), add multiple points based on your location while traveling (streaming), place individual points on the map, or do a combination of the three. Continue adding points until your asset or observation's location is complete.
    - Use your location to add individual points—Move to the next place you want to add a point (the location target follows you) and tap **Add point**. If you are doing GPS averaging, an average is calculated when placing each point. You can capture the location offset from your location.
    - Use your location while traveling (streaming)—From the **Overflow** menu , tap **Start streaming**. Walk or drive along or around the asset or observation and points are automatically added to the location. The frequency at which they are added depends on the streaming settings.
    - Place individual points on the map—Move the map so that the next place you want to add a point is under the location target and tap **Add point**.

    Tip:

    You can use the location of an existing point (including one that is part of a length or area). Move the map so that the point with the location you need to use is near the location target such that an orange dot appears over the existing point, and lift your finger from the map. The location target moves (snaps) to the existing point.

8. Fill out the form, including adding any attachments (photos, videos, or audio files).
9. Tap **Submit** once your related form is ready.

The form of the existing asset or observation is updated to reference the new form and the new form displays in the panel. The new form's location shows on the map. If you're

working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

Tips

Tips to help you get the most out of your data collection are listed below.

Improve your GPS reception

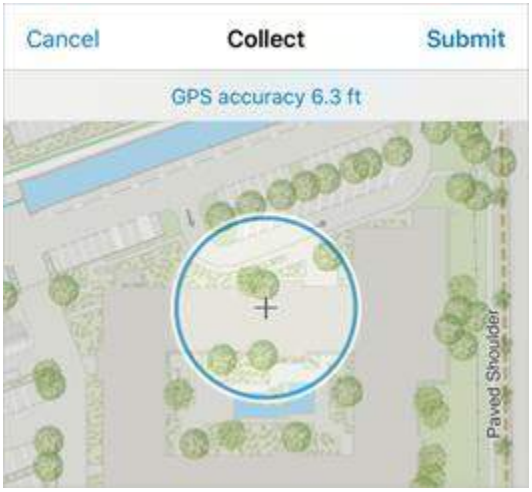
To improve your GPS reception, make sure you have a clear view of the sky. Avoid tree canopy, and move away from tall buildings. GPS accuracy is displayed in the GPS banner. Tap the GPS banner to get GPS details, including the provider.

Edit location

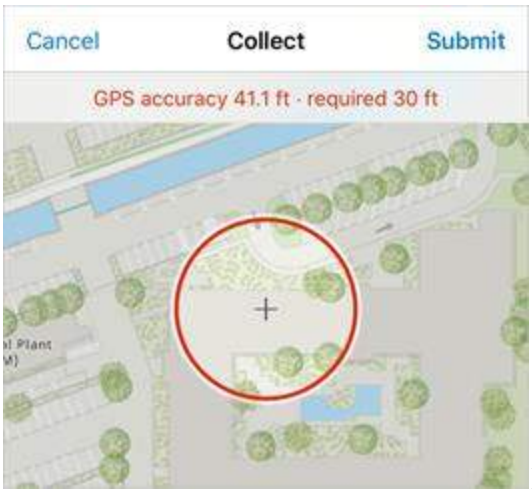
The location of a single place is a point and the location of a length or an area is defined by a series of points. Locations are edited by adding, updating, and deleting the points.

- A single point is added when you tap **Add point**. It is placed under the location target. You can position the location target over your location by tapping the GPS button or position it manually by moving the map.

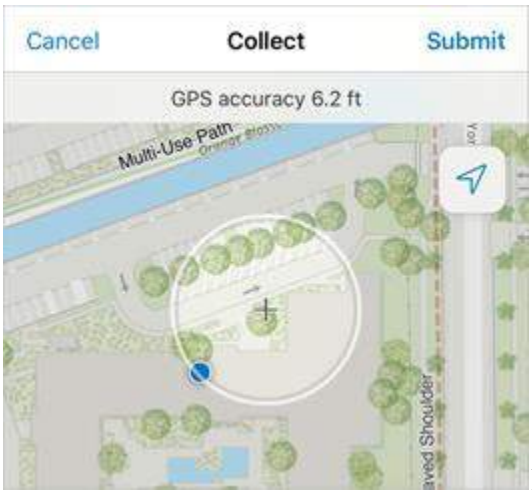
  If the **GPS** button doesn't display, the map is already centered over your location and the location target moves with you. If the GPS meets the required accuracy, the circle of the location target is blue, as is the text in the GPS banner. Otherwise, the circle and text are red. If the location target isn't centered over your location, the **GPS** button displays, the circle of the location target is gray, and the text in the GPS banner is gray.



Good GPS accuracy



Inadequate GPS accuracy

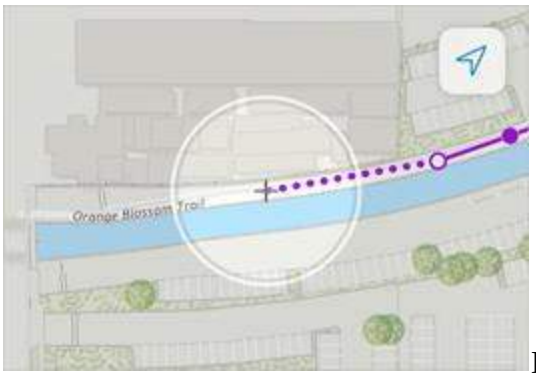


Place a point without GPS

If you're placing the point using the GPS and the GPS doesn't meet the required accuracy, you are notified. You can choose to ignore the accuracy requirement and place the point anyway.

If you are performing GPS averaging, an average is calculated when placing each point using the GPS.

Before the point is added to a length or area, dotted lines show a preview of the location with a point added under the location target.



Dots preview the location

- While editing a length or area, the location has a selected point (with a white fill). By default, the last point added is selected. Tap a point to select it.
- Points added to the location of a length or area are added following the selected point.
- Multiple points can be added to a length or area automatically through streaming, following as you move and creating smooth shapes, by tapping **Start Streaming** in the **Overflow** menu •••.

  The location target is removed from the map and the blue GPS dot appears. The first streamed point is placed on the map at your current location (assuming your GPS accuracy is within the limits you've set). Walk or drive the asset or observation. As your GPS location updates, points are added to the location. To manually add or update a point, stop streaming, make your updates, and start streaming again.

  The frequency at which points are added depends on your settings. If you want the points spaced a minimum distance apart, base the streaming on distance and specify a distance. If you want points added at a minimum time frequency, base the streaming on time and specify a time interval.

- Move the selected point by positioning the location target over the new place and tapping **Update point** (for single places) or **Update selected point** in the **Overflow** menu ••• (for lengths and areas).
- Remove the selected point of a length or area by tapping **Delete selected point** in the **Overflow** menu •••.
- Undo location edits by tapping **Undo**, or redo them by tapping **Redo**, in the **Overflow** menu •••.

Capture locations with altitude

You can directly capture 3D assets and observations to use throughout ArcGIS. If your layer is z-aware, points captured in Field Maps include z-values (altitude information).

Note:

Capturing assets and observations into a z-aware layer requires a z-value. If you are capturing at your location and your location is being provided through Wi-Fi, a z-value is not included, and you are not able to add the point.

Inspect

iOS | Other versions

ArcGIS Field Maps allows you to perform inspections or edit assets and observations in the field with maps that are enabled for editing. The best workflow for these inspections depends on how you monitor the results:

- If you only need the current status, update the asset or observation itself to provide updated information.
- If you maintain historical records for the asset, add a related report to provide current information.
- If you need to update the forms of multiple assets or observations, update them at the same time.

Note:

If your assets or observations don't have related reports, you won't see options for them.

If you're capturing new assets or observations, see Capture.

Update an existing asset (edit)

Update an existing asset or observation, changing the location or information in the form.

1. Open the map of your assets or observations.
2. Select the asset or observation you need to update by doing one of the following:
   - Tap the asset or observation on the map to select it manually.
   - Do a search for the asset or observation, and choose it from the search results.
   - From a pin dropped at its location, go to **What's here** and choose the asset or observation from the list.

   If there is more than one asset or observation at that location, choose the one to update from the list that appears.

   The asset or observation is highlighted on the map and its form appears in the panel.

3. Tap **Edit** .

   The asset or observation's location and form are editable.

4. Update the asset or observation's location as needed by editing its location.
5. Fill out the form, including adding any attachments (photos, videos, or audio files).

6. Tap **Submit** once your asset or observation is ready.

   Your asset or observation is on the map and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

Add a related report

Add a new related inspection report (related record) to an existing asset or observation, providing status information.

1. Open the map of your assets or observations.
2. Select the asset or observation to which you need to add a report by doing one of the following:
   - Tap the asset or observation on the map to select it manually.
   - Do a search for the asset or observation, and choose it from the search results.
   - From a pin dropped at its location, go to **What's here** and choose the asset or observation from the list.

   If there is more than one asset or observation at that location, choose the one to update from the list that appears.

   The asset or observation is highlighted on the map and its form appears in the panel.

3. In the form, scroll to the **Related** section. Tap the type of report you are adding.

   A list of existing reports appears if there are any.

4. Tap **Add** to add a new report. If prompted, choose the type of report.

   Note:

   If you're not prompted to choose a type, only a single type is available, and it is selected automatically.

   The form for your new report appears.

5. Fill out the form, including adding any attachments (photos, videos, or audio files).
6. Tap **Submit** once your inspection is ready.

   Your inspection is added to the related asset and its form displays in the panel. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

Update the forms of multiple existing assets (edit multiple)

Update a form entry for multiple assets or observations at the same time. For example, if mobile workers are performing inspections and need to mark multiple hydrants as having passed inspection, they can select all the hydrants and update all their form entries tracking inspection at once.

Note:

With multiple features selected, you can't update the location, attachments, or related reports.

1. Open the map of your assets or observations.
2. From the **Overflow** menu ⋯, tap **Edit multiple**.

   Note:

   If the map doesn't have an editable layer that supports updates, you won't see the **Edit multiple** option.

3. Select the assets or observations you need to update by doing one of the following:
   - Tap individual assets or observations on the map to add them to the selection.
   - Tap multiple assets or observations to add all of them to the selection.

     If the assets or observations you tap first are in different layers, choose the layer you want to update.

4. Tip:
5. If you add an asset or observation to your selection in error, you can remove it by swiping it in the list of selected features and tapping **Deselect**.
6. You must select at least two assets or observations. All selected assets or observations must be in the same layer.
7. The assets or observations are highlighted on the map and included in the panel. In the panel, you can review the selection or tap an asset or observation to see its details. After viewing the details of a single asset or observation, close its details to return to the list of selected items.
8. Once you have selected all the assets or observations you need to update, tap **Continue**.

   A form created by combining all the values in the selected assets or observations appears in the panel. Entries for which the forms of all the selected assets or observations have the same value display the value. Entries with more than one value in the selection display multiple values. Entries without values don't display a value.

9. Fill out the form.

   While editing multiple features, you can't add or remove attachments. Entries determined by subtypes and entries that are the foreign keys for relationships are hidden and can't be updated.

10. Tap **Submit** once your assets or observations are ready.

    Your assets or observations are updated. If you're working online, others immediately have access to your edits. If you're working offline, your edits are available to others once you sync them.

Sync

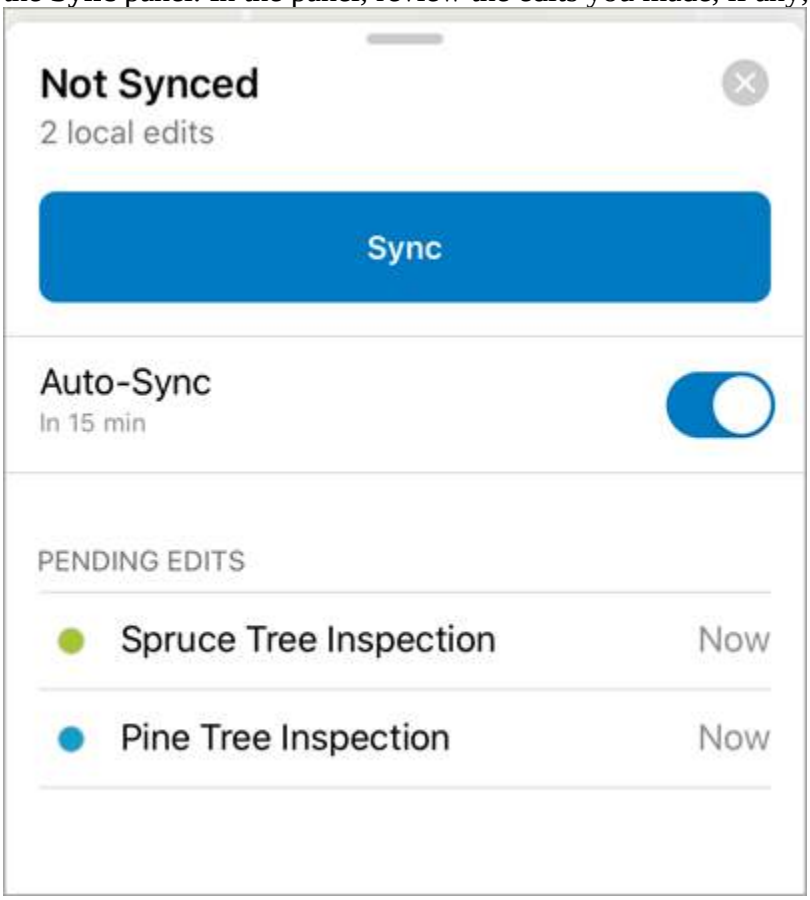
iOS | Other versions

Mobile workers in areas without a reliable data connection, or with no data connection at all, download map areas to their device to capture assets, record observations, and perform inspections. Once they finish collection, the changes appear only on their device. They must sync to make the changes available to other mobile workers as well as workers in the office. In some scenarios, mobile workers also need to get changes made by others onto their device to keep their map current. This is also done when the map area is synced.

Sync work

Sync allows you to send and receive updates for maps you've downloaded. Anytime you regain connectivity and want to check for updates or send updates to other people, sync the map either while editing it or from the list of maps. You can also enable automatic syncing so that your map syncs whenever it has a data connection.

- While working in the map, tap **Sync** ⇵ (⇵ if you have edits that aren't synced) to open the **Sync** panel. In the panel, review the edits you made, if any, and tap **Sync**.

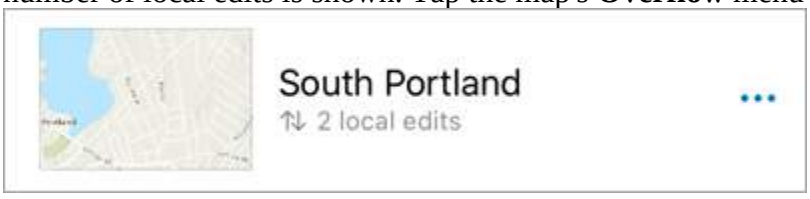


Tip:

Enable automatic sync if you want sync to begin when you have a data connection.

If **Sync** is disabled in the panel, the map is configured to limit the data retrieved from the server and you don't have local edits.

- In the list of maps, find the map area you want to sync. If it includes local edits, the number of local edits is shown. Tap the map's **Overflow** menu ••• and tap **Sync**.



Enable automatic sync

Mobile workers may have sporadic connectivity, or they may not always remember to sync their changes. Enabling automatic sync sends the mobile worker's edits and retrieves the latest changes when there is a data connection without the mobile worker needing to explicitly sync.

You can enable automatic sync either from the Field Maps settings or while working in a map. Whichever way it's enabled, the setting applies to all offline maps used in Field Maps. The active map area automatically syncs every 15 minutes if the device has a data connection and the app is on screen. The map area does not sync if the device doesn't detect an internet connection.

Note:

Automatic sync is enabled by default.

Enable automatic sync in the app settings

To enable automatic sync in the app settings, complete the following steps:

1. While viewing the **Maps** list, tap **Profile** .
2. In the **General** section of the profile, use the **Auto-Sync** toggle button to turn on automatic sync.
3. Return to your profile, and return to the **Maps** list.

Enable automatic sync while working with an offline map area

To enable automatic sync while working with an offline map area, complete the following steps:

1. While working in an offline map area, tap **Sync** (if you have edits that aren't synced) to open the **Sync** panel.
2. In the **Sync** panel, use the **Auto-Sync** toggle button to turn on automatic sync.

Sync over Wi-Fi only

You may not want your workers to sync using a device's data plan and instead want them to wait for a Wi-Fi connection. Complete the following steps to turn off syncing using cellular data.

Note:

Syncing using cellular data is off by default.

1. While viewing the **Maps** list, tap **Profile** .
2. In the **General** section of the profile, tap **Cellular Data**.
3. Turn off the **Sync and Update** toggle button to restrict syncing using cellular data.
4. Return to your profile, and return to the **Maps** list.

Tips

Keep the following tips in mind when syncing your data:

- Encourage the use of automatic sync. This saves mobile workers from having to remember to sync or monitoring their data connection to see if they can sync. The app syncs automatically when it has a data connection.
- Consider the photo resolution required for your assets, observations, and inspections. You can specify a smaller photo size to reduce the amount of data transferred when syncing.
- If multiple mobile workers edit the same data in the field, the way sync is handled depends on how the data is stored. For hosted feature layers and archive-enabled, nonversioned data in an ArcGIS Server feature service, the last edit synced is preserved. For versioned data in an ArcGIS Server feature service, the database administrator manages conflicting changes through reconciling and posting. If you are concerned about multiple mobile workers editing the same data, it is recommended that you use versioned data in an ArcGIS Server feature service. See Offline maps and traditional versioned data.
- If mobile workers experience sync issues, enable logging. To enable logging, go to the profile in Field Maps, tap **Troubleshooting**, and enable **Logging**. Retry the sync operation that was failing, and the log (visible in the **Troubleshooting** section) contains details of the failure. This log can be shared with an administrator.
- If mobile workers experience sync issues and need to move data off a device, see How to access offline edits from ArcGIS Field Maps directly from an Android or iOS device.

ATTACHMENT 21 – TCEQ Regulatory Guidance on Imhoff System

Operation & Maintenance Guide for Imhoff Tank & Oxidation Pond Wastewater Treatment Plants

Texas Water Commission
LP 91-01

Operation & Maintenance Guide

for Imhoff Tank and Oxidation Pond

Wastewater Treatment Plants

Prepared by

Field Operations Division
District 1 Staff
Amarillo, Texas
and
Graphic Arts Section

February, 1991

TEXAS WATER COMMISSION

B. J. Wynne, III, ***Chairman*** **John E. Birdwell,** ***Commissioner***

Cliff Johnson, ***Commissioner***

Allen Beinke, ***Executive Director***

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Preface

This guide is designed to provide necessary information to assist municipalities that have Imhoff-oxidation pond wastewater plants with proper operation and maintenance.

Disclaimer

This publication is to serve as a guide only and the contents do not necessarily reflect the views and policies of the Texas Water Commission. Mention of trade names or commercial products constitutes neither endorsement nor recommendation for use.

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INTRODUCTION

This guide has been designed to be used as an aide in the operation of primarily Imhoff-oxidation pond type wastewater treatment plants that mainly serve small municipalities. This guide is by no means meant to be complete or used as law to obtain compliance with TWC permit.

The Imhoff Tank
(Primary Treatment)

IMHOFF TANKS

The Imhoff tank was developed by Karl Imhoff to serve the residents of Emscher District of Germany. In 1907 he brought the plant design to the United States. Tanks were installed widely throughout the United States. The tank was widely used for preliminary treatment preceding trickling filters.

Design

The components of the Imhoff tanks design are shown in Figure 1. The Imhoff tank incorporates sedimentation and sludge digestion within the same structure without impairing the aerobic effluent quality with anaerobic septic condition, resulting from the digestion of the organic solids removed.

The tank is structured in two levels: (1) sedimentation taking place in the upper level; and (2) sludge digestion taking place below.

The tank may be horizontal rectangular flow or circular radial flow. (1) The upper level or sedimentation chamber has baffles to slow down the flow so the solids can settle out. (2) The digestion compartment is generally divided with cross walls. These cross walls are for even distribution of solids and for structural reasons. These walls have openings in them to provide equalization and distribution of sludge to the various compartments. These cross walls are located well below the normal sludge level below the normal sludge level.

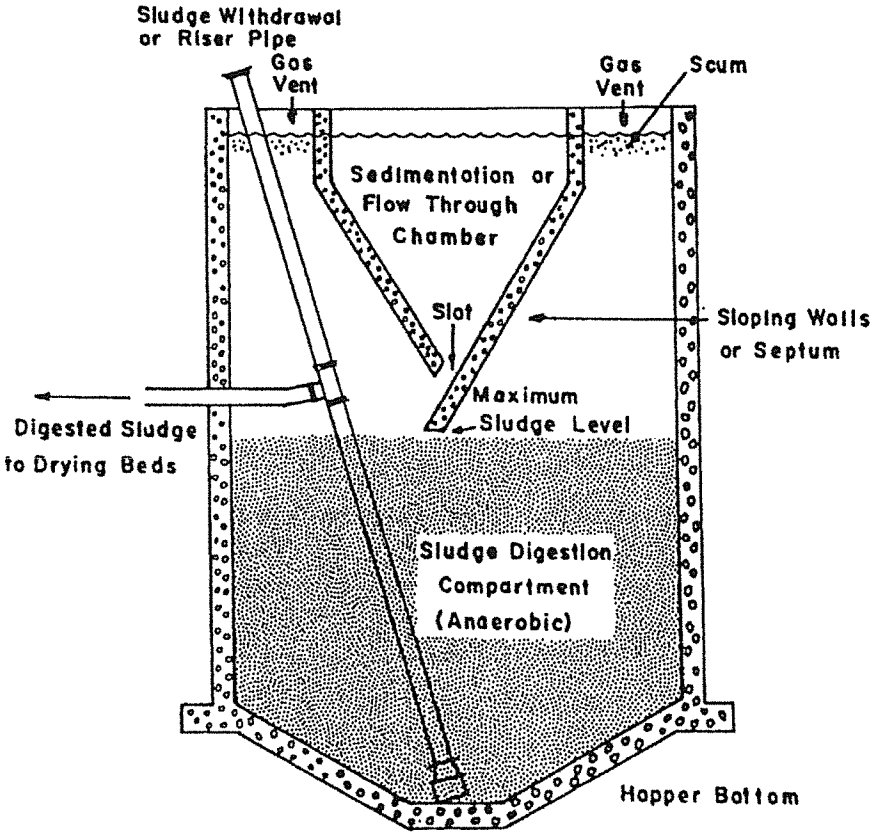


Figure 1. –Cross-section of Imhoff

Sedimentation (Flow-Through) Chamber

After the raw sewage has passed through the grit cham-

ber, bar screens, and/or comminuter, it enters the tank and flows through the "sedimentation" or flow-through chamber. This chamber has inlet and outlet structures and baffles (to prevent short circuiting and to trap floating debris). The sedimentation chamber removes approximately:

1. 100% settleable solids

2. 60% suspended solids

3. 30% Biochemical oxygen demand (BOD)

from the influent if the velocity of the sewage flow is reduced to 1/2 to 1 foot per second. The sloping (septum) walls give the sedimentation chamber a trough-shaped bottom that has a slot which extends the entire length of the sedimentation chamber. The suspended solids separated from the raw sewage adheres to the vertical or sloping walls or slide into the digestion chamber. The sedimentation chamber is designed to:

A. Have a displacement velocity of less than 1.5 feet per minute. Generally, 0.5 to 1.0 foot per minute.

B. The theoretical detention time ranges from 2.0 to 2.5 hours.

C. Surface loading - 600 to 1000 gallons per day per square footage of surface area.

D. Maximum depth from top of outlet weir to slots is 9 feet.

E. Width of slots is 6 to 8 inches.

F. The overlap of sloping walls is 6 to 8 inches.

G. Slope of sloping walls is 50 to 60 degrees.

H. The freeboard from raw sewage is 18 to 24 inches.

I. Inlet baffles - Constructed across each chamber near inlet end. Bottom edge 12 to 18 inches below level of outlet weir and the top, which is beveled downward toward the inlet, should extend slightly above the anticipated level of the sewage in the chamber at peak flow.

J. Outlet baffles - Constructed across each chamber near the outlet with the top edge level with the top of the tank and the bottom edge 6 to 12 inches below the outlet weir level.

K. Outlet weir - A metal plate weir, either knife edged or notched, which can be adjusted to make it level, should be provided at the outlet end of the chamber.

L. Outlet channel - Provided to collect the effluent from the weir or weirs and be adequate in size to carry the effluent from all outlet weirs in such a manner as to prevent their submergence (to trickling filter or oxidation pond).

The Sludge Digestion Compartment

One of the most important advantages of this type of treatment is that sedimentation and sludge digestion can take place in the same structure. The sludge undergoing digestion in the Imhoff Tank is warmed by the sewage flowing above the digestion chamber and the surrounding earth; therefore, no heaters are needed. To create minimum diffusion between sludge liquor and sludge blanket, the sewage passing through the sedimentation chamber - a neutral zone of at least 18 inches above and below the slot must be maintained. The sludge blanket should never be allowed to reach the slots. If the neutral zone is not practiced, the flowing sewage will become septic and excessive amounts of scum will form.

The major bacteria in the Imhoff Tank type of plant is *Psychrophilic* which is a cold temperature bacteria with a temperature range of below 50 degrees F to 68 degrees F and *Mesophilic* with a temperature range between 68 degrees F and 113 degrees F. Saprophytic bacteria, which are the acid formers, are present. These need a pH of 6.5 to 8.0. The methane formed transforms the acids or volatiles into methane gas. The other gases formed are carbon dioxide and hydrogen sulfide. The sludge digestion:

A. Capacity is 3.5 to 4.0 cubic feet per capita served.

B. Depth ranges from 10 to 15 feet.

C. Slope of hopper-bottom is 30 to 45 degrees. Multiple hoppers may be necessary to provide such bottom slopes which will result in sludge withdrawal.

D. Sludge withdrawal or riser pipes - 6 to 8 inches in diameter (Figure 2). Tope of pipe should be provided with a removable cover (blind flange). The pipe which branches horizontally through the tank wall to sludge drying beds should be installed from the vertical riser pipe at least 5 feet below the level of sewage in the sedimentation chamber.

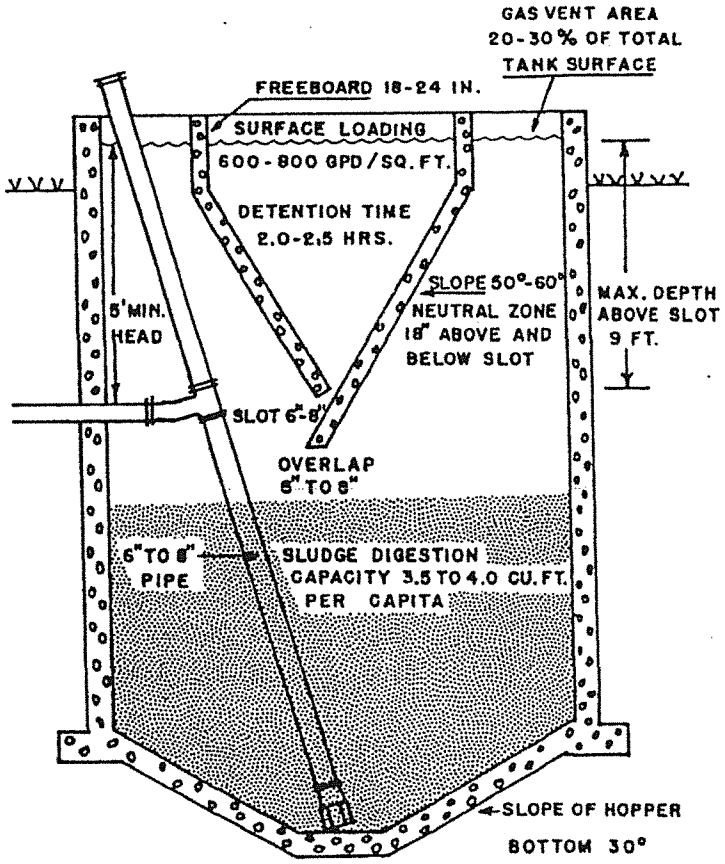


Figure 2. – Cross-section of Imhoff

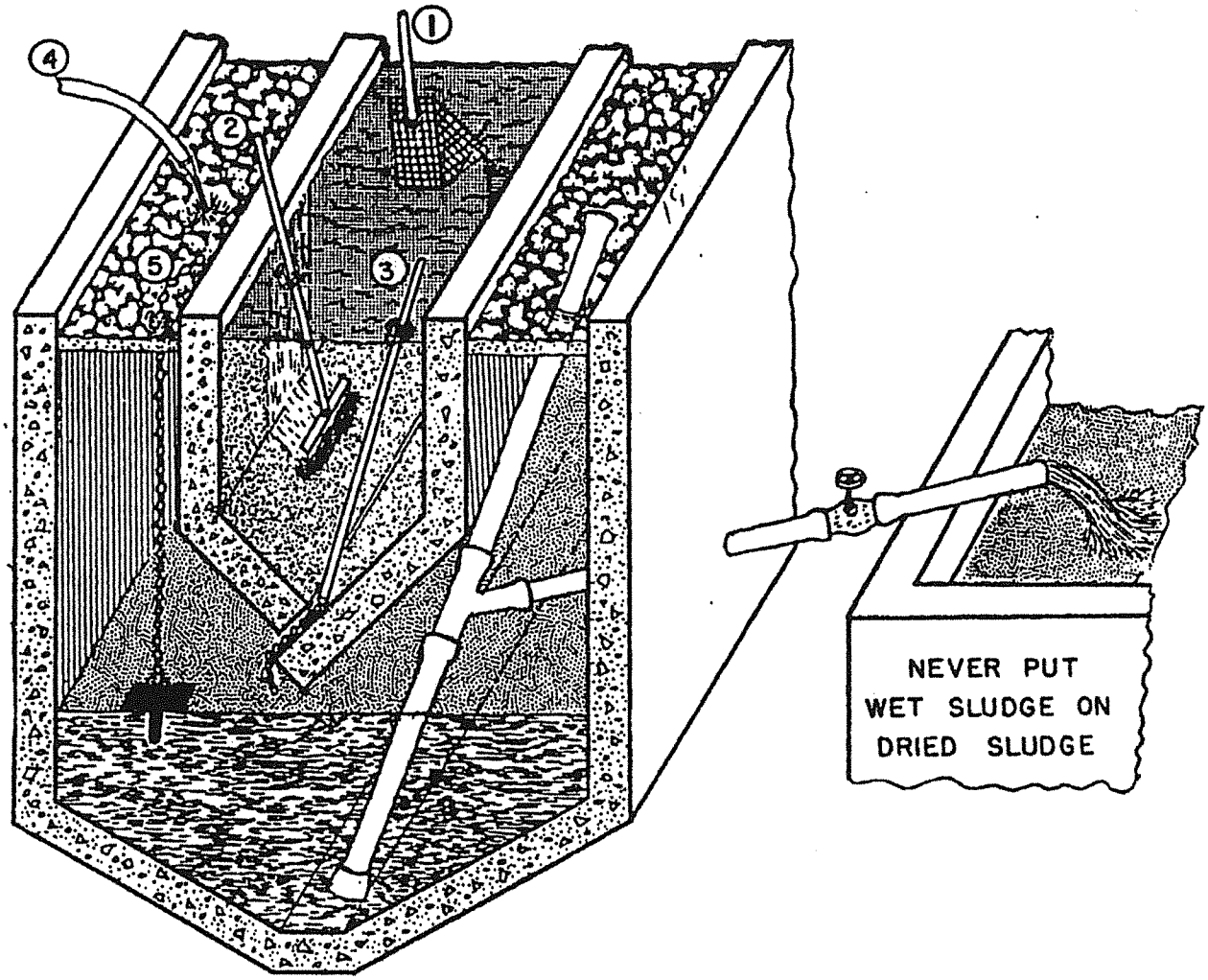
Gas Vents or Scum Chambers

The outer openings are called gas vents or scum chambers - the function of providing space for scum that is brought to the surface by adhering to gases produced in the digestion process. This allows the gas to escape to the atmosphere or to be collected prior to being burned or utilized as fuel.

A. The width of gas vents of scum chamber openings should be sufficient to allow entrance to sludge compartments when the tank is dry.

B. The gas vent area is 25% to 30% of total tank surface area.

Daily and Weekly Operation of the Imhoff Tank



(1) SKIM SEDIMENTATION CHAMBER (DUMP IN GAS VENT)

(2) SQUEEGEE SIDES AND SLOPING WALLS

(3) CLEAN SLOT WITH CHAIN

(4) BREAK SCUM ON GAS VENT (WITH HOE OR WATER JET)

(5) DEPTH OF SLUDGE BY SOUNDING

Figure 3. – Imhoff Tank Maintenance

DAILY AND WEEKLY OPERATION OF THE IMHOFF TANK

A. Clean daily. (Figure 4 and Figure 5)

1. screens and/or communiters
2. grit chamber
3. flow measuring devices
4. chlorination equipment

B. Remove and dispose of accumulations in the inlet and outlet channels.

C. "Churn" the scum in gas vents with scum hoe to assure proper escape of gases resulting from digestion of sludge and to aid in settling of the solids trapped in the scum.

Note: Scum which will not settle should be removed from the scum chamber and be buried to prevent odors and fly breeding.

D. Sedimentation chamber (flow through chamber)

1. All floating solids should be skimmed from the surface and the material removed should be placed in gas vent or buried.
2. After removal of floating material, the total submerged interior surfaces of chamber sides, ends, and sloping walls should be *squeeged* to remove solids adhering to them.
3. To be assured that all solids slide into the digestion compartment and that no obstructions exist along the slot, a *chain* is lowered through the slots and then proceed from one end to the other end of the tank in a sawing type motion.
4. The skimming process should again be repeated to remove floating material.
5. Remove all organic material which might be splashed above the normal sewage level on the sides and ends of the sedimentation chamber. Also, remove this material as well as any material trapped on the baffles with a stiff *bristled broom or brush.*

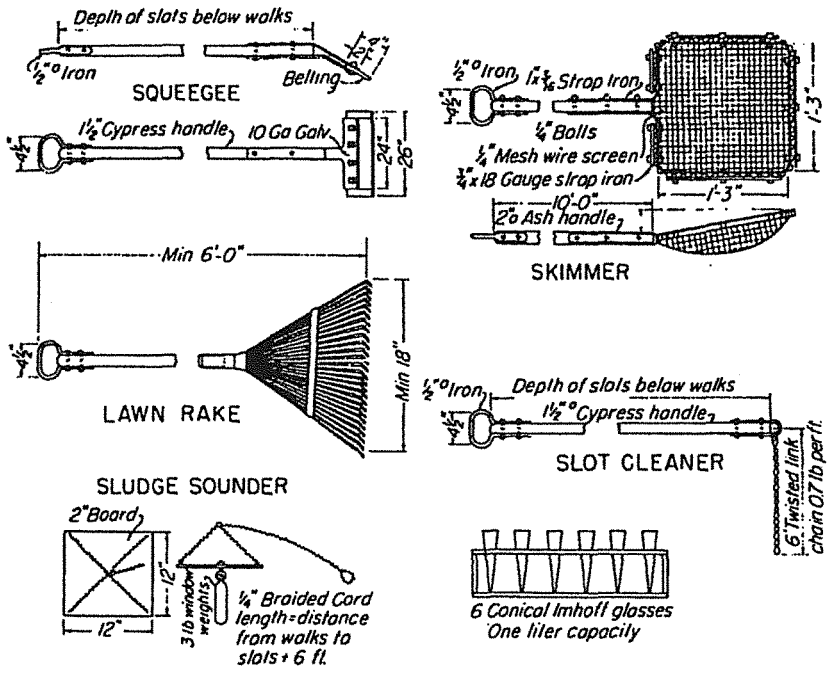


Figure 4. – Maintenance Tools

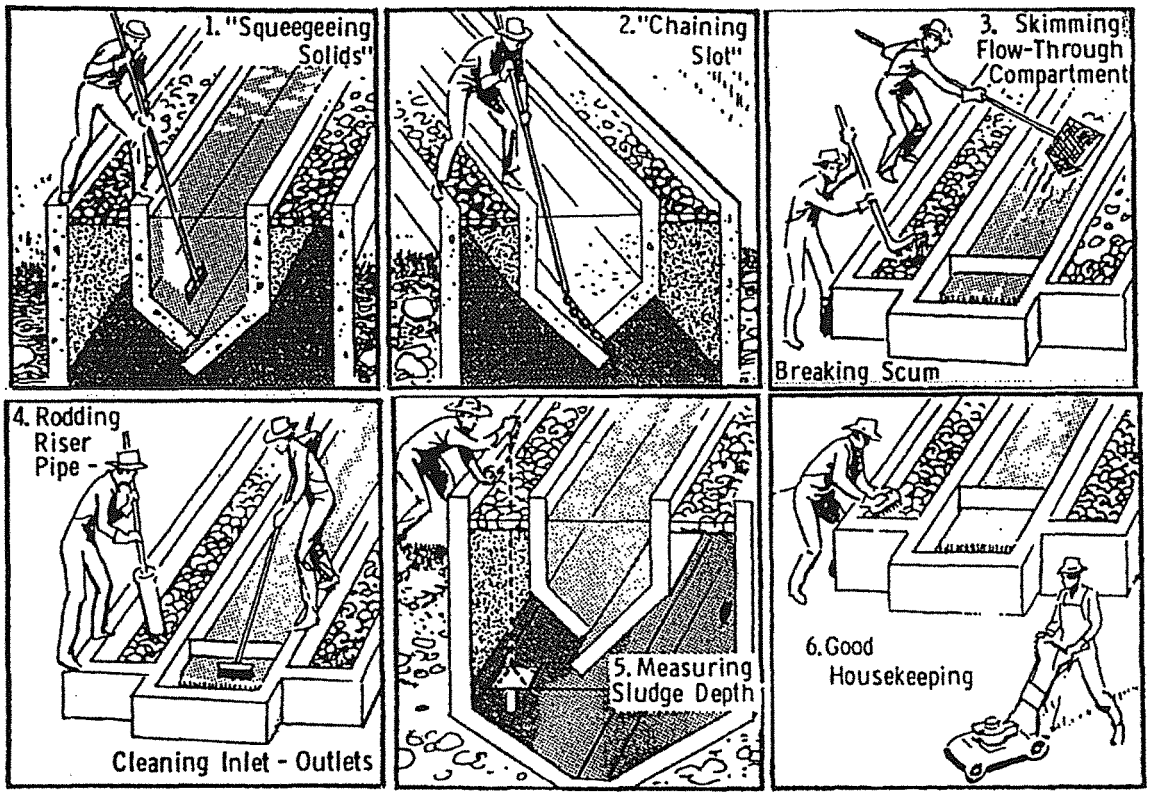


Figure 5. – Maintenance Procedures

E. Digestion Compartment

1. At least once a week the elevation of the sludge blanket should be measured. This can be done with a sludge sounding block, pitcher pump, or a photo-electric cell. The sludge level should be 18 inches or more below the slots of the sedimentation chamber.

2. Draw sludge in small amounts at frequent intervals rather than large amounts at longer intervals during the winter months when temperature is below 50 degrees F (maybe 120 days). But if temperature is 82 degrees F only 30 days.

3. Fully digested sludge should be brownish-black in color and have a pH of 7.0 or greater.

Cause(s) of Foaming or Frothing

A. Withdrawal of too much sludge at one time.

B. Prolonged increase or decrease of air temperature.

C. Starting up an Imhoff Tank.

D. Allow scum accumulation on gas vents to become so deep they don't allow proper escape of gases.

E. pH of sludge being less than 6.5.

F. Lime can be added through gas vents at the rate of 10 pounds per 1,000 population.

G. Chronic foaming has been decreased by pre-chlorination of raw sewage.

Waste Treatment Ponds

WASTE TREATMENT PONDS

The first wastewater collection systems in the ancient Orient and Europe consisted of ponds. These pond systems worked fine until they became overloaded. Organic wastes were even added to ponds to increase algae production thus increasing fish production.

In the United States, ponds were first built to exclude wastewater from places they would be objectionable, then the treatment capabilities were discovered later.

Advantages of waste treatment ponds:

1) Lack of expensive operating equipment

2) Doesn't require technically trained personnel

3) Economical to construct

4) Adaptable to fluctuating loads

5) Most trouble-free treatment process when operated properly

These shallow 3-5 ft. depth ponds treat (stabilize) wastes by natural processes. The heavier solids settle to the bottom to be decomposed by bacteria. Lighter suspended solids are decomposed by a suspended type of bacteria. The dissolved nutrients (Nitrogen, Phosphorous) are utilized by algae by photosynthesis.

Pond Classification & Uses

Ponds: Basic Types:

1) *Stabilization Ponds* - No. 1 treatment unit, often quite large

2) *Oxidation Ponds* - Ponds in *series* after 1st treatment pond, these will provide additional *clarification, BOD removal, disinfection*

3) *Polishing Ponds* - Ponds in series after trickling filter plant

Operational Variations in Ponds:

1) *Aerobic* - Characterized by *having* D. O. (dissolved oxygen) distributed throughout pond practically all the time. Usually requires additional oxygen provided by algae, mechanical agitation, bubbling air through pond, - other than what diffuses at air/ water interface.

2) *Anaerobic* - Characterized by *lack of* D. O. throughout entire depth. Treatment depends on *fermentation* at pond bottom. Can be quite odorous, but extremely efficient. Industrial process wastes are stabilized by these ponds.

3) *Facultative* - Most common type.

Upper portion (Supernatant) is aerobic.

Bottom portion is anaerobic.

Algae supplies most of the oxygen to the supernatant.

Classification based upon detention time:

Less than 3 days performs similar to a settling tank with some algal growth.

3 to 20 days detention time - produces large amounts of algal growth. This detention time merely allows organic matter to change form (into algae) and delays problems until algae settles in the receiving stream. Effluent BOD may match influent BOD., but BOD is a rate estimate. Rate of O2 used is temporarily slowed down, but when algal cells decompose, BOD will increase.

Longer than 20 days - Produce definite stabilization. *Anaerobic* on bottom; *Aerobic* on top.

Explanation of Treatment Process (Figure 6)

Aerobic Pond:

1) Organic matter plus bacteria release carbon dioxide ($CO_{2)}$ and Ammonia)NH_3), then along with sunlight plus water (H_2O) algae populations increase.

2) Algae combined with the carbon dioxide (CO_2) in the water and with sunlight release oxygen as a by-product (and some CO_2). At night this pressure reverses.

3) Bacteria + oxygen + organic matter = CO_2 & NH_3.

Anaerobic Ponds:

1) Organic matter worked on by acid producing bacteria = CO_2, nitrogen and other organic acids.

2) Organic acids worked on by methane producing bacteria produces methane gas resulting in alkalinity.

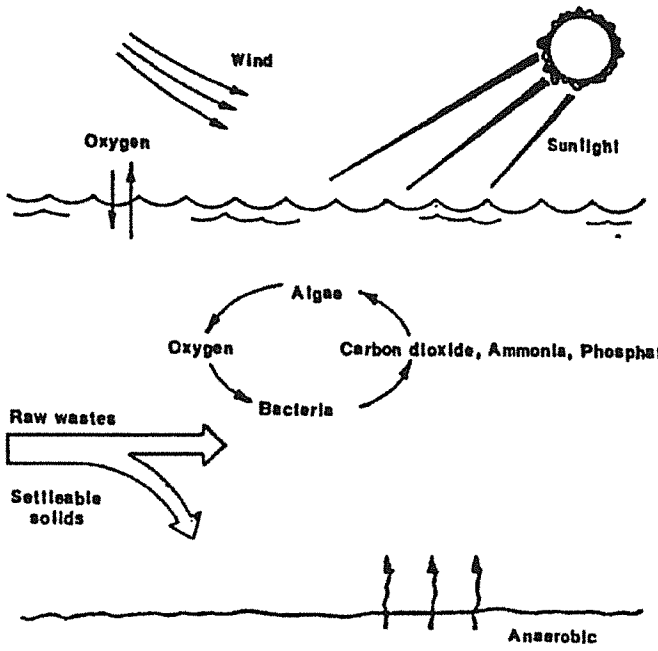


Figure 6
Treatment Processes in Lagoons

Facultative Ponds:

The above 2 processes both occur in the facultative pond.

Sludge Accumulation in Anaerobic Zone:

Results of:
1) Lack of Bacteriological Pop
2) Low pH
3) Presence of inhibiting factors
4) Low temperature

If decomposition resumes suddenly - (i.e., after cold spell), the "Acid Producers" produce more organic acid which lowers pH and causes H^2S gas to be released.

All organic matter on bottom of pond is, subject to "methane fermentation" IF

1) Abundance of organic matter present
2) pH 6.5 7.5
3) Alkalinity of *several hundred* mg/l, and
4) Suitable temperature

Pond Performance:

1) Provide *BOD_5* removal of *50 - 90%*

2) Facultative ponds with *50-60 days* detention time will remove *90-95%* of *Coliform Bacteria* and *70-80%* of *BOD* load.

3) Physical Sedimentation removes 90% of suspended solids in 3 days, and 80% Dissident Organic Solids in 10 days. "Biofloculation" - (Clumping) may occur within hours if good population of algae and bacteria are present.

Pond not doing its job when:

1) Creates visual and/or odorous nuisance

2) Leaves high BOD, solids, grease, or Coliform Bacteria.

Starting a Pond:

One of the most critical points of pond life.

1) *One foot (1')* of water, at least, should be in pond before introducing wastes.

2) Start during *warm* part of year.
* Warmer the pond - better the treatment, 60 days to develop.

Note: 1) Green color - algal bloom

2) Bubbles rising near inlet - (bacterial action) pH should be kept 7.5 if possible.

Daily Operation and Maintenance of Ponds

Daily Operation and Maintenance of Ponds

Scum Control

Scum is common in warm weather and may harbor odorous blue-green algae and/or cut off light penetration.

*Sometimes this could become source of Botulism to waterfowl and shorebirds.

Wind activity normally breaks it up, but you – may use

1) Rakes from shore

2) Water jet streams, or

3) Outboard motors

To correct this problem.

Odor Control

Most odors are caused by *overloading* and/or *poor housekeeping*.

Odors usually occur during Spring warm-up period. These odors can usually be controlled by:

1) Recirculation of aerobic water

2) Chlorination–chlorine can be added as a means to control odors.

3) Sodium Nitrate ($NaNo_3$)–can be used to add oxygen to the waters.

Weed Control

If weeds and vegetation are not controlled, it will allow mosquito breeding, allows for scum accumulation, and will hinder circulation. Shading from trees will cut down on the efficiency of treatment, also.

Insect Control

Mosquitoes–keep weeds and scum down to minimum.

Chironomid Midges–"Spray"

Levee Maintenance

1) Do not allow water to flow over levee.

2) Use bank protection (cement, brick, wood fence).

3) Levee tops should be crowned–sheet flow of rainwater.

4) Eradicate rodents such as gophers.

Operating Hints

1) Anaerobic ponds should be covered with floating polystyrene planks and followed by aerobic ponds

2) Ponds in series may cause the first pond to become overloaded! Ponds in parallel will evenly distribute the waste water.

3) If possible, allow for 25-100% recirculation. Allows algae and bacteria to accumulate.

4) Heavy chlorination may help odor control, but will probably interfere with biological functions.

5) Ponds will need cleaning when solids begin floating and when sludge depths become excessive.

6) Before applying Insecticides or Herbicides, check with proper authorities regarding long term effects.

Aerators

Used to: Provide additional air during night, cold weather, overloaded ponds.

May operate as aerated lagoon. Similar to Aeration Basin–Activated Sludge–but No Sludge return.

Air generally on timers: Rule of Thumb–**Foam on surface**/reduce time aerator ON; **No foam on surface**/increase time aerator ON.

Sampling

pH and D. O. are most important.

pH and D. O. increase during the day and decrease during the night.

Troubleshooting Problems with Treatment Ponds

Problem	**EXCESSIVE WEEDS**
Indicators	1. Excessive weed growths 2. Mosquito problems in neighborhood of ponds 3. Poor pond circulation
Monitoring Analysis and/or Inspection	1. Check water depths in selected areas of the pond
Corrective Measures	1. Deepen all pond areas shallower than three feet. 2. Remove all weed growths as soon as they are visible. 3. For mosquito control, vary liquid level in the pond every 10 days.

Troubleshooting Problems with Treatment Ponds–Continued

Problem	**POND ODORS**
Indicators	1. Odors of hydrogen sulfide origin from pond 2. Other objectionable odors
Monitoring Analysis and/or Inspection	1. Check for blue-green algae growths in pond 2. Check for scum accumulation in pond 3. Analyze for total and dissolved sulfides in pond and pond influent 4. Check pond pH and pond influent pH 5. Check DO content in pond at several locations
Corrective Measures	1. If pond influent is septic, correct situation upstream by areation or controlled prechlorination 2. If possible, aerate pond with mechanical aerators 3. Remove or break up all scum accumulations 4. Prechlorinate pond influent 5. If pond is septic, divert flow from aerobic pond to it or pump high D. O. make up water to it 6. Add sodium nitrate to pond 7. Provide ordor masking agent if feasible

Troubleshooting Problems with Treatment Ponds–Continued

Problem

LOW POND DISSOLVED OXYGEN

Indicators

1. Low algae growth in pond
2. Trace hydrogen sulfide odors
3. Grey color of pond

Monitoring Analysis and/or Inspection

1. Check all areas in pond for adequate D. O.
2. Monitor flow into pond and calculate average daily detention time in pond
3. Check pH of pond influent and pond contents
4. Run total and dissolved sulfides in pond influent
5. Check pond loading rate (lb BOD/acre).
6. Check for floating aquatic weeds

Corrective Measures

1. Increase detention time in ponds to at least five days by placing ponds in parallel
2. In the absence of adequate D. O. in the pond, aerate pond contents or pond influent
3. Chlorinate pond influent if sulfides are present
4. Physically remove floating weeds to increase light penetration

Flow Measurements

Flow

For most Imhoff/oxidation pond plants, other than general maintenance and daily inspections, flow is the only measurement taken daily or 5 times/week. There are several reasons for this.

1) The permit for each entity has a flow limitation. This daily flow measurement must be recorded and records kept for at least 3 years, available for TWC inspection. During a TWC annual inspection, the four highest flow months are taken and averaged together. If the average of the four highest months is 75% or greater than the permitted flow limitation, then you are required to get with your engineer and begin updating your old system or designing a new system to handle the larger flow. Then when the average flows are 90% or greater of permitted limit, then you are required to begin the actual construction or update of your system.

2) An accurate record of low flow overtime can be helpful in troubleshooting. For example: Those with flow recorders, sharp regular peak flows may be an indication of an oversized lift station or the set points for lift pumps level switches are improperly set.

3) Dischargers into a stream or watercourse. The actual organic loading of a stream segment is in part determined by the lbs/day being discharged by each permittee within the segment.

There are 2 primary devices for flow measurement.

1) Weirs

2) Flumes

Weirs

A weir is a measuring device which consists of a bulkhead or dam containing a recess or notch through which the sewage flows and falls to a level below the bottom of the recess or notch. There are many different shapes of weirs, but the most common types are rectangular, cippoletti, and triangular or V notch (Figure 7).

V Notch - The angle of the notch most commonly used is a 90 degree, although there are notch weirs with angles of 60 degrees, 45 degrees, 30 degrees, and 22 1/2 degrees. The V notch weir is the best weir profile for measuring discharges less than 1 CFS and has reasonable accuracy for flows up to 10 CFS.

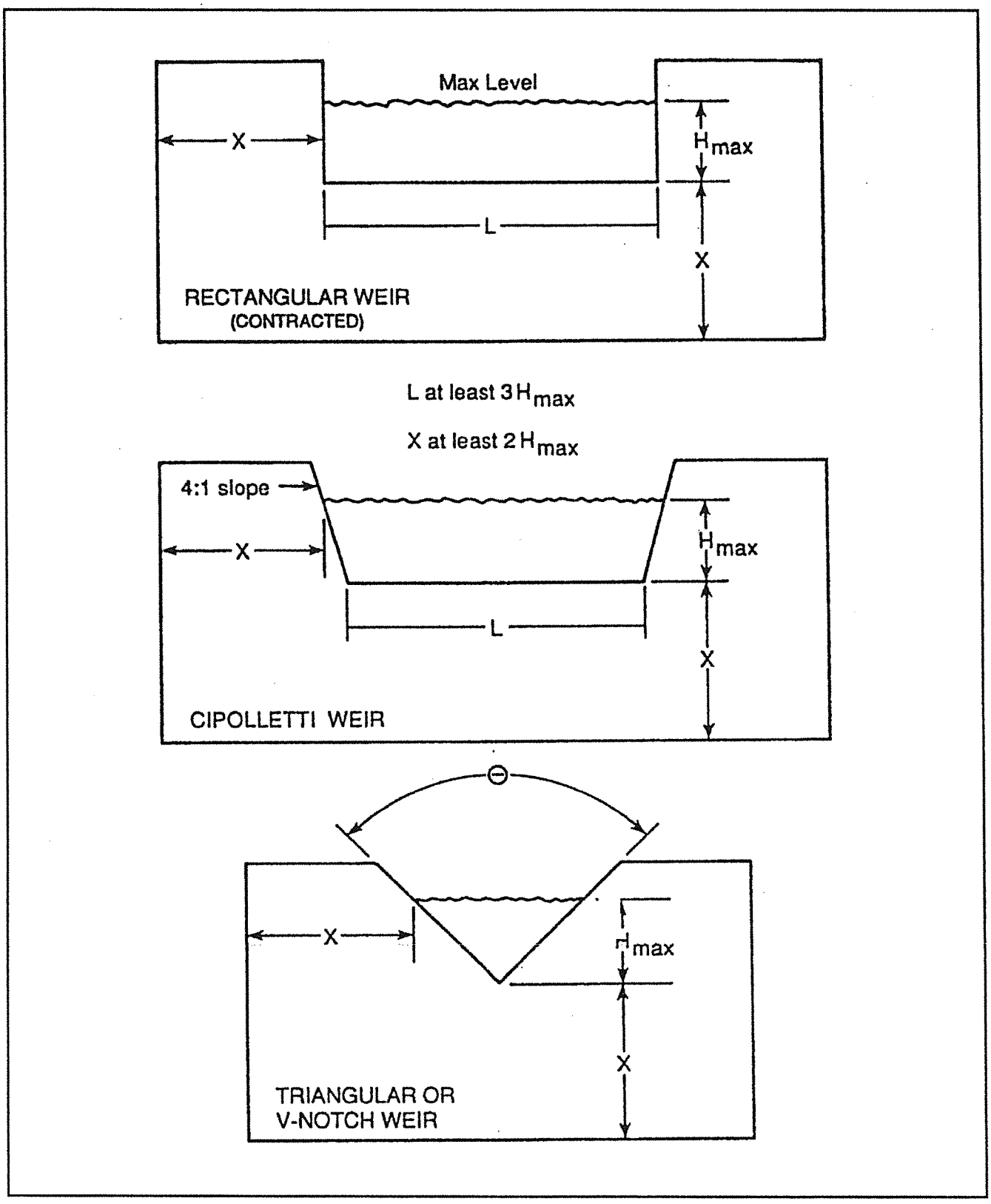


Figure 7. – Three Common Types of Sharp-Crested Weirs

Rectangular Weir - The rectangular sharp crested weir may be used in one of two configurations.

1) *Contracted rectangular weir* - this consists of a rectangular notch cut into a bulkhhead in the flow channel, producing a box-like opening.

2) *Rectangular suppressed weir* - The end contractions are completely suppressed by extending the weir across the entire width of the channel.

3) *Cipolletti weirs* - or trapizoidal sharp crested weir. This is similar to a rectangular weir with end contractions except that the sides incline outwardly.

Measurements

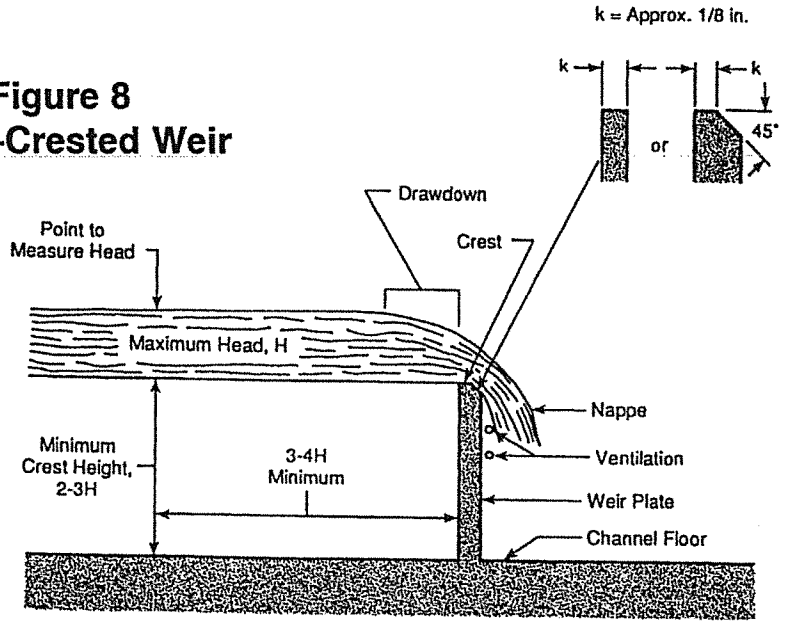
For taking a flow measurement of a weir you measure the height of the crest then measure height to top of the liquid, then subtract total height from height of crest (Figure 8), example:

90 degree V notch weir
measure height of crest = 12"
measure height to top of liquid = 16"

16
subtract 12
4" gives you head measurement.

The correct location then to take the actual measurement should be located upstream of the weir crest at a distance of at least three and preferably four times the head measurement. So 4 x 4"

Figure 8
Sharp-Crested Weir



head = 16" upstream of weir crest to take measurement. Go to chart (Isco) and find actual flow measurement.

To convert inches to head feet, take head measurement and divide by 12. 4 divided by 12 = .33

.156 LFS
1.17 GS
.1011 MGD

Crest length is also required for Cipolletti and rectangular weirs.

The second major class of commonly used measuring devices are the *flumes.* There are several kinds of flumes, however, the most commonly used is the parschall flume.

A flume is basically a special shaped open channel flow which provides restriction in the channel area. Normally, a flume consists of a converging section to restrict the flow, a throat section, and a diverging section to assure that the downstream level is less than the level in the converging section. The flume thus restricts the flow somewhat, then expands it again in a definite fashion.

The flow rate through the flume may be determined by measuring the head on the flume at a single point usually 2/3 of the way upstream of the distance of the converging section and throat section (Figure 9).

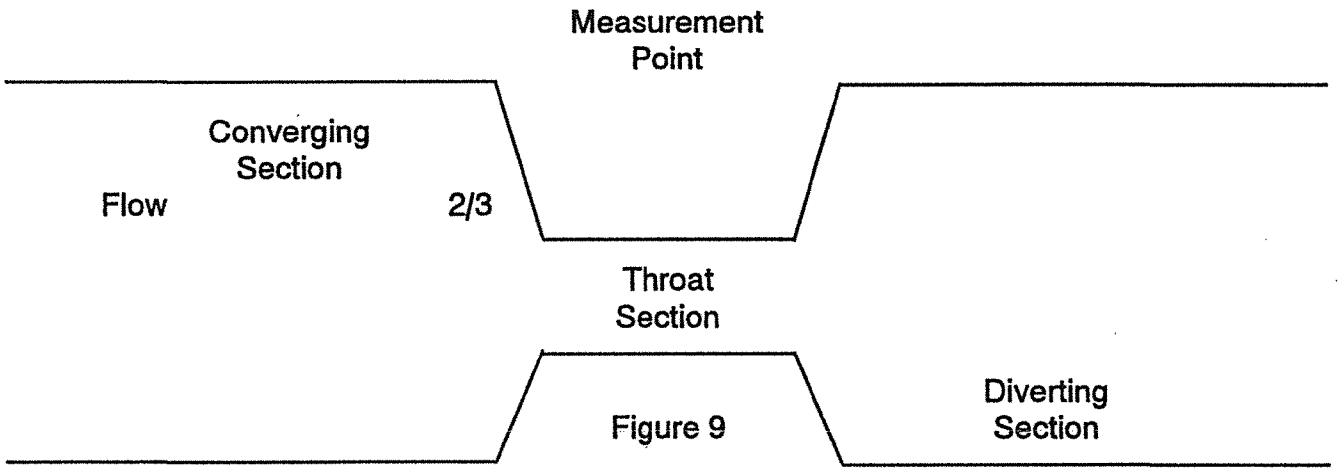


Figure 9

6" Flume - 1 1/4" head
.10 Head Ft.

= .0542 CFS
= .4053 GS
= .0350 MGD

To obtain an accurate flow measurement of a flume, you must measure the head and know the width of the throat of the flume.

Measurement of Sewage Flow

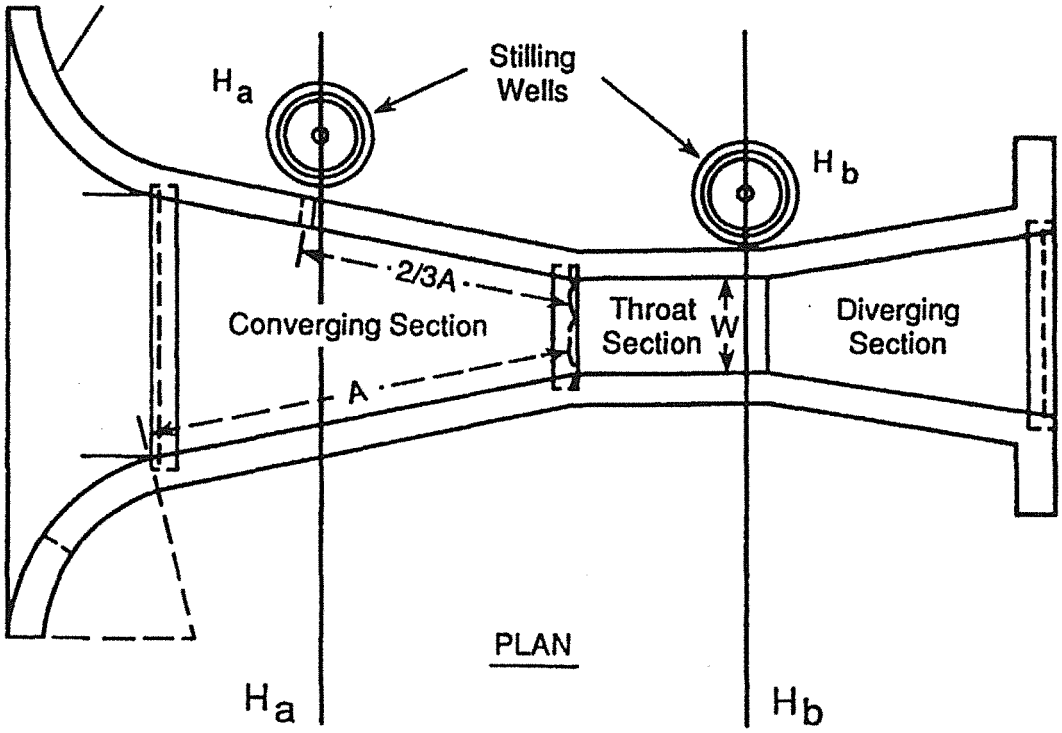
Some device for measuring sewage flow should be provided in every sewage plant. Several methods of measuring sewage flow are available. The most commonly used are the Parshall flume (Figure 10 & 11) and the V notch or rectangular weir. These devices may be equipped with instruments for registering amount of flow and recording rates of flow.

This information is valuable for operation records, determining recirculation rates, plant loadings, chemical dosages, sludge pumping schedules and other operational procedures.

The following table gives the free flow discharge from Parshall flumes in gallons per minute:

Free Flow Discharge–Parshall Flume–Gallons/ per Minute

Head in Feet	Head in Inches	Size of Flume–W				
		3"	6"	9"	12"	18"
0.10	1-3/16	10.3	22.4	40.0		
0.15	1-13/16	22.4	44.9	76.3		
0.20	2-3/8	36.7	71.6	116.9	157.1	229.0
0.25	3	51.6	103.3	166.1	219.9	318.7
0.30	3-5/8	69.0	139.2	219.9	287.3	422.0
0.35	4-3/16	88.0	175.1	278.0	359.0	534.0
0.40	4-13/16	104.0	215.5	341.1	444.3	659.0
0.45	5-3/8	130	260	404	534	790
0.50	6	152	310	476	624	925
0.55	6-5/8	180	359	552	727	1073
0.60	7-3/16	202	413	628	826	1225
0.65	7-13/16	233	467	714	934	1387
0.70	8-3/8	257	525	799	1046	1553
0.75	9	294	588	889	1158	1728
0.80	9-5/8	315	651	978	1280	1912
0.85	10-3/16	357	714	1073	1400	2096
0.90	10-13/16	378	781	1171	1530	2289
0.95	11-3/8	420	853	1274	1661	2491
1.00	12	448	925	1377	1795	2692
1.10	13-3/16		1077	1594	2074	3119
1.20	14-3/8		1234	1822	2370	3564
1.30	15-5/8		1400	2060	2675	4035



For free flow– H_a

For submerged flow– H_a and H_b

Figure 10. – Points at Which to Measure the Head in a Parshall Flume

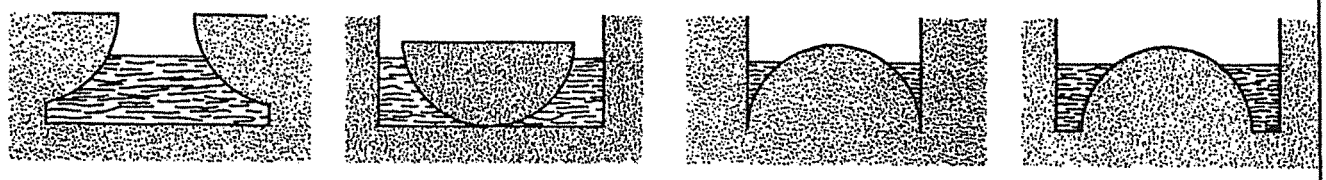


Figure 11. – Various Other Sharp-Crested Weir Profiles

Sampling and Recordkeeping

SAMPLING

Samples for wastewater treatment plants are collected for different purposes. Sampling is performed to determine compliance with existing permits and regulations.

Sampling at wastewater treatment plants requires the collection of adequately sized, representative samples of the wastewater.

Each permittee may also be required to monitor any other such parameters as the Executive Director may reasonably deem necessary to adequately monitor the quality of any discharge. The permittee will be notified in writing of such requirements prior to the initiation of the requirement.

The necessary samples shall be taken from the effluent at the sampling point as described in the governing permit.

Sampling and Laboratory Testing Methods

All sample collection, preservation, and holding times shall be conducted according to the recommendations found in, (a) the latest edition of *Standard Methods for the Examination of Water and Wastewater,* of (b) the U.S. EPA's *Methods for Chemical Analysis of Water and Wastes,* 1979, or (c) the U.S. EPA's *Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents,* 1973.

Sampling Generalities

The result of any test can be no better than the sample on which it is performed.

The objectives of sampling is to collect a portion of material small enough in volume to be transported conveniently and handled in the laboratory while still accurately representing the material being sampled.

General Precautions

Handle the sample in such a way that it does not deteriorate or become contaminated before it reaches the lab.

Before filling, rinse the container 2-3 times with the water being collected. Unless the bottle contains a preservative or dechlorinating agent.

Dependent upon the analysis, the container should be filled completely.

Always make a record of each sample collected and identify each bottle. Information should include: sample I.D., name of collector, date, time, location and other pertinent information (water temperature, water level, weather conditions).

Keep in mind when collecting from streams and rivers that analytical values may vary with depth, stream flow and distance from shore line. If collecting a grab sample, collect it from the middle of the stream at mid-depth.

Types of Samples

Both grab and composite samples can be collected either manually or with automatic samplers. A composite sample should consist of a minimum of eight grab samples collected at equal intervals and combined proportional to flow, or a sample continuously collected proportionally to flow.

Although eight samples is the recommended number for a composite sample, the number specified in the permit or in other applicable standards should be used if it differs from the recommended number.

Grab Samples

A sample collected a particular time and place and represents only the composition of the source at that time and place.

Composite Samples

Composite samples refer to a mixture of grab samples collected at the same sampling point and different times.

These samples are most useful in observing average concentrations over a period of time and are used in calculations of loading or efficiency of treatment.

Influent Samples

Should be taken at points of high-turbulence flow to ensure good mixing.

Effluent Samples

These should be collected at the site specified in the permit or, if no site is specified in the permit, at the most representative site downstream from all entering waste streams prior to entry into the receiving waters. Samples should be collected after chlorination. This will require dechlorination and reseeding for the BOD5 analysis.

Preservation of the Sample

A. At best, preservation techniques only retard chemical and biological changes that inevitably continue after sample collection.

1) These changes include:

a) Cation absorption or, or ion exchange with the walls of the container.

b) Microbiological activity which can affect the NH_3-N, NO_2-N, and NO_3-N content, decrease the phenol content and the BOD concentration.

B. Certain parameters should be analyzed while in the field. These would include:

1) Temperature
2) pH
3) Dissolved Oxygen
4) Residual Chlorine

C. Preservation Methods

1) Storage at low temperature (4 degrees C) is perhaps the best way to preserve most samples for one day.

2) No single method is entirely satisfactory and one should use chemical preservatives only when they are shown to not interfere with the analysis being made. When they are used they should be added to the sample bottle initially as soon after collection as possible. Extreme care should be taken whenever using these preservatives as this is, under certain conditions, the potential for violent reactions.

3) If uncertainty exists regarding appropriate preservation methods, then refer to Table 1 and 2 for appropriate preservation techniques.

Sample Holding Times

A. Generally, the shorter the holding time, the more reliable are the analytical results.

B. Some factors to consider with regard to holding time:

1) Character of the sample

2) Analysis to be performed

3) Condition of the storage

C. If uncertainty exists regarding length of available holding time, then refer to Table 2 for the appropriate holding times.

Table 1. – Minimum Sample Volumes

Parameter	Required Sample Volume (ml)
Alkalinity	200
Ammonia	500
BOD	1000
COD	100
Chloride	200
Chlorine	500
Cyanide	500
Fluoride	300
pH	100
Kjeldahl nitrogen	500
Nitrate-Nitrite	200
Oil and grease	1000
Orthophosphate	100
Phenols	500
Specific Conductance	100
Total Phosphorus	100
Total Residue	200
TDS	200
TSS	500
Sulfate	200
Sulfide	200
TOC	200
Metals	
Hexavalent Chromium	300
All Others	1000
Organics	
Volatiles	40 (use VOA bottle)
Semi-volatiles	1000
Pesticides	1000

Table 2. – Quality Assurance Guidelines: Proper Sample Containers, Preservatives, and Maximum Holding Times

Parameter No./Name	Container	Preservation	Maximum Holding Time
Bacterial Tests:			
Coliform, fecal and total	P, G	Cool, 4°C, 0.008% $Na_2S_2O_3$	6 hours
Fecal streptococci	P, G	Cool, 4°C, 0.008% $Na_2S_2O_3$	6 hours
Inorganic Tests:			
Acidity	P, G	Cool, 4°C	14 days
Alkalinity	P, G	Cool, 4°C	14 days
Ammonia	P, G	Cool, 4°C, H_2SO_4 to pH <2	28 days
Biochemical oxygen demand	P, G	Cool, 4°C	48 hours
Bromide	P, G	None required	28 days
Biochemical oxygen demand, carbonaceous	P, G	Cool, 4°C	48 hours
Chemical oxygen demand	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Chloride	P, G	None required	28 days
Chlorine, total residual	P, G	None required	Analyze immediately
Color	P, G	Cool, 4°C	48 hours
Cyanide, total and amendable to chlorination	P, G	Cool, 4°C, NaOH to pH>12, 0.6g ascorbic acid	14 days
Fluoride	P	None required	28 days
Hardness (Dissolved)	P, G	Cool, 4°C	14 days
Hydrogen ion (pH)	P, G	None required	Analyze immediately
Kjeldahl and organic nitrogen	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Nitrate	P, G	Cool, 4°C	48 hours
Nitrate-nitrite	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Nitrite	P, G	Cool, 4°C	48 hours
Oil and grease	G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Organic carbon	P, G	Cool, 4°C, HCL or H_2SO_4 to pH<2	28 days
Orthophosphate	P, G	Filter immediately, Cool, 4°C	48 hours
Oxygen, Dissolved (Probe)	G Bottle and top	None required	Analyze immediately
Oxygen, Dissolved (Winkler)	G Bottle and top	Fix on site and store in dark	8 hours
Phenols	G only	Cool, 4°C, H_2SO_4 to pH<2	28 days
Phosphorus, total	P, G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Residue, total	P, G	Cool, 4°C	7 days
Residue, Filterable	P, G	Cool, 4°C	48 hours
Residue, Nonfilterable (TSS)	P, G	Cool, 4°C	7 days
Residue, Settleable	P, G	Cool, 4°C	48 hours
Residue, volatile	P, G	Cool, 4°C	7 days
Silica	P	Cool, 4°C	28 days
Specific conductance	P, G	Cool, 4°C	28 days
Sulfate	P, G	Cool, 4°C	28 days
Sulfide	P, G	Cool, 4°C add zinc acetate plus sodium hydroxide to pH>9	7 days
Sulfite	P, G	None required	Analyze immediately
Surfactants	P, G	Cool, 4°C	48 hours
Temperature	P, G	None required	Analyze
Turbidity	P, G	Cool, 4°C	48 hours

Table 2. – Quality Assurance Guidelines: Proper Sample Containers, Preservatives, and Maximum Holding Times – Continued

Parameter No./Name	Container	Preservation	Maximum Holding Time
Metals:			
Chromium VI	P, G	Cool, 4°C	24 hours
Mercury	P, G	HNO_3 to pH<2	28 days
Metals, except chromium VI and mercury	P, G	HNO_3 to pH<2	6 months
Organic Tests:			
VOA (Volatile Organics [See EPA Method 624 for list of target compounds]	G, Teflon-lined septum, no air bubbles	Cool, 4°C, 0.008% $Na_2S_2)_3$ if chlorine is present	14 days
BTEX (Benzene, Toluene, Ethylbenzene, Xylene)	G, Teflon-lined septum, no air bubbles	Cool, 4°C, 0.008% $Na_2S_2)_3$ if chlorine is present	14 days
Semi-volatiles (includes acid and base neutral extractables, polynuclear aromatics, haloethers, and phenol compounds. See EPA method 625 for a list of target compounds	G, Teflon-lines cap.	Cool, 4°C, 0.008% $Na_2S_2)_3$ if chlorine is present	7 days until extraction, 40 days after extraction.
Phenols	G, Teflon-lines cap.	Cool, 4°C, 0.008% $Na_2S_2)_3$ if chlorine is present	7 days until extraction, 40 days after extraction.
PCBs	G, Teflon-lines cap.	Cool, 4°C	7 days until extraction, 40 days after extraction.
Pesticides Tests:			
Pesticides/Herbicides	G, Teflon-lines cap.	Cool, 4°C, pH 5-9	7 days until extraction, 40 days after extraction.
Radiological Tests:			
Alpha, beta and radium	P, G	HNO_3 to pH<2	6 months

Recordkeeping

Most permits require that records shall be maintained on a monthly basis and be available at the plant site for inspection by authorized representatives of the Commission for at least three years.

Importance of Good Records

Keeping records is important for the long-term operation of the system. Good records should:

- Verify the efficiency of process units and the overall treatment system
- Assist in making decisions affecting plant operation
- Assist in planning and maintaining system equipment
- Maintain separate costs for different functions such as operation, maintenance, laboratory, etc.
- Provide a basis for budgeting and staffing
- Provide a source of reliable information for plant operators, consultants, and regulatory agencies which will survive changes in personnel
- Provide a basis for justifying system expansion or modification

Types of Records

The types of records of importance in the operation, planning, and budgeting of a wastewater system include:

- Performance
- Physical facilities
- Maintenance
- Costs

Performance Records

Performance records help in making process control decisions, document conformance with discharge standards, and provide a basis for planning expansions or modification of the treatment processes. The discharge permit specifies the required effluent quality tests and frequency of tests. In many cases, the state regulatory agency may require more frequent reports than EPA. Additional laboratory analyses are usually required for efficient control of plant operation.

CITY OF _____ MONTH OF _____

METHOD OF FLOW MEASUREMENT _____

DATE	HEAD (IN.)	FLOW (MGD)	BOD (MG/L)	PH (S.U.)	TSS	F.C.	EXECUTIVE OFFICER
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
TOTAL							
AVERAGE							

SLUDGE DISPOSAL

DATE: _____

LOCATION: _____

AMOUNT HAULED: _____

NAME: _____

IRRIGATION -- WASTEWATER

ACREAGE: _____

GALLONGS: _____

ACRE-FEET/ACRE-YEAR: _____

ANNUAL SOIL SAMPLING

PH _____

TOTAL NITROGEN _____

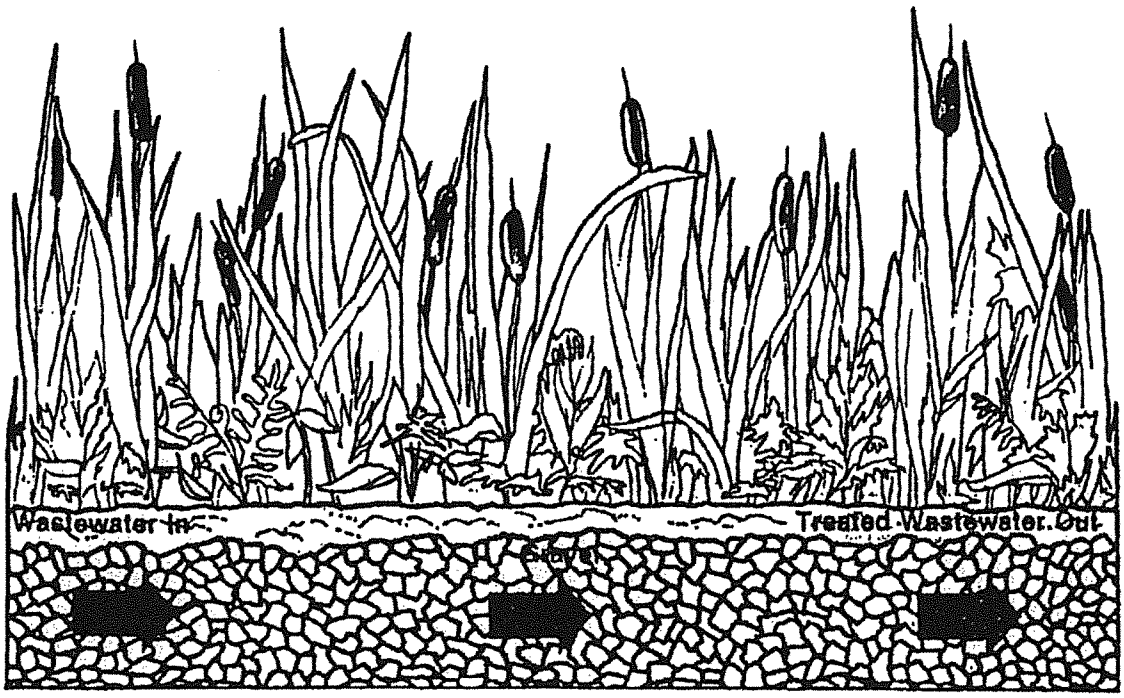
PHOSPHORUS _____

CONDUCTIVITY _____

Other Information

Treatment Systems

Constructed Wetlands



- ❑ Promising new approach to wastewater treatment.
- ❑ Marsh plants (cattails, reeds, etc.) are grown in beds of soil or gravel through which wastewater flows.
- ❑ Useful to further treat wastewater from a lagoon.
- ❑ Low cost system needing minimal operator attention. Periodically check plants and sometimes harvest at end of growing season.
- ❑ Relatively low land requirements compared to many land treatment systems.
- ❑ May be operated year-round in most climates.

Mean Pan Evaporation and Rainfall

Station	E_A Mean Evaporation (Inches/Year)	RFR_A Mean Rainfall (Inches/Year)
Abilene	75.0*	23.8**
Amarillo	87.9	20.28
Austin	70.0	32.49
Beaumont	47.8	55.07
Brownsville	56.0	25.13
Canyon Lake	80.8	33.19
Corpus Christi	67.0	32.0**
Daingerfield	74.2	46.12
Dallas	85.0	35.94
El Paso	106.5	7.77
Fort Stockton	105.6	11.85
Houston	48.7	48.19
Lake Somerville	71.7	37.45
Laredo	87.0*	21.0**
Lubbock	88.7	18.41
Lufkin	51.0*	43.0**
Midland-Odessa	85.0	13.0**
San Antonio	70.0*	30.0**
San Angelo	84.0*	19.0**
Temple	68.2	34.00
Tyler	55.0*	42.0**
Uvalde	72.0*	25.0**
Wichita Falls	73.0*	27.0**

*Interpolated From Map, P. 66 "Climatic Atlas of Texas"
**Interpolated From Map, P. 18 "Climatic Atlas of Texas"

Individual Usage Rates in Businesses/Institutions

This table may be used for estimating gallons of daily sewage flow per person to determine minimum tank capacity requirements, unless actual water usage data is available and has been carefully checked by the designer of the proposed system.

Type of Establishment	Gallons/Person/Day
Airports (per passenger)	5
Apartment Houses	50
Boarding Schools	50
Churches (per member)	5
Country Clubs (per resident member)	100
Country Clubs (per non-resident member present)	25
Day Care Centers (without kitchen)	15
Day Care Centers (with kitchen)	25
Drive-in Theaters (per car space)	5
Factories (gallons per person per shift, exclusive of industrial wastes)	20
Hospitals	200
Hotels	80
Institutions other than Hospitals	100
Laundries Self-service (gallons per wash, i.e., per customer)	50
Lounges (bar & tables)	10
Mobile Homes	75
Motels	50
Movie Theaters (per auditorium seat)	5
Office Buildings*	15
Parks (without bathhouse)	5
Parks (with bathhouse)	15
Restaurants (24-hour full service)	70 /seat/day
Restaurants (breakfast/lunch or lunch/dinner)	35 /seat/day
Restaurants (fast food–paper plate service)	15 /seat/day
Schools without cafeterias, gymnasiums or showers	15
Schools with cafeterias, but no gymnasiums or showers	20
Schools with cafeterias, gymnasiums and showers	25
Service stations (per vehicle served)	10
Stores (total per day per washroom)	400
Swimming Pools and Bathhouses	10
Townhouses (with clothes washer)	50
Travel Trailer/RV Parks	50
Vet Clinics (per animal)	10
Work or Construction Camps (semi-permanent)	50
Youth camps (no showers or meals served)	15

*Note: Offices without Food Service or Bathing Facilities, with Restrooms Equipped with Toilets Requiring 1.5 Gallon per Flush or Less, and Automatic Cutoff Faucets 6

Selected References

Selected References

Diagnostic Inspection Workbook, U.S. E.P.A., Washington, D.C. 20460.

Inspectors Guide for Evaluation of Municipal Wastewater Treatment Plants, U.S. E.P.A., Municipal Operations Branch, Office of Water Program Operations, Washington, D.C. 20460, EPA-430/9-79-010.

Manual of Wastewater Operations, The Texas Water Utilities Association, 1971.

NPDES Compliance Inspection Manual, U.S. E.P.A., Office of Water Enforcement and Permits (EN-338), Washington, D.C. 20460, June 1984.

Performance Evaluation and Troubleshooting at Municipal Wastewater Treatment Facilities, U.S. E.P.A., Municipal Operations Branch, Office of Water Program Operations, Washington, D.C. 20460, EPA-430/9-78-001.

Appendix A
Design Criteria for Ponds

(i) **Aerated lagoon**

(1) *Horsepower.* Mechanical aeration units in aerated lagoons shall have sufficient power to provide a minimum of 1.6 pounds of oxygen per pound of BOD_5 applied with the largest unit out of service. If oxygen requirements control the amount of horsepower needed, proposed oxygen transfer rates in excess of 2 lbs. per horsepower-hour must be justified by actual performance data. The amount of oxygen supplied or the pounds of BOD_5 per hour that may be applied per hourse-power-hour may be calculated by the use of any acceptable formula. The combined horsepower rating of the aeration units shall not be less than 30 horsepower per million gallons of aerated lagoon volume.

(2) *Construction.* Earthen ponds shall have large sections of concrete slabs or equivalent protection under each aeration unit to prevent scouring of the earth. Concrete scour pads shall be used in all areas where the velocity exceeds 1 feet per second. Earthern ponds shall have protection on the slopes of the embankment at the water line to prevent erosion of the slopes from the turbulence in the lagoon. Where the horsepower level is more than 200 horsepower per million gallons of lagoon volume, the pond embankment at the water line shall be protected from erosion with riprap which may be concrete, gunite, a six-inch thick layer of asphalt-saturated or cement-stabilized earth rolled and compacted into place, or suitable rock riprap. The creast and dry slopes of embankments shall be protected from erosion by planting of grass.

(3) *Subsequent treatment, discharge systems.* Aerated lagoon effluent will normally be routed to additional ponds for secondary treatment and to provide sufficient detention time for disinfection. The secondary ponds system shall consist of two or more ponds. Secondary pond sizing shall not exceed 35 pounds of BOD_5 per acre per day. Hydraulic detention time in a combined aerated lagoon and secondary pond system shall be a minimum of 21 days (based on design flow) in order to provide adequate disinfection. In designing the secondary ponds, BOD_5 removal efficiency in the aerated lagoon(s) may be calculated using the following formula:

$$E = \frac{1}{1 + K(V/Q)}$$

Where

E = efficiency of a complete mix reactor without recycle

K = removal rate constant, day^{-1} (generally 0.5 day^{-1} for domestic sewage)

V = aeration basin volume, million gallons

Q = wastewater flow rate, in million gallons per day

(j) **Wastewater stabilization ponds (secondary treatment ponds)**

(1) *Pretreatment.* Wastewater stabilization ponds shall be preceded by facilities for primary sedimentation of the raw sewage. Aerated lagoons or facultative lagoons may be utilized in place of conventional primary treatment facilities.

(2) *Imperviousness.* All earthern structures proposed for use in domestic wastewater treatment or storage shall be constructed to protect groundwater resources. Where linings are necessary, the following methods are acceptable.

(A) in-situ or placed clay soils having the following qualities may be utilized for pond lining:

(i) more than 30% passing a 200-mesh sieve;

(ii) liquid limit greater than 30%;

(iii) plasticity index greater than 15; and

(iv) a minimum thickness of 2 feet.

(B) membrane lining with a minimum thickness of 20 mils, and an underdrain leak detection system.

(C) other methods with commission approval.

(3) *Distribution of flow.* Stabilization ponds shall be of such shape and size to insure even distribution of the wastewater flow throughout the entire pond. While the shapes of ponds may be dictated to some extent by the topography of the location, long narrow ponds are preferable and they should be oriented in the direction of the prevailing winds such that debris is blown toward the inlet. Ponds with narrow inlets or sloughs should be avoided.

(4) *Access area.* Storm water drainage shall be excluded from all ponds. All vegetation shall be removed from within the pond area during construction. Access areas shall be cleared and maintained for a distance of at least 20 feet from the outside toes of the pond embankment walls.

(5) *Multiple ponds.* The use of multiple ponds in pond systems is required. The operation of the ponds shall be flexible, enabling one or more ponds to be taken out of service without affecting the operation of the remaining ponds. The ponds shall be operated in series during routine operation periods.

(6) *Organic loading*. The organic loading on the stabilization ponds, based on the total surface area of the ponds, shall not exceed 35 pounds of BOD_5 per acre per day. The loading on the initial stabilization pond shall not exceed 75 pounds of BOD_5 per acre per day.

(7) *Depth*. The stabilization ponds or cells shall have a normal water depth of 3 to 5 feet.

(8) *Inlets and outlets*. Multiple inlets and multiple outlets are required. The inlets and outlets shall be arranged to prevent short circuiting within the pond so that the flow of wastewater is distributed evenly throughout the pond. Multiple inlets and outlets shall be spaced evenly. All outlets shall be baffled with removable baffles to prevent floating material from being discharged, and shall be constructed so that the level of the pond surface may be varied under normal operating conditions. Submerged outlets shall be used to prevent the discharge of algae.

(9) *Embankment walls*. The embankment walls should be compacted thoroughly and compaction details shall be covered in the specifications. Soil used in the embankment shall be free of foreign material such as paper, brush and fallen trees. The embankment walls shall have a top width of at least 10 feet. Interior and exterior slope of the embankment wall should be one foot vertical to three feet horizontal. There shall be a freeboard of not less than two feet nor more than three feet based on the normal operating depth. All embankment walls shall be protected by planting grass or riprapping. Where embankment walls are subject to wave action, riprapping should be installed. Erosion stops and water seals shall be installed on all piping penetrating the embankments. Provisions should be made to change the operating level of the pond sos the pond surface can be raised or lowered at least six inches.

(10) *Partially Mixed Aerated Lagoons*

(A) Horsepower. With partially mixed aerated lagoons, no attempt is made to keep all ponds solid in suspension. Mechanical or diffused aeration equipment should be sized to provide a minimum of 1.6 pounds of oxygen per pound of BOD_5 applied with the largest unit out of service. Where multiple ponds are used in series, the power input may be reduced as the influent BOD5 to each pond decreases. Proposed oxygen transfer rates in excess of two ponds per horsepower-hour must be justified by actual performance data.

(B) Pond sizing. Partially mixed aerated lagoons should be sized in accordance with the formula in §317.4(i)(3) of this title (relating to Wastewater Treatment Facilities) using K-0.28. Pond length to width ratios should be three to one or four to one.

(C) Imperviousness. Requirements for imperviousness, multiple cells, embankment walls, and inlets and outlets shall be the same as for other secondary treatment ponds.

(k) **Facultative lagoon (raw wastewater stabilization pond).**

(1) *Configuration*. The length to width ratio of the lagoon should be three to one, with flow along the length from inlets near one end to outlets at the opposite end (other configurations may be approved if adequate means of prevention of short circuiting are provided). The length should be oriented in the direction of the prevailing winds with the inlet side located such that debris will be blown toward the inlet (generally, the north-northwest side). Inlet baffles shall be provided to collect floatable material. The outlets shall be constructed so that the water level of the lagoon may be varied under normal operating conditions. Storm water drainage shall be prevented from entering the lagoon. The design engineer may wish to locate the facultative lagoon in a central location with regard to the surrounding secondary ponds to facilitate compliance with the buffer zone requirement specified in Chapter 309 of this title (relating to Domestic Wastewater Effluent Limitations and Plant Siting).

(2) *Imperviousness*. Requirements for imperviousness shall be the same as those for secondary treatment ponds.

(3) *Depth*. The portion of the lagoon near the inlets shall have a 10 to 12 foot depth to provide sludge storage and anaerobic treatment. This deeper portion should be approximately 25 percent of the area of the lagoon bottom. The remainder of the pond should have a depth of five to eight feet.

(4) *Organic loading*. The organic loading, based on the surface area of the facultative lagoon, shall not exceed 150 pounds of BOD_5 per acre per day.

(5) *Odor control*. The facultative lagoon shall have multiple inlets and the inlets should be submerged approximately 24 inches below the water surface to minimize odor but not disturb the anaerobic zone. Capabilities for recirculation at 50% to 100% of the design flow should be provided. Care should be taken to avoid situations where siphoning of lagoon contents through submerged inlets can occur.

(6) *Embankment walls*. Refer to §317.4(j)(9) of this title (relating to Wastewater Treatment Facilities).

(7) *Subsequent treatment*. The facultative lagoon effluent will normally be routed to a wastewater stabilization pond system for secondary treatment. In designing the stabilization pond system, it may be assumed that BOD removal in the faculative lagoon is 50%. The stabilization pond system shall contain two or more ponds.

Appendix B
Soil Sampling Procedures

Texas Water Commission
District 1–Amarillo

Wastewater Permits Soil Sampling Information

I. Annual Soil Sampling Requirements for Land Disposal of Treated Wastewater

A. Annual soil sampling from the root zone of the irrigated site shall be required.

B. Sampling procedures shall employ accepted techniques of soil science for obtaining representative analytical results.

C. Analysis shall be performed for pH, total nitrogen, potassium, phosphorus, and conductivity.

D. The Permittee shall submit the result of the soil samples to the Austin and the District offices of the Commission during the month of September of each year.

II. Procedures for Taking Soil Samples

A. Soil tests can be only as accurate as the samples on which they are made. Proper collection of soil samples is extremely important. Chemical tests of poorly taken samples may actually be misleading because they do not represent the area.

B. Tools

1. The best tools for sampling soil are a stainless steel or chrome plated soil probe and clean plastic buckets. **DO NOT** use galvanized tools or rubber buckets due to potential zinc contamination.

2. Make sure the tools are clean to avoid contamination from fertilizer or other soils.

3. A spade or soil auger may also be used.

C. Sample Size

1. Soil samples should be taken by collecting at least 12 to 15 cores of uniform size and depth per sample.

2. Take **ONE** composite sample from each uniform area of 10 to 40 acres in a field (see Figure 1).

In areas such as East Texas, one sample should represent only 10 to 20 acres; where soils are more uniform such as the High Plains, one sample can represent up to 40 acres.

D. Location and Methodology for Taking Sub-Samples

1. Large areas should be divided into separate sampling unites (see Figure 1). These separate units should represent the various soil types, cropping patterns, and production history.

   Note: Soil Conservation Service County Survey Maps and Field Histories can be used to choose sampling units.

2. Samples to measure soil fertility should be taken from the surface 8 inches of soil (see Figure 2).

   Take sample cores from compressed soil to ensure a consistent sample depth. If fields have been tilled, you may need to take the core from the wheel track of the sampling vehicle.

   When sampling row crops, take cores 4 to 6 inches to the side of the row. **DO NOT** take cores from the furrow bottoms or from directly in the row.

3. When taking soil samples, scrape the litter from the surface prior to sampling.

   Make the core or boring approximately 8 inches deep in the soil (see Figure 2).

   To use a spade, dig a V-shaped hole and take a one-inch slide of soil from the smooth side of the hole (see Figure 3). Then take a 1 x 1 inch core from the center of the shovel slice (see Figure 3). Place this core into the compositing bucket.

   Repeat the sampling procedure in 10 to 15 different places across the sampling area. Then, thoroughly mix the contents in the bucket with a clean utensil and remove a quart of the mixture. Place this mixed soil in a clean quart jar and ship to the laboratory for analysis as soon as possible.

III. Precautions

A. Avoid sampling spots in the field such as small gullies, slight field depressions, terrace waterways, and unusual sponts.

B. When sampling fertilized fields, avoid sampling directly in fertilized band.

C. **DO NOT** use old vegetable cans, tobacco cans, match boxes, etc., to submit samples.

D. **DO NOT** use heat to dry samples.

E. Be sure to keep a record as to the area represented by each sample and the location of the sub-samples within.

References

"Procedures for Taking Soil Samples". Soil Testing Laboratory, Texas Agricultural Extension Service, College Station, Texas 77843-2474.

"Proper Soil Sampling Procedures". Servi-Tech Laboratory, 1816 E. Wyatt Earp, Dodge City, Kansas 67801.

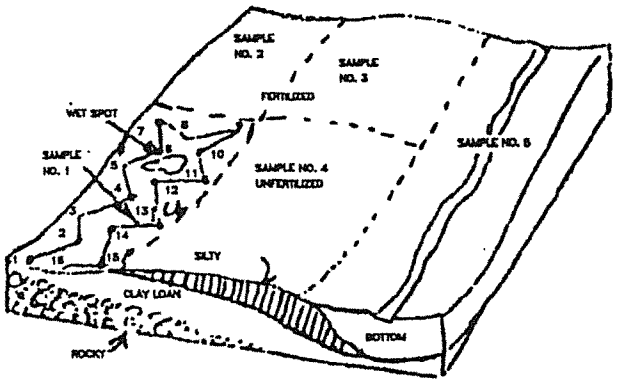


FIGURE 1-B

Hypothetical irrigated field divided into 5 sampling units based on soil type, slope and fertilizer history.

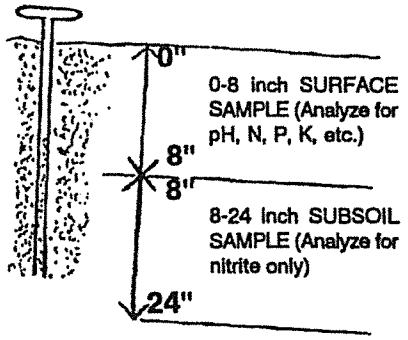


FIGURE 2-B

Hypothetical soil sampling depths using an augher.

NOTE: Soil sampling depths may vary due to various crop root zones.

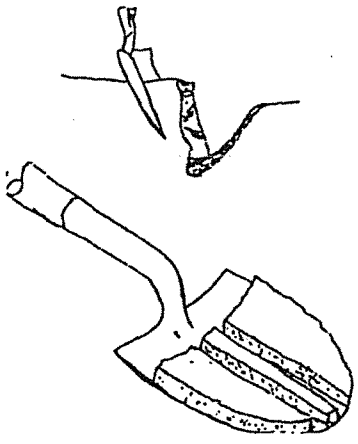


Figure 3-B

Soil sampling using a spade. Note 1 X 1 inch core.

ATTACHMENT 22 – WWTP Discharge Permit Issued 2019

TPDES PERMIT NO.
WQ0010765001
[For TCEQ office use only - EPA I.D. No. TX0025968]

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. Box 13087
Austin, Texas 78711-3087

This is a renewal that replaces TPDES Permit No. WQ0010765001 issued on July 31, 2014.

PERMIT TO DISCHARGE WASTES
under provisions of
Section 402 of the Clean Water Act
and Chapter 26 of the Texas Water Code

City of Wallis

whose mailing address is

P.O. Box 190
Wallis, Texas 77485

is authorized to treat and discharge wastes from the City of Wallis Wastewater Treatment Facility, SIC Code 4952

located at 17403 Railroad Street, in the City of Wallis, Austin County, Texas 77485

to an unnamed ditch; thence to Tesch's Branch; thence to Allens Creek; thence to Brazos River Below Navasota River in Segment No. 1202 of the Brazos River Basin

only according to effluent limitations, monitoring requirements, and other conditions set forth in this permit, as well as the rules of the Texas Commission on Environmental Quality (TCEQ), the laws of the State of Texas, and other orders of the TCEQ. The issuance of this permit does not grant to the permittee the right to use private or public property for conveyance of wastewater along the discharge route described in this permit. This includes, but is not limited to, property belonging to any individual, partnership, corporation or other entity. Neither does this permit authorize any invasion of personal rights nor any violation of federal, state, or local laws or regulations. It is the responsibility of the permittee to acquire property rights as may be necessary to use the discharge route.

This permit shall expire at midnight, **five years from the date of issuance**.

ISSUED DATE:
June 26, 2019

For the Commission

INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS Outfall Number 001

1. During the period beginning upon the date of issuance and lasting through the completion of expansion to the 0.498 million gallons per day (MGD) facility, the permittee is authorized to discharge subject to the following effluent limitations:

   The daily average flow of effluent shall not exceed 0.2 MGD, nor shall the average discharge during any two-hour period (2-hour peak) exceed 416 gallons per minute (gpm).

Effluent Characteristic	Discharge Limitations				Min. Self-Monitoring Requirements	
	Daily Avg mg/l (lbs/day)	7-day Avg mg/l	Daily Max mg/l	Single Grab mg/l	Report Daily Avg. & Max. Single Grab Measurement Frequency	Sample Type
Flow, MGD	Report	N/A	Report	N/A	Five/week	Instantaneous
Biochemical Oxygen Demand (5-day)	20 (33)	30	45	65	One/week	Grab
Total Suspended Solids	20 (33)	30	45	65	One/week	Grab
E. coli, colony-forming units or most probable number per 100 ml	126	N/A	N/A	399	One/month	Grab

2. The effluent shall contain a chlorine residual of at least 1.0 mg/l and shall not exceed a chlorine residual of 4.0 mg/l after a detention time of at least 20 minutes (based on peak flow), and shall be monitored five times per week by grab sample. An equivalent method of disinfection may be substituted only with prior approval of the Executive Director.

3. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per month by grab sample.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts and no discharge of visible oil.

5. Effluent monitoring samples shall be taken at the following location(s): Following the final treatment unit.

6. The effluent shall contain a minimum dissolved oxygen of 6.0 mg/l and shall be monitored once per week by grab sample.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS Outfall Number 001

1. During the period beginning upon the completion of expansion to the 0.498 million gallons per day (MGD) facility and lasting through the date of expiration, the permittee is authorized to discharge subject to the following effluent limitations:

   The daily average flow of effluent shall not exceed 0.498 MGD, nor shall the average discharge during any two-hour period (2-hour peak) exceed 1,042 gallons per minute (gpm).

Effluent Characteristic	Discharge Limitations				Min. Self-Monitoring Requirements	
	Daily Avg mg/l (lbs/day)	7-day Avg mg/l	Daily Max mg/l	Single Grab mg/l	Report Daily Avg. & Max. Single Grab Measurement Frequency	Sample Type
Flow, MGD	Report	N/A	Report	N/A	Continuous	Totalizing Meter
Carbonaceous Biochemical Oxygen Demand (5-day)	20 (83)	30	45	65	One/week	Grab
Total Suspended Solids	20 (83)	30	45	65	One/week	Grab
Ammonia Nitrogen	9 (37)	N/A	10	15	One/week	Grab
E. coli, colony-forming units or most probable number per 100 ml	126	N/A	N/A	399	One/month	Grab

2. The effluent shall contain a chlorine residual of at least 1.0 mg/l and shall not exceed a chlorine residual of 4.0 mg/l after a detention time of at least 20 minutes (based on peak flow), and shall be monitored five times per week by grab sample. An equivalent method of disinfection may be substituted only with prior approval of the Executive Director.

3. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per month by grab sample.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts and no discharge of visible oil.

5. Effluent monitoring samples shall be taken at the following location(s): Following the final treatment unit.

6. The effluent shall contain minimum dissolved oxygen of 6.0 mg/l and shall be monitored once per week by grab sample.

DEFINITIONS AND STANDARD PERMIT CONDITIONS

As required by Title 30 Texas Administrative Code (TAC) Chapter 305, certain regulations appear as standard conditions in waste discharge permits. 30 TAC § 305.121 - 305.129 (relating to Permit Characteristics and Conditions) as promulgated under the Texas Water Code (TWC) §§ 5.103 and 5.105, and the Texas Health and Safety Code (THSC) §§ 361.017 and 361.024(a), establish the characteristics and standards for waste discharge permits, including sewage sludge, and those sections of 40 Code of Federal Regulations (CFR) Part 122 adopted by reference by the Commission. The following text includes these conditions and incorporates them into this permit. All definitions in TWC § 26.001 and 30 TAC Chapter 305 shall apply to this permit and are incorporated by reference. Some specific definitions of words or phrases used in this permit are as follows:

1. Flow Measurements

   a. Annual average flow - the arithmetic average of all daily flow determinations taken within the preceding 12 consecutive calendar months. The annual average flow determination shall consist of daily flow volume determinations made by a totalizing meter, charted on a chart recorder and limited to major domestic wastewater discharge facilities with one million gallons per day or greater permitted flow.

   b. Daily average flow - the arithmetic average of all determinations of the daily flow within a period of one calendar month. The daily average flow determination shall consist of determinations made on at least four separate days. If instantaneous measurements are used to determine the daily flow, the determination shall be the arithmetic average of all instantaneous measurements taken during that month. Daily average flow determination for intermittent discharges shall consist of a minimum of three flow determinations on days of discharge.

   c. Daily maximum flow - the highest total flow for any 24-hour period in a calendar month.

   d. Instantaneous flow - the measured flow during the minimum time required to interpret the flow measuring device.

   e. 2-hour peak flow (domestic wastewater treatment plants) - the maximum flow sustained for a two-hour period during the period of daily discharge. The average of multiple measurements of instantaneous maximum flow within a two-hour period may be used to calculate the 2-hour peak flow.

   f. Maximum 2-hour peak flow (domestic wastewater treatment plants) - the highest 2-hour peak flow for any 24-hour period in a calendar month.

2. Concentration Measurements

   a. Daily average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit, within a period of one calendar month, consisting of at least four separate representative measurements.

      i. For domestic wastewater treatment plants - When four samples are not available in a calendar month, the arithmetic average (weighted by flow) of all values in the previous four consecutive month period consisting of at least four measurements shall be utilized as the daily average concentration.

ii. For all other wastewater treatment plants - When four samples are not available in a calendar month, the arithmetic average (weighted by flow) of all values taken during the month shall be utilized as the daily average concentration.

b. 7-day average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit, within a period of one calendar week, Sunday through Saturday.

c. Daily maximum concentration - the maximum concentration measured on a single day, by the sample type specified in the permit, within a period of one calendar month.

d. Daily discharge - the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the sampling day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the sampling day.

The daily discharge determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily discharge determination of concentration shall be the arithmetic average (weighted by flow value) of all samples collected during that day.

e. Bacteria concentration (*E. coli* or Enterococci) - Colony Forming Units (CFU) or Most Probable Number (MPN) of bacteria per 100 milliliters effluent. The daily average bacteria concentration is a geometric mean of the values for the effluent samples collected in a calendar month. The geometric mean shall be determined by calculating the nth root of the product of all measurements made in a calendar month, where n equals the number of measurements made; or, computed as the antilogarithm of the arithmetic mean of the logarithms of all measurements made in a calendar month. For any measurement of bacteria equaling zero, a substituted value of one shall be made for input into either computation method. If specified, the 7-day average for bacteria is the geometric mean of the values for all effluent samples collected during a calendar week.

f. Daily average loading (lbs/day) - the arithmetic average of all daily discharge loading calculations during a period of one calendar month. These calculations must be made for each day of the month that a parameter is analyzed. The daily discharge, in terms of mass (lbs/day), is calculated as (Flow, MGD x Concentration, mg/l x 8.34).

g. Daily maximum loading (lbs/day) - the highest daily discharge, in terms of mass (lbs/day), within a period of one calendar month.

3. Sample Type

a. Composite sample - For domestic wastewater, a composite sample is a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow, and collected at the intervals required by 30 TAC § 319.9 (a). For industrial wastewater, a composite sample is a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow, and collected at the intervals required by 30 TAC § 319.9 (b).

b. Grab sample - an individual sample collected in less than 15 minutes.

4. Treatment Facility (facility) - wastewater facilities used in the conveyance, storage, treatment, recycling, reclamation and/or disposal of domestic sewage, industrial wastes, agricultural wastes, recreational wastes, or other wastes including sludge handling or disposal facilities under the jurisdiction of the Commission.

5. The term "sewage sludge" is defined as solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in 30 TAC Chapter 312. This includes the solids that have not been classified as hazardous waste separated from wastewater by unit processes.

6. Bypass - the intentional diversion of a waste stream from any portion of a treatment facility.

MONITORING AND REPORTING REQUIREMENTS

1. Self-Reporting

Monitoring results shall be provided at the intervals specified in the permit. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall conduct effluent sampling and reporting in accordance with 30 TAC §§ 319.4 - 319.12. Unless otherwise specified, effluent monitoring data shall be submitted each month, to the Compliance Monitoring Team of the Enforcement Division (MC 224), by the 20th day of the following month for each discharge which is described by this permit whether or not a discharge is made for that month. Monitoring results must be submitted online using the NetDMR reporting system available through the TCEQ website unless the permittee requests and obtains an electronic reporting waiver. Monitoring results must be signed and certified as required by Monitoring and Reporting Requirements No. 10.

As provided by state law, the permittee is subject to administrative, civil and criminal penalties, as applicable, for negligently or knowingly violating the Clean Water Act (CWA); TWC §§ 26, 27, and 28; and THSC § 361, including but not limited to knowingly making any false statement, representation, or certification on any report, record, or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, or falsifying, tampering with or knowingly rendering inaccurate any monitoring device or method required by this permit or violating any other requirement imposed by state or federal regulations.

2. Test Procedures

a. Unless otherwise specified in this permit, test procedures for the analysis of pollutants shall comply with procedures specified in 30 TAC §§ 319.11 - 319.12. Measurements, tests, and calculations shall be accurately accomplished in a representative manner.

b. All laboratory tests submitted to demonstrate compliance with this permit must meet the requirements of 30 TAC § 25, Environmental Testing Laboratory Accreditation and Certification.

3. Records of Results

a. Monitoring samples and measurements shall be taken at times and in a manner so as to be representative of the monitored activity.

b. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period

of at least five years (or longer as required by 40 CFR Part 503), monitoring and reporting records, including strip charts and records of calibration and maintenance, copies of all records required by this permit, records of all data used to complete the application for this permit, and the certification required by 40 CFR § 264.73(b)(9) shall be retained at the facility site, or shall be readily available for review by a TCEQ representative for a period of three years from the date of the record or sample, measurement, report, application or certification. This period shall be extended at the request of the Executive Director.

c. Records of monitoring activities shall include the following:

i. date, time and place of sample or measurement;

ii. identity of individual who collected the sample or made the measurement.

iii. date and time of analysis;

iv. identity of the individual and laboratory who performed the analysis;

v. the technique or method of analysis; and

vi. the results of the analysis or measurement and quality assurance/quality control records.

The period during which records are required to be kept shall be automatically extended to the date of the final disposition of any administrative or judicial enforcement action that may be instituted against the permittee.

4. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit using approved analytical methods as specified above, all results of such monitoring shall be included in the calculation and reporting of the values submitted on the approved self-report form. Increased frequency of sampling shall be indicated on the self-report form.

5. Calibration of Instruments

All automatic flow measuring or recording devices and all totalizing meters for measuring flows shall be accurately calibrated by a trained person at plant start-up and as often thereafter as necessary to ensure accuracy, but not less often than annually unless authorized by the Executive Director for a longer period. Such person shall verify in writing that the device is operating properly and giving accurate results. Copies of the verification shall be retained at the facility site and/or shall be readily available for review by a TCEQ representative for a period of three years.

6. Compliance Schedule Reports

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date to the Regional Office and the Compliance Monitoring Team of the Enforcement Division (MC 224).

7. Noncompliance Notification

a. In accordance with 30 TAC § 305.125(9) any noncompliance which may endanger human health or safety, or the environment shall be reported by the permittee to the TCEQ. Except as allowed by 30 TAC § 305.132, report of such information shall be provided orally or by facsimile transmission (FAX) to the Regional Office within 24 hours of becoming aware of the noncompliance. A written submission of such information shall also be provided by the permittee to the Regional Office and the Compliance Monitoring Team of the Enforcement Division (MC 224) within five working days of becoming aware of the noncompliance. For Publicly Owned Treatment Works (POTWs), effective September 1, 2020, the permittee must submit the written report for unauthorized discharges and unanticipated bypasses that exceed any effluent limit in the permit using the online electronic reporting system available through the TCEQ website unless the permittee requests and obtains an electronic reporting waiver. The written submission shall contain a description of the noncompliance and its cause; the potential danger to human health or safety, or the environment; the period of noncompliance, including exact dates and times; if the noncompliance has not been corrected, the time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance, and to mitigate its adverse effects.

b. The following violations shall be reported under Monitoring and Reporting Requirement 7.a.:

   i. Unauthorized discharges as defined in Permit Condition 2(g).

   ii. Any unanticipated bypass that exceeds any effluent limitation in the permit.

   iii. Violation of a permitted maximum daily discharge limitation for pollutants listed specifically in the Other Requirements section of an Industrial TPDES permit.

c. In addition to the above, any effluent violation which deviates from the permitted effluent limitation by more than 40% shall be reported by the permittee in writing to the Regional Office and the Compliance Monitoring Team of the Enforcement Division (MC 224) within 5 working days of becoming aware of the noncompliance.

d. Any noncompliance other than that specified in this section, or any required information not submitted or submitted incorrectly, shall be reported to the Compliance Monitoring Team of the Enforcement Division (MC 224) as promptly as possible. For effluent limitation violations, noncompliances shall be reported on the approved self-report form.

8. In accordance with the procedures described in 30 TAC §§ 35.301 - 35.303 (relating to Water Quality Emergency and Temporary Orders) if the permittee knows in advance of the need for a bypass, it shall submit prior notice by applying for such authorization.

9. Changes in Discharges of Toxic Substances

   All existing manufacturing, commercial, mining, and silvicultural permittees shall notify the Regional Office, orally or by facsimile transmission within 24 hours, and both the Regional Office and the Compliance Monitoring Team of the Enforcement Division (MC 224) in writing within five (5) working days, after becoming aware of or having reason to believe:

   a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant listed at 40 CFR Part 122, Appendix D,

Tables II and III (excluding Total Phenols) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. One hundred micrograms per liter (100 µg/L);

ii. Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

iii. Five (5) times the maximum concentration value reported for that pollutant in the permit application; or

iv. The level established by the TCEQ.

b. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. Five hundred micrograms per liter (500 µg/L);

ii. One milligram per liter (1 mg/L) for antimony;

iii. Ten (10) times the maximum concentration value reported for that pollutant in the permit application; or

iv. The level established by the TCEQ.

10. Signatories to Reports

All reports and other information requested by the Executive Director shall be signed by the person and in the manner required by 30 TAC § 305.128 (relating to Signatories to Reports).

11. All POTWs must provide adequate notice to the Executive Director of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to CWA § 301 or § 306 if it were directly discharging those pollutants;

b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit; and

c. For the purpose of this paragraph, adequate notice shall include information on:

i. The quality and quantity of effluent introduced into the POTW; and

ii. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

PERMIT CONDITIONS

1. General

a. When the permittee becomes aware that it failed to submit any relevant facts in a permit

application, or submitted incorrect information in an application or in any report to the Executive Director, it shall promptly submit such facts or information.

b. This permit is granted on the basis of the information supplied and representations made by the permittee during action on an application, and relying upon the accuracy and completeness of that information and those representations. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked, in whole or in part, in accordance with 30 TAC Chapter 305, Subchapter D, during its term for good cause including, but not limited to, the following:

   i. Violation of any terms or conditions of this permit;

   ii. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

   iii. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

c. The permittee shall furnish to the Executive Director, upon request and within a reasonable time, any information to determine whether cause exists for amending, revoking, suspending or terminating the permit. The permittee shall also furnish to the Executive Director, upon request, copies of records required to be kept by the permit.

2. Compliance

a. Acceptance of the permit by the person to whom it is issued constitutes acknowledgment and agreement that such person will comply with all the terms and conditions embodied in the permit, and the rules and other orders of the Commission.

b. The permittee has a duty to comply with all conditions of the permit. Failure to comply with any permit condition constitutes a violation of the permit and the Texas Water Code or the Texas Health and Safety Code, and is grounds for enforcement action, for permit amendment, revocation, or suspension, or for denial of a permit renewal application or an application for a permit for another facility.

c. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

d. The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal or other permit violation that has a reasonable likelihood of adversely affecting human health or the environment.

e. Authorization from the Commission is required before beginning any change in the permitted facility or activity that may result in noncompliance with any permit requirements.

f. A permit may be amended, suspended and reissued, or revoked for cause in accordance with 30 TAC §§ 305.62 and 305.66 and TWC§ 7.302. The filing of a request by the permittee for a permit amendment, suspension and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

g. There shall be no unauthorized discharge of wastewater or any other waste. For the

purpose of this permit, an unauthorized discharge is considered to be any discharge of wastewater into or adjacent to water in the state at any location not permitted as an outfall or otherwise defined in the Other Requirements section of this permit.

h. In accordance with 30 TAC § 305.535(a), the permittee may allow any bypass to occur from a TPDES permitted facility which does not cause permitted effluent limitations to be exceeded or an unauthorized discharge to occur, but only if the bypass is also for essential maintenance to assure efficient operation.

i. The permittee is subject to administrative, civil, and criminal penalties, as applicable, under TWC §§ 7.051 - 7.075 (relating to Administrative Penalties), 7.101 - 7.111 (relating to Civil Penalties), and 7.141 - 7.202 (relating to Criminal Offenses and Penalties) for violations including, but not limited to, negligently or knowingly violating the federal CWA §§ 301, 302, 306, 307, 308, 318, or 405, or any condition or limitation implementing any sections in a permit issued under the CWA § 402, or any requirement imposed in a pretreatment program approved under the CWA §§ 402 (a)(3) or 402 (b)(8).

3. Inspections and Entry

a. Inspection and entry shall be allowed as prescribed in the TWC Chapters 26, 27, and 28, and THSC § 361.

b. The members of the Commission and employees and agents of the Commission are entitled to enter any public or private property at any reasonable time for the purpose of inspecting and investigating conditions relating to the quality of water in the state or the compliance with any rule, regulation, permit or other order of the Commission. Members, employees, or agents of the Commission and Commission contractors are entitled to enter public or private property at any reasonable time to investigate or monitor or, if the responsible party is not responsive or there is an immediate danger to public health or the environment, to remove or remediate a condition related to the quality of water in the state. Members, employees, Commission contractors, or agents acting under this authority who enter private property shall observe the establishment's rules and regulations concerning safety, internal security, and fire protection, and if the property has management in residence, shall notify management or the person then in charge of his presence and shall exhibit proper credentials. If any member, employee, Commission contractor, or agent is refused the right to enter in or on public or private property under this authority, the Executive Director may invoke the remedies authorized in TWC § 7.002. The statement above, that Commission entry shall occur in accordance with an establishment's rules and regulations concerning safety, internal security, and fire protection, is not grounds for denial or restriction of entry to any part of the facility, but merely describes the Commission's duty to observe appropriate rules and regulations during an inspection.

4. Permit Amendment and/or Renewal

a. The permittee shall give notice to the Executive Director as soon as possible of any planned physical alterations or additions to the permitted facility if such alterations or additions would require a permit amendment or result in a violation of permit requirements. Notice shall also be required under this paragraph when:

i. The alteration or addition to a permitted facility may meet one of the criteria for

determining whether a facility is a new source in accordance with 30 TAC § 305.534 (relating to New Sources and New Dischargers); or

ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in the permit, nor to notification requirements in Monitoring and Reporting Requirements No. 9; or

iii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. Prior to any facility modifications, additions, or expansions that will increase the plant capacity beyond the permitted flow, the permittee must apply for and obtain proper authorization from the Commission before commencing construction.

c. The permittee must apply for an amendment or renewal at least 180 days prior to expiration of the existing permit in order to continue a permitted activity after the expiration date of the permit. If an application is submitted prior to the expiration date of the permit, the existing permit shall remain in effect until the application is approved, denied, or returned. If the application is returned or denied, authorization to continue such activity shall terminate upon the effective date of the action. If an application is not submitted prior to the expiration date of the permit, the permit shall expire and authorization to continue such activity shall terminate.

d. Prior to accepting or generating wastes which are not described in the permit application or which would result in a significant change in the quantity or quality of the existing discharge, the permittee must report the proposed changes to the Commission. The permittee must apply for a permit amendment reflecting any necessary changes in permit conditions, including effluent limitations for pollutants not identified and limited by this permit.

e. In accordance with the TWC § 26.029(b), after a public hearing, notice of which shall be given to the permittee, the Commission may require the permittee, from time to time, for good cause, in accordance with applicable laws, to conform to new or additional conditions.

f. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under CWA § 307(a) for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition. The permittee shall comply with effluent standards or prohibitions established under CWA § 307(a) for toxic pollutants within the time provided in the regulations that established those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

5. Permit Transfer

a. Prior to any transfer of this permit, Commission approval must be obtained. The Commission shall be notified in writing of any change in control or ownership of

facilities authorized by this permit. Such notification should be sent to the Applications Review and Processing Team (MC 148) of the Water Quality Division.

b. A permit may be transferred only according to the provisions of 30 TAC § 305.64 (relating to Transfer of Permits) and 30 TAC § 50.133 (relating to Executive Director Action on Application or WQMP update).

6. Relationship to Hazardous Waste Activities

This permit does not authorize any activity of hazardous waste storage, processing, or disposal that requires a permit or other authorization pursuant to the Texas Health and Safety Code.

7. Relationship to Water Rights

Disposal of treated effluent by any means other than discharge directly to water in the state must be specifically authorized in this permit and may require a permit pursuant to TWC Chapter 11.

8. Property Rights

A permit does not convey any property rights of any sort, or any exclusive privilege.

9. Permit Enforceability

The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

10. Relationship to Permit Application

The application pursuant to which the permit has been issued is incorporated herein; provided, however, that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

11. Notice of Bankruptcy

a. Each permittee shall notify the Executive Director, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of Title 11 (Bankruptcy) of the United States Code (11 USC) by or against:

i. the permittee;

ii. an entity (as that term is defined in 11 USC, § 101(14)) controlling the permittee or listing the permit or permittee as property of the estate; or

iii. an affiliate (as that term is defined in 11 USC, § 101(2)) of the permittee.

b. This notification must indicate:

i. the name of the permittee and the permit number(s);

ii. the bankruptcy court in which the petition for bankruptcy was filed; and

iii. the date of filing of the petition.

OPERATIONAL REQUIREMENTS

1. The permittee shall at all times ensure that the facility and all of its systems of collection, treatment, and disposal are properly operated and maintained. This includes, but is not limited to, the regular, periodic examination of wastewater solids within the treatment plant by the operator in order to maintain an appropriate quantity and quality of solids inventory as described in the various operator training manuals and according to accepted industry standards for process control. Process control, maintenance, and operations records shall be retained at the facility site, or shall be readily available for review by a TCEQ representative, for a period of three years.

2. Upon request by the Executive Director, the permittee shall take appropriate samples and provide proper analysis in order to demonstrate compliance with Commission rules. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall comply with all applicable provisions of 30 TAC Chapter 312 concerning sewage sludge use and disposal and 30 TAC §§ 319.21 - 319.29 concerning the discharge of certain hazardous metals.

3. Domestic wastewater treatment facilities shall comply with the following provisions:

   a. The permittee shall notify the Municipal Permits Team, Wastewater Permitting Section (MC 148) of the Water Quality Division, in writing, of any facility expansion at least 90 days prior to conducting such activity.

   b. The permittee shall submit a closure plan for review and approval to the Municipal Permits Team, Wastewater Permitting Section (MC 148) of the Water Quality Division, for any closure activity at least 90 days prior to conducting such activity. Closure is the act of permanently taking a waste management unit or treatment facility out of service and includes the permanent removal from service of any pit, tank, pond, lagoon, surface impoundment and/or other treatment unit regulated by this permit.

4. The permittee is responsible for installing prior to plant start-up, and subsequently maintaining, adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures by means of alternate power sources, standby generators, and/or retention of inadequately treated wastewater.

5. Unless otherwise specified, the permittee shall provide a readily accessible sampling point and, where applicable, an effluent flow measuring device or other acceptable means by which effluent flow may be determined.

6. The permittee shall remit an annual water quality fee to the Commission as required by 30 TAC Chapter 21. Failure to pay the fee may result in revocation of this permit under TWC § 7.302(b)(6).

7. Documentation

   For all written notifications to the Commission required of the permittee by this permit, the permittee shall keep and make available a copy of each such notification under the same conditions as self-monitoring data are required to be kept and made available. Except for

information required for TPDES permit applications, effluent data, including effluent data in permits, draft permits and permit applications, and other information specified as not confidential in 30 TAC §§ 1.5(d), any information submitted pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted in the manner prescribed in the application form or by stamping the words confidential business information on each page containing such information. If no claim is made at the time of submission, information may be made available to the public without further notice. If the Commission or Executive Director agrees with the designation of confidentiality, the TCEQ will not provide the information for public inspection unless required by the Texas Attorney General or a court pursuant to an open records request. If the Executive Director does not agree with the designation of confidentiality, the person submitting the information will be notified.

8. Facilities that generate domestic wastewater shall comply with the following provisions; domestic wastewater treatment facilities at permitted industrial sites are excluded.

   a. Whenever flow measurements for any domestic sewage treatment facility reach 75% of the permitted daily average or annual average flow for three consecutive months, the permittee must initiate engineering and financial planning for expansion and/or upgrading of the domestic wastewater treatment and/or collection facilities. Whenever the flow reaches 90% of the permitted daily average or annual average flow for three consecutive months, the permittee shall obtain necessary authorization from the Commission to commence construction of the necessary additional treatment and/or collection facilities. In the case of a domestic wastewater treatment facility which reaches 75% of the permitted daily average or annual average flow for three consecutive months, and the planned population to be served or the quantity of waste produced is not expected to exceed the design limitations of the treatment facility, the permittee shall submit an engineering report supporting this claim to the Executive Director of the Commission.

      If in the judgment of the Executive Director the population to be served will not cause permit noncompliance, then the requirement of this section may be waived. To be effective, any waiver must be in writing and signed by the Director of the Enforcement Division (MC 219) of the Commission, and such waiver of these requirements will be reviewed upon expiration of the existing permit; however, any such waiver shall not be interpreted as condoning or excusing any violation of any permit parameter.

   b. The plans and specifications for domestic sewage collection and treatment works associated with any domestic permit must be approved by the Commission and failure to secure approval before commencing construction of such works or making a discharge is a violation of this permit and each day is an additional violation until approval has been secured.

   c. Permits for domestic wastewater treatment plants are granted subject to the policy of the Commission to encourage the development of area-wide waste collection, treatment, and disposal systems. The Commission reserves the right to amend any domestic wastewater permit in accordance with applicable procedural requirements to require the system covered by this permit to be integrated into an area-wide system, should such be developed; to require the delivery of the wastes authorized to be collected in, treated by or discharged from said system, to such area-wide system; or to amend this permit in any other particular to effectuate the Commission's policy. Such amendments may be

made when the changes required are advisable for water quality control purposes and are feasible on the basis of waste treatment technology, engineering, financial, and related considerations existing at the time the changes are required, exclusive of the loss of investment in or revenues from any then existing or proposed waste collection, treatment or disposal system.

9. Domestic wastewater treatment plants shall be operated and maintained by sewage plant operators holding a valid certificate of competency at the required level as defined in 30 TAC Chapter 30.

10. For Publicly Owned Treatment Works (POTWs), the 30-day average (or monthly average) percent removal for BOD and TSS shall not be less than 85%, unless otherwise authorized by this permit.

11. Facilities that generate industrial solid waste as defined in 30 TAC § 335.1 shall comply with these provisions:

    a. Any solid waste, as defined in 30 TAC § 335.1 (including but not limited to such wastes as garbage, refuse, sludge from a waste treatment, water supply treatment plant or air pollution control facility, discarded materials, discarded materials to be recycled, whether the waste is solid, liquid, or semisolid), generated by the permittee during the management and treatment of wastewater, must be managed in accordance with all applicable provisions of 30 TAC Chapter 335, relating to Industrial Solid Waste Management.

    b. Industrial wastewater that is being collected, accumulated, stored, or processed before discharge through any final discharge outfall, specified by this permit, is considered to be industrial solid waste until the wastewater passes through the actual point source discharge and must be managed in accordance with all applicable provisions of 30 TAC Chapter 335.

    c. The permittee shall provide written notification, pursuant to the requirements of 30 TAC § 335.8(b)(1), to the Corrective Action Section (MC 221) of the Remediation Division informing the Commission of any closure activity involving an Industrial Solid Waste Management Unit, at least 90 days prior to conducting such an activity.

    d. Construction of any industrial solid waste management unit requires the prior written notification of the proposed activity to the Registration and Reporting Section (MC 129) of the Permitting and Registration Support Division. No person shall dispose of industrial solid waste, including sludge or other solids from wastewater treatment processes, prior to fulfilling the deed recordation requirements of 30 TAC § 335.5.

    e. The term "industrial solid waste management unit" means a landfill, surface impoundment, waste-pile, industrial furnace, incinerator, cement kiln, injection well, container, drum, salt dome waste containment cavern, or any other structure vessel, appurtenance, or other improvement on land used to manage industrial solid waste.

    f. The permittee shall keep management records for all sludge (or other waste) removed from any wastewater treatment process. These records shall fulfill all applicable requirements of 30 TAC § 335 and must include the following, as it pertains to wastewater treatment and discharge:

i. Volume of waste and date(s) generated from treatment process;
ii. Volume of waste disposed of on-site or shipped off-site;
iii. Date(s) of disposal;
iv. Identity of hauler or transporter;
v. Location of disposal site; and
vi. Method of final disposal.

The above records shall be maintained on a monthly basis. The records shall be retained at the facility site, or shall be readily available for review by authorized representatives of the TCEQ for at least five years.

12. For industrial facilities to which the requirements of 30 TAC § 335 do not apply, sludge and solid wastes, including tank cleaning and contaminated solids for disposal, shall be disposed of in accordance with THSC § 361.

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SLUDGE PROVISIONS

The permittee is authorized to dispose of sludge only at a Texas Commission on Environmental Quality (TCEQ) authorized land application site, co-disposal landfill, wastewater treatment facility, or facility that further processes sludge. **The disposal of sludge by land application on property owned, leased or under the direct control of the permittee is a violation of the permit unless the site is authorized with the TCEQ. This provision does not authorize Distribution and Marketing of Class A or Class AB Sewage Sludge. This provision does not authorize the permittee to land apply sludge on property owned, leased or under the direct control of the permittee.**

SECTION I. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE LAND APPLICATION

A. General Requirements

1. The permittee shall handle and dispose of sewage sludge in accordance with 30 TAC § 312 and all other applicable state and federal regulations in a manner that protects public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants that may be present in the sludge.

2. In all cases, if the person (permit holder) who prepares the sewage sludge supplies the sewage sludge to another person for land application use or to the owner or lease holder of the land, the permit holder shall provide necessary information to the parties who receive the sludge to assure compliance with these regulations.

3. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

B. Testing Requirements

1. Sewage sludge shall be tested once during the term of this permit in accordance with the method specified in both 40 CFR Part 261, Appendix II and 40 CFR Part 268, Appendix I [Toxicity Characteristic Leaching Procedure (TCLP)] or other method that receives the prior approval of the TCEQ for the contaminants listed in 40 CFR Part 261.24, Table 1. Sewage sludge failing this test shall be managed according to RCRA standards for generators of hazardous waste, and the waste's disposition must be in accordance with all applicable requirements for hazardous waste processing, storage, or disposal. Following failure of any TCLP test, the management or disposal of sewage sludge at a facility other than an authorized hazardous waste processing, storage, or disposal facility shall be prohibited until such time as the permittee can demonstrate the sewage sludge no longer exhibits the hazardous waste toxicity characteristics (as demonstrated by the results of the TCLP tests). A written report shall be provided to both the TCEQ Registration and Reporting Section (MC 129) of the Permitting and Registration Support Division and the Regional Director (MC Region 12) within seven (7) days after failing the TCLP Test.

The report shall contain test results, certification that unauthorized waste management has stopped and a summary of alternative disposal plans that comply with RCRA standards for the management of hazardous waste. The report shall be addressed to: Director, Permitting and Registration Support Division (MC 129), Texas Commission on Environmental Quality, P.O. Box 13087, Austin, Texas 78711-3087. In addition, the permittee shall prepare an annual report on the results of all sludge toxicity testing. This annual report shall be submitted to the TCEQ Regional Office (MC Region 12) and the Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30th of each year. Effective September 1, 2020, the permittee must submit this annual report using the online electronic reporting system available through the TCEQ website unless the permittee requests and obtains an electronic reporting waiver.

2. Sewage sludge shall not be applied to the land if the concentration of the pollutants exceeds the pollutant concentration criteria in Table 1. The frequency of testing for pollutants in Table 1 is found in Section I.C. of this permit.

TABLE 1

Pollutant	Ceiling Concentration (Milligrams per kilogram)*
Arsenic	75
Cadmium	85
Chromium	3000
Copper	4300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
PCBs	49
Selenium	100
Zinc	7500

* Dry weight basis

3. Pathogen Control

All sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site must be treated by one of the following methods to ensure that the sludge meets either the Class A, Class AB or Class B pathogen requirements.

a. For sewage sludge to be classified as Class A with respect to pathogens, the density of fecal coliform in the sewage sludge must be less than 1,000 most probable number (MPN) per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge must be less than three MPN per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed. In addition, one of the alternatives listed below must be met:

Alternative 1 - The temperature of the sewage sludge that is used or disposed shall be maintained at or above a specific value for a period of time. See 30 TAC § 312.82(a)(2)(A) for specific information;

Alternative 5 (PFRP) - Sewage sludge that is used or disposed of must be treated in one of the Processes to Further Reduce Pathogens (PFRP) described in 40 CFR Part 503, Appendix B. PFRP include composting, heat drying, heat treatment, and thermophilic aerobic digestion; or

Alternative 6 (PFRP Equivalent) - Sewage sludge that is used or disposed of must be treated in a process that has been approved by the U. S. Environmental Protection Agency as being equivalent to those in Alternative 5.

b. For sewage sludge to be classified as Class AB with respect to pathogens, the density of fecal coliform in the sewage sludge must be less than 1,000 MPN per gram of total solids (dry weight basis), or the density of *Salmonella* sp. bacteria in the sewage sludge be less than three MPN per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed. In addition, one of the alternatives listed below must be met:

Alternative 2 - The pH of the sewage sludge that is used or disposed shall be raised to above 12 std. units and shall remain above 12 std. units for 72 hours.

The temperature of the sewage sludge shall be above 52° Celsius for 12 hours or longer during the period that the pH of the sewage sludge is above 12 std. units.

At the end of the 72-hour period during which the pH of the sewage sludge is above 12 std. units, the sewage sludge shall be air dried to achieve a percent solids in the sewage sludge greater than 50%; or

Alternative 3 - The sewage sludge shall be analyzed for enteric viruses prior to pathogen treatment. The limit for enteric viruses is less than one Plaque-forming Unit per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 30 TAC § 312.82(a)(2)(C)(i-iii) for specific information. The sewage sludge shall be analyzed for viable helminth ova prior to pathogen treatment. The limit for viable helminth ova is less than one per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 30 TAC § 312.82(a)(2)(C)(iv-vi) for specific information; or

Alternative 4 - The density of enteric viruses in the sewage sludge shall be less than one Plaque-forming Unit per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed. The density of viable helminth ova in the sewage sludge shall be less than one per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed.

c. Sewage sludge that meets the requirements of Class AB sewage sludge may be classified a Class A sewage sludge if a variance request is submitted in writing that is supported by substantial documentation demonstrating equivalent methods for reducing odors and written approval is granted by the executive director. The executive director may deny the variance request or revoke that approved variance if it is determined that the variance may potentially endanger human health or the environment, or create nuisance odor conditions.

d. Three alternatives are available to demonstrate compliance with Class B criteria for

sewage sludge.

Alternative 1

i. A minimum of seven random samples of the sewage sludge shall be collected within 48 hours of the time the sewage sludge is used or disposed of during each monitoring episode for the sewage sludge.

ii. The geometric mean of the density of fecal coliform in the samples collected shall be less than either 2,000,000 MPN per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

Alternative 2 - Sewage sludge that is used or disposed of shall be treated in one of the Processes to Significantly Reduce Pathogens (PSRP) described in 40 CFR Part 503, Appendix B, so long as all of the following requirements are met by the generator of the sewage sludge.

i. Prior to use or disposal, all the sewage sludge must have been generated from a single location, except as provided in paragraph v. below;

ii. An independent Texas Licensed Professional Engineer must make a certification to the generator of a sewage sludge that the wastewater treatment facility generating the sewage sludge is designed to achieve one of the PSRP at the permitted design loading of the facility. The certification need only be repeated if the design loading of the facility is increased. The certification shall include a statement indicating the design meets all the applicable standards specified in Appendix B of 40 CFR Part 503;

iii. Prior to any off-site transportation or on-site use or disposal of any sewage sludge generated at a wastewater treatment facility, the chief certified operator of the wastewater treatment facility or other responsible official who manages the processes to significantly reduce pathogens at the wastewater treatment facility for the permittee, shall certify that the sewage sludge underwent at least the minimum operational requirements necessary in order to meet one of the PSRP. The acceptable processes and the minimum operational and record keeping requirements shall be in accordance with established U.S. Environmental Protection Agency final guidance;

iv. All certification records and operational records describing how the requirements of this paragraph were met shall be kept by the generator for a minimum of three years and be available for inspection by commission staff for review; and

v. If the sewage sludge is generated from a mixture of sources, resulting from a person who prepares sewage sludge from more than one wastewater treatment facility, the resulting derived product shall meet one of the PSRP, and shall meet the certification, operation, and record keeping requirements of this paragraph.

Alternative 3 - Sewage sludge shall be treated in an equivalent process that has been approved by the U.S. Environmental Protection Agency, so long as all of the following requirements are met by the generator of the sewage sludge.

i. Prior to use or disposal, all the sewage sludge must have been generated from a

single location, except as provided in paragraph v. below;

ii. Prior to any off-site transportation or on-site use or disposal of any sewage sludge generated at a wastewater treatment facility, the chief certified operator of the wastewater treatment facility or other responsible official who manages the processes to significantly reduce pathogens at the wastewater treatment facility for the permittee, shall certify that the sewage sludge underwent at least the minimum operational requirements necessary in order to meet one of the PSRP. The acceptable processes and the minimum operational and record keeping requirements shall be in accordance with established U.S. Environmental Protection Agency final guidance;

iii. All certification records and operational records describing how the requirements of this paragraph were met shall be kept by the generator for a minimum of three years and be available for inspection by commission staff for review;

iv. The Executive Director will accept from the U.S. Environmental Protection Agency a finding of equivalency to the defined PSRP; and

v. If the sewage sludge is generated from a mixture of sources resulting from a person who prepares sewage sludge from more than one wastewater treatment facility, the resulting derived product shall meet one of the Processes to Significantly Reduce Pathogens, and shall meet the certification, operation, and record keeping requirements of this paragraph.

In addition to the Alternatives 1 – 3, the following site restrictions must be met if Class B sludge is land applied:

i. Food crops with harvested parts that touch the sewage sludge/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of sewage sludge.

ii. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of sewage sludge when the sewage sludge remains on the land surface for 4 months or longer prior to incorporation into the soil.

iii. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than 4 months prior to incorporation into the soil.

iv. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge.

v. Animals shall not be allowed to graze on the land for 30 days after application of sewage sludge.

vi. Turf grown on land where sewage sludge is applied shall not be harvested for 1 year after application of the sewage sludge when the harvested turf is placed on either land with a high potential for public exposure or a lawn.

vii. Public access to land with a high potential for public exposure shall be restricted for 1 year after application of sewage sludge.

viii. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge.

ix. Land application of sludge shall be in accordance with the buffer zone requirements found in 30 TAC § 312.44.

4. Vector Attraction Reduction Requirements

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by one of the following Alternatives 1 through 10 for vector attraction reduction.

Alternative 1 - The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38%.

Alternative 2 - If Alternative 1 cannot be met for an anaerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30° and 37° Celsius. Volatile solids must be reduced by less than 17% to demonstrate compliance.

Alternative 3 - If Alternative 1 cannot be met for an aerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge with percent solids of two percent or less aerobically in the laboratory in a bench-scale unit for 30 additional days at 20° Celsius. Volatile solids must be reduced by less than 15% to demonstrate compliance.

Alternative 4 - The specific oxygen uptake rate (SOUR) for sewage sludge treated in an aerobic process shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis) at a temperature of 20° Celsius.

Alternative 5 - Sewage sludge shall be treated in an aerobic process for 14 days or longer. During that time, the temperature of the sewage sludge shall be higher than 40° Celsius and the average temperature of the sewage sludge shall be higher than 45° Celsius.

Alternative 6 - The pH of sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali shall remain at 12 or higher for two hours and then remain at a pH of 11.5 or higher for an additional 22 hours at the time the sewage sludge is prepared for sale or given away in a bag or other container.

Alternative 7 - The percent solids of sewage sludge that does not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 75% based on the moisture content and total solids prior to mixing with other materials. Unstabilized solids are

defined as organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Alternative 8 - The percent solids of sewage sludge that contains unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90% based on the moisture content and total solids prior to mixing with other materials at the time the sludge is used. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Alternative 9 -

i. Sewage sludge shall be injected below the surface of the land.

ii. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.

iii. When sewage sludge that is injected below the surface of the land is Class A or Class AB with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen treatment process.

Alternative 10-

i. Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land.

ii. When sewage sludge that is incorporated into the soil is Class A or Class AB with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.

C. Monitoring Requirements

Toxicity Characteristic Leaching Procedure (TCLP) Test	- once during the term of this permit
PCBs	- once during the term of this permit

All metal constituents and fecal coliform or *Salmonella* sp. bacteria shall be monitored at the appropriate frequency shown below, pursuant to 30 TAC § 312.46(a)(1):

Amount of sewage sludge (*) metric tons per 365-day period	Monitoring Frequency
0 to less than 290	Once/Year
290 to less than 1,500	Once/Quarter
1,500 to less than 15,000	Once/Two Months
15,000 or greater	Once/Month

(*) *The amount of bulk sewage sludge applied to the land (dry wt. basis).*

Representative samples of sewage sludge shall be collected and analyzed in accordance with the methods referenced in 30 TAC § 312.7

Identify each of the analytic methods used by the facility to analyze enteric viruses, fecal coliforms, helminth ova, *Salmonella* sp., and other regulated parameters.

Identify in the following categories (as applicable) the sewage sludge treatment process or processes at the facility: preliminary operations (e.g., sludge grinding and degritting), thickening (concentration), stabilization, anaerobic digestion, aerobic digestion, composting, conditioning, disinfection (e.g., beta ray irradiation, gamma ray irradiation, pasteurization), dewatering (e.g., centrifugation, sludge drying beds, sludge lagoons), heat drying, thermal reduction, and methane or biogas capture and recovery.

Identify the nature of material generated by the facility (such as a biosolid for beneficial use or land-farming, or sewage sludge for disposal at a monofill) and whether the material is ultimately conveyed off-site in bulk or in bags.

SECTION II. REQUIREMENTS SPECIFIC TO BULK SEWAGE SLUDGE FOR APPLICATION TO THE LAND MEETING CLASS A, CLASS AB or B PATHOGEN REDUCTION AND THE CUMULATIVE LOADING RATES IN TABLE 2, OR CLASS B PATHOGEN REDUCTION AND THE POLLUTANT CONCENTRATIONS IN TABLE 3

For those permittees meeting Class A, Class AB or B pathogen reduction requirements and that meet the cumulative loading rates in Table 2 below, or the Class B pathogen reduction requirements and contain concentrations of pollutants below listed in Table 3, the following conditions apply:

A. Pollutant Limits

Table 2

Pollutant	Cumulative Pollutant Loading Rate (pounds per acre)*
Arsenic	36
Cadmium	35
Chromium	2677
Copper	1339
Lead	268
Mercury	15
Molybdenum	Report Only
Nickel	375
Selenium	89
Zinc	2500

Table 3

Pollutant	Monthly Average Concentration (milligrams per kilogram)*
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Molybdenum	Report Only
Nickel	420
Selenium	36
Zinc	2800

*Dry weight basis

B. Pathogen Control

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, a reclamation site, shall be treated by either Class A, Class AB or Class B pathogen reduction requirements as defined above in Section I.B.3.

C. Management Practices

1. Bulk sewage sludge shall not be applied to agricultural land, forest, a public contact site, or a reclamation site that is flooded, frozen, or snow-covered so that the bulk sewage sludge enters a wetland or other waters in the State.

2. Bulk sewage sludge not meeting Class A requirements shall be land applied in a manner which complies with Applicability in accordance with 30 TAC §312.41 and the Management Requirements in accordance with 30 TAC § 312.44.

3. Bulk sewage sludge shall be applied at or below the agronomic rate of the cover crop.

4. An information sheet shall be provided to the person who receives bulk sewage sludge sold or given away. The information sheet shall contain the following information:

   a. The name and address of the person who prepared the sewage sludge that is sold or given away in a bag or other container for application to the land.

   b. A statement that application of the sewage sludge to the land is prohibited except in accordance with the instruction on the label or information sheet.

   c. The annual whole sludge application rate for the sewage sludge application rate for the sewage sludge that does not cause any of the cumulative pollutant loading rates in Table 2 above to be exceeded, unless the pollutant concentrations in Table 3 found in Section II above are met.

D. Notification Requirements

1. If bulk sewage sludge is applied to land in a State other than Texas, written notice shall be provided prior to the initial land application to the permitting authority for the State in which the bulk sewage sludge is proposed to be applied. The notice shall include:

   a. The location, by street address, and specific latitude and longitude, of each land application site.

   b. The approximate time period bulk sewage sludge will be applied to the site.

   c. The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if appropriate) for the person who will apply the bulk sewage sludge.

2. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

E. Record keeping Requirements

The sludge documents will be retained at the facility site and/or shall be readily available for review by a TCEQ representative. The person who prepares bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information at

the facility site and/or shall be readily available for review by a TCEQ representative for a period of five years. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for record keeping found in 30 TAC § 312.47 for persons who land apply.

1. The concentration (mg/kg) in the sludge of each pollutant listed in Table 3 above and the applicable pollutant concentration criteria (mg/kg), or the applicable cumulative pollutant loading rate and the applicable cumulative pollutant loading rate limit (lbs/ac) listed in Table 2 above.

2. A description of how the pathogen reduction requirements are met (including site restrictions for Class AB and Class B sludge, if applicable).

3. A description of how the vector attraction reduction requirements are met.

4. A description of how the management practices listed above in Section II.C are being met.

5. The following certification statement:

   "I certify, under penalty of law, that the applicable pathogen requirements in 30 TAC § 312.82(a) or (b) and the vector attraction reduction requirements in 30 TAC § 312.83(b) have been met for each site on which bulk sewage sludge is applied. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the management practices have been met. I am aware that there are significant penalties for false certification including fine and imprisonment."

6. The recommended agronomic loading rate from the references listed in Section II.C.3. above, as well as the actual agronomic loading rate shall be retained. The person who applies bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information at the facility site and/or shall be readily available for review by a TCEQ representative indefinitely. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for record keeping found in 30 TAC § 312.47 for persons who land apply:

   a. A certification statement that all applicable requirements (specifically listed) have been met, and that the permittee understands that there are significant penalties for false certification including fine and imprisonment. See 30 TAC § 312.47(a)(4)(A)(ii) or 30 TAC § 312.47(a)(5)(A)(ii), as applicable, and to the permittee's specific sludge treatment activities.

   b. The location, by street address, and specific latitude and longitude, of each site on which sludge is applied.

   c. The number of acres in each site on which bulk sludge is applied.

   d. The date and time sludge is applied to each site.

e. The cumulative amount of each pollutant in pounds/acre listed in Table 2 applied to each site.

f. The total amount of sludge applied to each site in dry tons.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

F. Reporting Requirements

The permittee shall report annually to the TCEQ Regional Office (MC Region 12) and Compliance Monitoring Team (MC 224) of the Enforcement Division, by September 30th of each year the following information. Effective September 1, 2020, the permittee must submit this annual report using the online electronic reporting system available through the TCEQ website unless the permittee requests and obtains an electronic reporting waiver.

1. Identify in the following categories (as applicable) the sewage sludge treatment process or processes at the facility: preliminary operations (e.g., sludge grinding and degritting), thickening (concentration), stabilization, anaerobic digestion, aerobic digestion, composting, conditioning, disinfection (e.g., beta ray irradiation, gamma ray irradiation, pasteurization), dewatering (e.g., centrifugation, sludge drying beds, sludge lagoons), heat drying, thermal reduction, and methane or biogas capture and recovery.

2. Identify the nature of material generated by the facility (such as a biosolid for beneficial use or land-farming, or sewage sludge for disposal at a monofill) and whether the material is ultimately conveyed off-site in bulk or in bags.

3. Results of tests performed for pollutants found in either Table 2 or 3 as appropriate for the permittee's land application practices.

4. The frequency of monitoring listed in Section I.C. that applies to the permittee.

5. Toxicity Characteristic Leaching Procedure (TCLP) results.

6. PCB concentration in sludge in mg/kg.

7. Identity of hauler(s) and TCEQ transporter number.

8. Date(s) of transport.

9. Texas Commission on Environmental Quality registration number, if applicable.

10. Amount of sludge disposal dry weight (lbs/acre) at each disposal site.

11. The concentration (mg/kg) in the sludge of each pollutant listed in Table 1 (defined as a monthly average) as well as the applicable pollutant concentration criteria (mg/kg) listed in Table 3 above, or the applicable pollutant loading rate limit (lbs/acre) listed in Table 2 above if it exceeds 90% of the limit.

12. Level of pathogen reduction achieved (Class A, Class AB or Class B).

13. Alternative used as listed in Section I.B.3.(a. or b.). Alternatives describe how the pathogen reduction requirements are met. If Class B sludge, include information on how site restrictions were met.

14. Identify each of the analytic methods used by the facility to analyze enteric viruses, fecal coliforms, helminth ova, *Salmonella* sp., and other regulated parameters.

15. Vector attraction reduction alternative used as listed in Section I.B.4.

16. Amount of sludge transported in dry tons/year.

17. The certification statement listed in either 30 TAC § 312.47(a)(4)(A)(ii) or 30 TAC § 312.47(a)(5)(A)(ii) as applicable to the permittee's sludge treatment activities, shall be attached to the annual reporting form.

18. When the amount of any pollutant applied to the land exceeds 90% of the cumulative pollutant loading rate for that pollutant, as described in Table 2, the permittee shall report the following information as an attachment to the annual reporting form.

    a. The location, by street address, and specific latitude and longitude.

    b. The number of acres in each site on which bulk sewage sludge is applied.

    c. The date and time bulk sewage sludge is applied to each site.

    d. The cumulative amount of each pollutant (i.e., pounds/acre) listed in Table 2 in the bulk sewage sludge applied to each site.

    e. The amount of sewage sludge (i.e., dry tons) applied to each site.

    The above records shall be maintained on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

SECTION III. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE DISPOSED IN A MUNICIPAL SOLID WASTE LANDFILL

A. The permittee shall handle and dispose of sewage sludge in accordance with 30 TAC § 330 and all other applicable state and federal regulations to protect public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants that may be present. The permittee shall ensure that the sewage sludge meets the requirements in 30 TAC § 330 concerning the quality of the sludge disposed in a municipal solid waste landfill.

B. If the permittee generates sewage sludge and supplies that sewage sludge to the owner or operator of a municipal solid waste landfill (MSWLF) for disposal, the permittee shall provide to the owner or operator of the MSWLF appropriate information needed to be in compliance with the provisions of this permit.

C. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

D. Sewage sludge shall be tested once during the term of this permit in accordance with the method specified in both 40 CFR Part 261, Appendix II and 40 CFR Part 268, Appendix I (Toxicity Characteristic Leaching Procedure) or other method, which receives the prior approval of the TCEQ for contaminants listed in Table 1 of 40 CFR § 261.24. Sewage sludge failing this test shall be managed according to RCRA standards for generators of hazardous waste, and the waste's disposition must be in accordance with all applicable requirements for hazardous waste processing, storage, or disposal.

   Following failure of any TCLP test, the management or disposal of sewage sludge at a facility other than an authorized hazardous waste processing, storage, or disposal facility shall be prohibited until such time as the permittee can demonstrate the sewage sludge no longer exhibits the hazardous waste toxicity characteristics (as demonstrated by the results of the TCLP tests). A written report shall be provided to both the TCEQ Registration and Reporting Section (MC 129) of the Permitting and Registration Support Division and the Regional Director (MC Region 12) of the appropriate TCEQ field office within 7 days after failing the TCLP Test.

   The report shall contain test results, certification that unauthorized waste management has stopped and a summary of alternative disposal plans that comply with RCRA standards for the management of hazardous waste. The report shall be addressed to: Director, Permitting and Registration Support Division (MC 129), Texas Commission on Environmental Quality, P. O. Box 13087, Austin, Texas 78711-3087. In addition, the permittee shall prepare an annual report on the results of all sludge toxicity testing. This annual report shall be submitted to the TCEQ Regional Office (MC Region 12) and the Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30 of each year.

E. Sewage sludge shall be tested as needed, in accordance with the requirements of 30 TAC Chapter 330.

F. Record keeping Requirements

   The permittee shall develop the following information and shall retain the information for five years.

1. The description (including procedures followed and the results) of all liquid Paint Filter Tests performed.

2. The description (including procedures followed and results) of all TCLP tests performed.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

G. Reporting Requirements

The permittee shall report annually to the TCEQ Regional Office (MC Region 12) and Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30th of each year the following information. Effective September 1, 2020, the permittee must submit this annual report using the online electronic reporting system available through the TCEQ website unless the permittee requests and obtains an electronic reporting waiver.

1. Identify in the following categories (as applicable) the sewage sludge treatment process or processes at the facility: preliminary operations (e.g., sludge grinding and degritting), thickening (concentration), stabilization, anaerobic digestion, aerobic digestion, composting, conditioning, disinfection (e.g., beta ray irradiation, gamma ray irradiation, pasteurization), dewatering (e.g., centrifugation, sludge drying beds, sludge lagoons), heat drying, thermal reduction, and methane or biogas capture and recovery.

2. Toxicity Characteristic Leaching Procedure (TCLP) results.

3. Annual sludge production in dry tons/year.

4. Amount of sludge disposed in a municipal solid waste landfill in dry tons/year.

5. Amount of sludge transported interstate in dry tons/year.

6. A certification that the sewage sludge meets the requirements of 30 TAC § 330 concerning the quality of the sludge disposed in a municipal solid waste landfill.

7. Identity of hauler(s) and transporter registration number.

8. Owner of disposal site(s).

9. Location of disposal site(s).

10. Date(s) of disposal.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

SECTION IV. REQUIREMENTS APPLYING TO SLUDGE TRANSPORTED TO ANOTHER FACILITY FOR FURTHER PROCESSING

These provisions apply to sludge that is transported to another wastewater treatment facility or facility that further processes sludge. These provisions are intended to allow transport of sludge to facilities that have been authorized to accept sludge. These provisions do not limit the ability of the receiving facility to determine whether to accept the sludge, nor do they limit the ability of the receiving facility to request additional testing or documentation.

A. General Requirements

1. The permittee shall handle and dispose of sewage sludge in accordance with 30 TAC Chapter 312 and all other applicable state and federal regulations in a manner that protects public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants that may be present in the sludge.

2. Sludge may only be transported using a registered transporter or using an approved pipeline.

B. Record Keeping Requirements

1. For sludge transported by an approved pipeline, the permittee must maintain records of the following:

   a. the amount of sludge transported;

   b. the date of transport;

   c. the name and TCEQ permit number of the receiving facility or facilities;

   d. the location of the receiving facility or facilities;

   e. the name and TCEQ permit number of the facility that generated the waste; and

   f. copy of the written agreement between the permittee and the receiving facility to accept sludge.

2. For sludge transported by a registered transporter, the permittee must maintain records of the completed trip tickets in accordance with 30 TAC § 312.145(a)(1)-(7) and amount of sludge transported.

3. The above records shall be maintained on-site on a monthly basis and shall be made available to the TCEQ upon request. These records shall be retained for at least five years.

C. Reporting Requirements

The permittee shall report the following information annually to the TCEQ Regional Office (MC Region 12) and Compliance Monitoring Team (MC 224) of the Enforcement Division, by September 30th of each year. Effective September 1, 2020, the permittee must submit this annual report using the online electronic reporting system available through the TCEQ website unless the permittee requests and obtains an electronic reporting waiver.

1. Identify in the following categories (as applicable) the sewage sludge treatment process or processes at the facility: preliminary operations (e.g., sludge grinding and degritting), thickening (concentration), stabilization, anaerobic digestion, aerobic digestion, composting, conditioning, disinfection (e.g., beta ray irradiation, gamma ray irradiation, pasteurization), dewatering (e.g., centrifugation, sludge drying beds, sludge lagoons), heat drying, thermal reduction, and methane or biogas capture and recovery.
2. the annual sludge production;
3. the amount of sludge transported;
4. the owner of each receiving facility;
5. the location of each receiving facility; and
6. the date(s) of disposal at each receiving facility.

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OTHER REQUIREMENTS

1. The permittee shall employ or contract with one or more licensed wastewater treatment facility operators or wastewater system operations companies holding a valid license or registration according to the requirements of 30 TAC Chapter 30, Occupational Licenses and Registrations, and in particular 30 TAC Chapter 30, Subchapter J, Wastewater Operators and Operations Companies.

   This Category D facility in the Interim phase and Category C facility in the Final phase must be operated by a chief operator or an operator holding a Category D license or higher in the Interim phase and Category C license or higher in the Final phase. The facility must be operated a minimum of five days per week by the licensed chief operator or an operator holding the required level of license or higher. The licensed chief operator or operator holding the required level of license or higher must be available by telephone or pager seven days per week. Where shift operation of the wastewater treatment facility is necessary, each shift which does not have the on-site supervision of the licensed chief operator must be supervised by an operator in charge who is licensed not less than one level below the category for the facility.

2. The facility is not located in the Coastal Management Program boundary.

3. The permittee shall comply with the requirements of 30 TAC § 309.13(a) through (d). In addition, by ownership of the required buffer zone area, the permittee shall comply with the requirements of 30 TAC § 309.13(e).

4. The permittee shall provide facilities for the protection of its wastewater treatment facility from a 100-year flood.

5. In accordance with 30 TAC § 319.9, a permittee that has at least twelve months of uninterrupted compliance with its bacteria limit may notify the commission in writing of its compliance and request a less frequent measurement schedule. To request a less frequent schedule, the permittee shall submit a written request to the TCEQ Wastewater Permitting Section (MC 148) for each phase that includes a different monitoring frequency. The request must contain all of the reported bacteria values (Daily Avg. and Daily Max/Single Grab) for the twelve consecutive months immediately prior to the request. If the Executive Director finds that a less frequent measurement schedule is protective of human health and the environment, the permittee may be given a less frequent measurement schedule. For this permit, 1/month may be reduced to 1/quarter in for both phases. **A violation of any bacteria limit by a facility that has been granted a less frequent measurement schedule will require the permittee to return to the standard frequency schedule and submit written notice to the TCEQ Wastewater Permitting Section (MC 148).** The permittee may not apply for another reduction in measurement frequency for at least 24 months from the date of the last violation. The Executive Director may establish a more frequent measurement schedule if necessary to protect human health or the environment.

6. Prior to construction of the Final phase of the treatment facilities, the permittee shall submit to the TCEQ Wastewater Permitting Section (MC 148) a summary transmittal letter in accordance with the requirements in 30 TAC § 217.6(d). If requested by the Wastewater Permitting Section, the permittee shall submit plans, specifications, and a final engineering design report which comply with 30 TAC Chapter 217, Design Criteria for Domestic

Wastewater Systems. The permittee shall clearly show how the treatment system will meet the effluent limitations required on Page 2a of this permit. A copy of the summary transmittal letter shall be available at the plant site for inspection by authorized representatives of the TCEQ.

7. The permittee shall notify the TCEQ Regional Office (MC Region 12) and the Applications Review and Processing Team (MC 148) of the Water Quality Division, in writing at least forty-five (45) days prior to the completion of the Final phase facilities on Notification of Completion Form 20007.

CONTRIBUTING INDUSTRIES AND PRETREATMENT REQUIREMENTS

1. The following pollutants may not be introduced into the treatment facility:

   a. Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW), including, but not limited to, waste streams with a closed-cup flash point of less than 140° Fahrenheit (60° Celsius) using the test methods specified in 40 CFR § 261.21;

   b. Pollutants which will cause corrosive structural damage to the POTW, but in no case shall there be discharges with a pH lower than 5.0 standard units, unless the works are specifically designed to accommodate such discharges;

   c. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW, resulting in Interference;

   d. Any pollutant, including oxygen-demanding pollutants (e.g., biochemical oxygen demand or BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW;

   e. Heat in amounts which will inhibit biological activity in the POTW, resulting in Interference, but in no case shall there be heat in such quantities that the temperature at the POTW treatment plant exceeds 104° Fahrenheit (40° Celsius) unless the Executive Director, upon request of the POTW, approves alternate temperature limits;

   f. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause Interference or Pass Through;

   g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and

   h. Any trucked or hauled pollutants except at discharge points designated by the POTW.

2. The permittee shall require any indirect discharger to the treatment works to comply with the reporting requirements of Sections 204(b), 307, and 308 of the Clean Water Act, including any requirements established under 40 CFR Part 403 *[rev. Federal Register/ Vol. 70/ No. 198/ Friday, October 14, 2005/ Rules and Regulations, pages 60134-60798].*

3. The permittee shall provide adequate notification to the Executive Director, care of the Wastewater Permitting Section (MC 148) of the Water Quality Division, within 30 days subsequent to the permittee's knowledge of either of the following:

   a. Any new introduction of pollutants into the treatment works from an indirect discharger which would be subject to Sections 301 and 306 of the Clean Water Act if it were directly discharging those pollutants; and

   b. Any substantial change in the volume or character of pollutants being introduced into the treatment works by a source introducing pollutants into the treatment works at the time of issuance of the permit.

   Any notice shall include information on the quality and quantity of effluent to be introduced into the treatment works and any anticipated impact of the change on the quality or quantity of effluent to be discharged from the POTW.

Revised July 2007

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APPENDIX H – Wallis Budget and Expenses Calculations

Projected Revenues and Expenses Spreadsheet						
Year	**0**	**1**	**2**	**3**	**4**	**5**
Inflation		2.20%	2.20%	2.20%	2.20%	2.20%
Growth (based on 2010 census or estimated projections)		0.31%	0.31%	0.31%	0.31%	0.31%
CAPITAL EXPENDITURES BUDGET:						
Total Revenues	$695,750.00	$697,906.83	$700,070.34	$702,240.55	$704,417.50	$706,601.19
Total Expenses (from Budget)	$674,134.40	$688,965.36	$704,122.59	$719,613.29	$735,444.78	$751,624.57
Current Year Net Income	$21,615.60	$8,941.47	($4,052.26)	($17,372.74)	($31,027.28)	($45,023.38)
Reserve Account (beginning of year carry over)	$0.00	$82,615.60	$91,557.07	$87,504.81	$70,132.07	$39,104.79
Secured Funding	$61,000.00	$0.00	$0.00	$0.00	$0.00	$0.00
End of Year Reserves	$82,615.60	$91,557.07	$87,504.81	$70,132.07	$39,104.79	($5,918.59)
Projected Savings Needed for Capital Expenses		$958,666.67	$856,667.00	$856,666.00	$297,268.00	$297,267.00
Shortfall in Reserved Savings		**($867,109.60)**	**($769,162.19)**	**($786,533.93)**	**($258,163.21)**	**($303,185.59)**

PROJECTED RATE INCREASE NEEDED						
***Monthly Rate Increase per Connection**	**610**	**$ (118.46)**	**$ (105.08)**	**$ (107.45)**	**$ (35.27)**	**$ (41.42)**

* An independent rate study should be conducted for actual rate increases.

	A	B	C	D	E	F
1	**WATER & SEWER**					
2	**PO BOX 190**					
3	**WALLIS TX 77485**	**2014-2015 BUDGET**	**2015-2016 BUDGET**	**2016-2017 BUDGET**	**2017-2018 BUDGET**	**2018-2019 BUDGET**
4						
5	**REVENUE:**					
6	WATER SALES	$ 184,000.00	$ 220,000.00	$ 186,000.00	$ 199,940.00	$ 216,000.00
7	WATER TAP FEES	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 2,000.00	$ -
8	RECONNECT FEES	$ 2,270.00	$ 600.00	$ 1,500.00	$ 8,500.00	$ 6,180.00
9	LATE FEES	$ 4,720.00	$ 13,500.00	$ 1,500.00	$ 9,000.00	$ 11,313.00
10	SALES TAX	$ -	$ -	$ 9,000.00	$ 10,000.00	$ 11,535.08
11	SEWER SALES	$ 140,000.00	$ 165,000.00	$ 141,000.00	$ 145,778.00	$ 168,000.00
12	SEWER TAP FEES	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 3,000.00	$ -
13	WATER & SEWER EXTENTIONS	$ 2,500.00	$ -	$ -	$ 2,500.00	$ -
14	GARBAGE FEES	$ 95,000.00	$ 110,000.00	$ 110,000.00	$ 123,000.00	$ 166,800.00
15	INTEREST INCOME	$ 750.00	$ 530.00	$ 500.00	$ 500.00	$ 1,137.17
16	EMERGENCY REPAIR FUND	$ -	$ -	$ -	$ 35,000.00	$ -
17	**TOTAL: REVENUE**	**$ 431,740.00**	**$ 512,130.00**	**$ 452,000.00**	**$ 539,218.00**	**$ 580,965.25**
18						
19	**EXPENSE:**					
20	LONGEVITY	$ 710.00	$ 766.00	$ 840.00	$ 600.00	$ 640.15
21	SALARIES	$ 103,400.00	$ 144,940.00	$ 129,600.00	$ 110,000.00	$ 126,640.95
22	OVERTIME	$ 16,300.00	$ 15,000.00	$ 12,410.00	$ 15,000.00	$ 7,358.31
23	SOCIAL SECURITY	$ 6,410.00	$ 9,916.00	$ 8,035.00	$ 6,820.00	$ 8,307.95
24	MEDICARE	$ 1,500.00	$ 2,319.00	$ 1,900.00	$ 1,595.00	$ 1,942.99
25	STATE UNEMPLOYMENT TAX-SUI	$ 770.00	$ 27.00	$ 578.00	$ 110.00	$ 315.00
26	WORKERS COMPENSATION	$ 5,150.00	$ 3,456.00	$ 4,000.00	$ 3,472.00	$ 3,948.43
27	GROUP INSURANCE	$ 19,000.00	$ 19,300.00	$ 23,142.00	$ 21,000.00	$ 26,477.22
28	RETIREMENT BENEFITS	$ 7,240.00	$ 9,596.00	$ 7,776.00	$ 6,600.00	$ 8,039.96
29	AUDIT FEES	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,877.00	$ 8,000.00
30	ENGINEERING FEES	$ 4,800.00	$ -	$ 2,000.00	$ 2,000.00	$ 8,000.00
31	EQUIPMENT RENTAL & MAINT	$ -	$ -	$ 3,000.00	$ -	$ -
32	ENVIRONMENTAL CONTRACTS	$ -	$ 10,000.00	$ 10,000.00	$ 5,800.00	$ 10,000.00
33	LICENSE PERMITS	$ 1,450.00	$ 3,000.00	$ 3,000.00	$ 3,500.00	$ 4,500.00
34	CONTRACT LABOR-WATER TESTING	$ -	$ -	$ -	$ -	$ 1,800.00
35	BANK CHARGES & FEES	$ -	$ 20.00	$ -	$ 10.00	$ -

	A	B	C	D	E	F
1	**WATER & SEWER**					
2	**PO BOX 190**					
3	**WALLIS TX 77485**	**2014-2015 BUDGET**	**2015-2016 BUDGET**	**2016-2017 BUDGET**	**2017-2018 BUDGET**	**2018-2019 BUDGET**
36	GARBAGE PICKUP	$ 88,000.00	$ 88,000.00	$ 114,543.00	$ 129,144.00	$ 132,000.00
37	DEPOSIT REFUNDS	$ -	$ -	$ 1,000.00	$ 2,000.00	$ 3,000.00
38	OPERATING SUPPLIES	$ 100.00	$ 1,700.00	$ 5,000.00	$ 5,000.00	$ 4,000.00
39	OFFICE SUPPLIES	$ 1,200.00	$ 1,000.00	$ 2,500.00	$ 1,500.00	$ 1,500.00
40	SOFTWARE & MAINTENANCE	$ -	$ -	$ -	$ -	$ 1,137.00
41	POSTAGE-WATER BILLS	$ 2,500.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 3,000.00
42	UNIFORMS	$ 2,770.00	$ 1,380.00	$ 1,500.00	$ 500.00	$ 900.00
43	SALES TAX EXPENSE	$ -	$ -	$ 8,300.00	$ 4,142.00	$ 12,480.00
44	CHEMICALS	$ 4,040.00	$ 4,000.00	$ 6,000.00	$ 5,000.00	$ 5,000.00
45	OTHER SUPPLIES	$ 2,150.00	$ 750.00	$ 1,000.00	$ 1,000.00	$ -
46	WATER CONSERVATION EXPENSE	$ 1,820.00	$ 2,000.00	$ 2,000.00	$ 2,500.00	$ 2,500.00
47	FUEL	$ 16,000.00	$ 10,000.00	$ 8,300.00	$ 10,000.00	$ 8,000.00
48	VEHICLE MAINT & REPAIR	$ 3,240.00	$ 3,200.00	$ 8,000.00	$ 6,000.00	$ 5,000.00
49	EQUIPMENT PURCHASES	$ 3,310.00	$ 1,000.00	$ 3,000.00	$ 6,000.00	$ 6,000.00
50	EQUIPMENT LEASE / RENTAL	$ 100.00	$ 100.00	$ 500.00	$ 500.00	$ 2,500.00
51	EQUIPMENT MAINT & REPAIR	$ 10,000.00	$ 14,000.00	$ 15,000.00	$ 20,000.00	$ 10,000.00
52	SYSTEM MAINT & REPAIR	$ 50,000.00	$ 40,000.00	$ 10,000.00	$ 20,000.00	$ 20,000.00
53	WATER & SEWER EXTENTIONS	$ 13,300.00	$ 5,000.00	$ 5,000.00	$ 10,000.00	$ 13,700.00
54	BUILDING MAINT & REPAIR	$ 5,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 1,000.00
55	TOOL PURCHASES	$ 5,000.00	$ 1,000.00	$ 3,000.00	$ 3,000.00	$ 800.00
56	TELEPHONE LAND LINE	$ 2,950.00	$ 650.00	$ 600.00	$ 500.00	$ 450.00
57	TELEPHONE CELLULAR	$ -	$ -	$ -	$ 1,200.00	$ 1,600.00
58	ELECTRICITY	$ -	$ -	$ 43,000.00	$ 38,000.00	$ 41,000.00
59	TRANSFER TO EMERGENCY REPAIR FUND	$ -	$ -	$ -	$ 35,000.00	$ 34,500.00
60	INSURANCE - LIAB SEWAGE BACKUP	$ -	$ -	$ -	$ 2,000.00	$ 495.00
61	INSURANCE - AUTO LIAB & DAMAGE	$ -	$ -	$ -	$ -	$ 1,549.00
62	INSURANCE - MOBILE EQUIPMENT	$ -	$ -	$ -	$ -	$ 505.52
63	INSURANCE - REAL & PERS PROPERTY	$ -	$ -	$ -	$ -	$ 4,058.59
64	TRAVEL / TRAINING EXPENSE	$ 2,000.00	$ 2,000.00	$ 1,000.00	$ 2,000.00	$ 1,000.00
65	ADVERTISING EXPENSE	$ 2,140.00	$ 500.00	$ 376.00	$ 250.00	$ 200.00

	A	B	C	D	E	F
1	**WATER & SEWER**					
2	**PO BOX 190**					
3	**WALLIS TX 77485**	**2014-2015 BUDGET**	**2015-2016 BUDGET**	**2016-2017 BUDGET**	**2017-2018 BUDGET**	**2018-2019 BUDGET**
4						
66	MISCELLANEOUS EXPENSE	$ 1,000.00	$ 500.00	$ 2,000.00	$ 1,000.00	$ -
67	CAPITAL OUTLAY EQUIPMENT	$ -	$ 40,000.00	$ 33,000.00	$ 15,000.00	$ -
68	CNH CAPITAL LOAN-CASE BACKHOE	$ -	$ -	$ -	$ -	$ 13,366.00
69	ENTEX/NATURAL GAS	$ 200.00	$ 1,980.00	$ 1,700.00	$ 1,500.00	$ 1,700.00
70	**TOTAL: EXPENSE**	**$ 389,550.00**	**$ 447,100.00**	**$ 492,600.00**	**$ 510,120.00**	**$ 548,912.07**
71						
72	**BUDGET SURPLUS (DEFICIT)**	**$ 42,190.00**	**$ 65,030.00**	**$ (40,600.00)**	**$ 29,098.00**	**$ 32,053.18**

WATER & SEWER PO BOX 190 WALLIS TX 77485	2016-2017 Budget	2017-2018 Budget	2018-2019 Budget	2019-2020 Budget
REVENUE:				
WATER SALES	$ 186,000.00	$ 199,940.00	$ 216,000.00	$ 220,000.00
WATER TAP FEES	$ 1,000.00	$ 2,000.00	$ -	$ 3,000.00
RECONNECT FEES	$ 1,500.00	$ 8,500.00	$ 6,180.00	$ 6,000.00
LATE FEES	$ 1,500.00	$ 9,000.00	$ 11,313.00	$ 12,000.00
SALES TAX	$ 9,000.00	$ 10,000.00	$ 12,000.00	$ 13,045.00
SEWER SALES	$ 141,000.00	$ 145,778.00	$ 168,000.00	$ 168,000.00
SEWER TAP FEES	$ 1,500.00	$ 3,000.00	$ -	$ 4,000.00
WATER & SEWER EXTENTIONS	$ -	$ 2,500.00	INACTIVATE	$ -
GARBAGE FEES	$ 110,000.00	$ 123,000.00	$ 166,800.00	$ 166,370.00
INTEREST INCOME	$ 500.00	$ 500.00	$ 1,137.17	$ 1,137.17
CDBG GRANT				$ 330,120.00
PW544 GRANT				$ 104,113.91
EMERGENCY REPAIR FUND	$ -	$ 35,000.00	INACTIVATE	
ACCOUNTANT'S ADJUSTMENTS	$ -	$ -	$ -	$ -
TOTAL: REVENUE	**$ 452,000.00**	**$ 539,218.00**	**$ 581,430.17**	**$ 1,027,786.08**
EXPENSE:				
LONGEVITY	$ 840.00	$ 600.00	$ 640.15	$ 640.15
SALARIES	$ 129,600.00	$ 110,000.00	$ 126,640.95	$ 89,151.24
OVERTIME	$ 12,410.00	$ 15,000.00	$ 7,358.31	$ 6,000.00
SOCIAL SECURITY	$ 8,035.00	$ 6,820.00	$ 8,307.95	$ 5,527.36
MEDICARE	$ 1,900.00	$ 1,595.00	$ 1,942.99	$ 1,292.68
STATE UNEMPLOYMENT TAX-SUI	$ 578.00	$ 110.00	$ 315.00	$ 225.00
WORKERS COMPENSATION	$ 4,000.00	$ 3,472.00	$ 3,948.43	$ 4,645.76
GROUP INSURANCE	$ 23,142.00	$ 21,000.00	$ 26,477.22	$ 18,771.24
RETIREMENT BENEFITS	$ 7,776.00	$ 6,600.00	$ 8,039.96	$ 5,241.06
AUDIT FEES	$ 6,000.00	$ 6,877.00	$ 8,000.00	$ 5,000.00
ENGINEERING FEES	$ 2,000.00	$ 2,000.00	$ 8,000.00	$ 8,000.00

WATER & SEWER PO BOX 190 WALLIS TX 77485	2016-2017 Budget	2017-2018 Budget	2018-2019 Budget	2019-2020 Budget
EQUIPMENT RENTAL & MAINT	$ 3,000.00	$ -	INACTIVATE	
ENVIRONMENTAL CONTRACTS	$ 10,000.00	$ 5,800.00	$ 10,000.00	$ 10,000.00
LICENSE PERMITS	$ 3,000.00	$ 3,500.00	$ 4,500.00	$ 4,500.00
CONTRACT LABOR-WATER TESTING	$ -	$ -	$ 1,800.00	$ 38,400.00
BANK CHARGES & FEES	$ -	$ 10.00	INACTIVATE	
GARBAGE PICKUP	$ 114,543.00	$ 129,144.00	$ 132,000.00	$ 126,000.00
DEPOSIT REFUNDS	$ 1,000.00	$ 2,000.00	$ 3,000.00	$ 3,000.00
OPERATING SUPPLIES	$ 5,000.00	$ 5,000.00	$ 4,000.00	$ 4,000.00
OFFICE SUPPLIES	$ 2,500.00	$ 1,500.00	$ 1,500.00	$ 2,750.00
SOFTWARE & MAINTENANCE	$ -	$ -	$ 1,137.00	$ 3,500.00
POSTAGE-WATER BILLS	$ 2,000.00	$ 2,000.00	$ 3,000.00	$ 3,000.00
UNIFORMS	$ 1,500.00	$ 500.00	$ 900.00	$ 650.00
SALES TAX EXPENSE	$ 8,300.00	$ 4,142.00	$ 12,480.00	$ 13,200.00
CHEMICALS	$ 6,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
OTHER SUPPLIES	$ 1,000.00	$ 1,000.00	INACTIVATE	
WATER CONSERVATION EXPENSE	$ 2,000.00	$ 2,500.00	$ 2,500.00	$ 2,616.00
FUEL	$ 8,300.00	$ 10,000.00	$ 8,000.00	$ 8,000.00
VEHICLE MAINT & REPAIR	$ 8,000.00	$ 6,000.00	$ 5,000.00	$ 5,000.00
EQUIPMENT PURCHASES	$ 3,000.00	$ 6,000.00	$ 6,000.00	$ 2,500.00
EQUIPMENT LEASE / RENTAL	$ 500.00	$ 500.00	$ 2,500.00	$ 500.00
EQUIPMENT MAINT & REPAIR	$ 15,000.00	$ 20,000.00	$ 10,000.00	$ 10,000.00
SYSTEM MAINT & REPAIR	$ 10,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00
WATER & SEWER EXTENTIONS	$ 5,000.00	$ 10,000.00	$ 13,700.00	$ 10,000.00
BUILDING MAINT & REPAIR	$ 2,000.00	$ 2,000.00	$ 1,000.00	$ 1,000.00
TOOL PURCHASES	$ 3,000.00	$ 3,000.00	$ 800.00	$ 1,500.00
TELEPHONE LAND LINE	$ 600.00	$ 500.00	$ 450.00	$ 450.00
TELEPHONE CELLULAR	$ -	$ 1,200.00	$ 1,600.00	$ 1,600.00
ELECTRICITY	$ 43,000.00	$ 38,000.00	$ 41,000.00	$ 35,000.00

WATER & SEWER PO BOX 190 WALLIS TX 77485	2016-2017 Budget	2017-2018 Budget	2018-2019 Budget	2019-2020 Budget
TRANSFER TO EMERGENCY REPAIR F	$ -	$ 35,000.00	$ 34,500.00	$ -
INSURANCE - LIAB SEWAGE BACKUP	$ -	$ 2,000.00	$ 495.00	$ 495.00
INSURANCE - AUTO LIAB & DAMAGE	$ -	$ -	$ 1,549.00	$ 1,549.00
INSURANCE - MOBILE EQUIPMENT	$ -	$ -	$ 505.52	$ 505.52
INSURANCE - REAL & PERS PROPERTY	$ -	$ -	$ 4,058.59	$ 4,085.40
TRAVEL / TRAINING EXPENSE	$ 1,000.00	$ 2,000.00	$ 1,000.00	$ 1,500.00
ADVERTISING EXPENSE	$ 376.00	$ 250.00	$ 200.00	$ 200.00
MISCELLANEOUS EXPENSE	$ 2,000.00	$ 1,000.00	INACTIVATE	
CDBG GRANT				$ 365,120.00
PW544 GRANT				$ 138,818.91
CAPITAL OUTLAY EQUIPMENT	$ 33,000.00	$ 15,000.00	$ -	
CNH CAPITAL LOAN-CASE BACKHOE	$ -	$ -	$ 13,366.00	$ 27,035.28
ENTEX/NATURAL GAS	$ 1,700.00	$ 1,500.00	$ 1,700.00	$ 1,700.00
TOTAL: EXPENSE	**$ 492,600.00**	**$ 510,120.00**	**$ 548,912.07**	**$ 997,669.60**
BUDGET SURPLUS (DEFICIT)	**$ (40,600.00)**	**$ 29,098.00**	**$ 32,518.10**	**$ 30,116.48**

	WATER & SEWER PO BOX 190 WALLIS TX 77485	2017-2018 Budget	2018-2019 Budget	2019-2020 Budget	2020-2021 Budget
	REVENUE:	*(12 months)*	*(12 months)*	*(12 months)*	*(12 months)*
52101	WATER SALES	$ 199,940.00	$ 216,000.00	$ 220,000.00	$ 229,440.00
52141	WATER TAP FEES	$ 2,000.00	$ -	$ 3,000.00	$ 2,000.00
52143	RECONNECT FEES	$ 8,500.00	$ 6,180.00	$ 6,000.00	$ 3,000.00
52145	LATE FEES	$ 9,000.00	$ 11,313.00	$ 12,000.00	$ 9,000.00
52150	SALES TAX	$ 10,000.00	$ 12,000.00	$ 13,045.00	$ 13,000.00
52201	SEWER SALES	$ 145,778.00	$ 168,000.00	$ 168,000.00	$ 180,960.00
52241	SEWER TAP FEES	$ 3,000.00	$ -	$ 4,000.00	$ 4,000.00
52250	WATER & SEWER EXTENTIONS	$ 2,500.00	INACTIVATE	$ -	$ -
52301	GARBAGE FEES	$ 123,000.00	$ 166,800.00	$ 166,370.00	$ 166,800.00
56121	INTEREST INCOME	$ 500.00	$ 1,137.17	$ 1,137.17	$ 2,000.00
56122	CDBG GRANT			$ 330,120.00	$ -
56123	PW544 GRANT			$ 104,113.91	$ -
56149	EMERGENCY REPAIR FUND	$ 35,000.00	INACTIVATE		$ -
56600	ACCOUNTANT'S ADJUSTMENTS	$ -	$ -	$ -	$ -
	TOTAL: REVENUE	**$ 539,218.00**	**$ 581,430.17**	**$ 1,027,786.08**	**$ 610,200.00**
	EXPENSE:				
61100	LONGEVITY	$ 600.00	$ 640.15	$ 640.15	$ 359.60
61101	SALARIES	$ 110,000.00	$ 126,640.95	$ 89,151.24	$ 188,698.88
61104	OVERTIME	$ 15,000.00	$ 7,358.31	$ 6,000.00	$ 6,000.00
61201	SOCIAL SECURITY	$ 6,820.00	$ 8,307.95	$ 5,527.36	$ 8,599.31
61203	MEDICARE	$ 1,595.00	$ 1,942.99	$ 1,292.68	$ 2,011.12
61205	STATE UNEMPLOYMENT TAX-SUI	$ 110.00	$ 315.00	$ 225.00	$ 135.00
61207	WORKERS COMPENSATION	$ 3,472.00	$ 3,948.43	$ 4,645.76	$ 1,831.00
61209	GROUP INSURANCE	$ 21,000.00	$ 26,477.22	$ 18,771.24	$ 24,604.44
61211	RETIREMENT BENEFITS	$ 6,600.00	$ 8,039.96	$ 5,241.06	$ 8,321.92
62101	AUDIT FEES	$ 6,877.00	$ 8,000.00	$ 5,000.00	$ 5,000.00
62105	ENGINEERING FEES	$ 2,000.00	$ 8,000.00	$ 8,000.00	$ 6,000.00

	WATER & SEWER PO BOX 190 WALLIS TX 77485	2017-2018 Budget	2018-2019 Budget	2019-2020 Budget	2020-2021 Budget
62840	EQUIPMENT RENTAL & MAINT	$ -	INACTIVATE		$ -
63101	ENVIRONMENTAL CONTRACTS	$ 5,800.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
63102	LICENSE PERMITS	$ 3,500.00	$ 4,500.00	$ 4,500.00	$ 4,500.00
63103	CONTRACT LABOR-WATER TESTING	$ -	$ 1,800.00	$ 72,000.00	$ -
63107	BANK CHARGES & FEES	$ 10.00	INACTIVATE		$ -
63109	GARBAGE PICKUP	$ 129,144.00	$ 132,000.00	$ 126,000.00	$ 126,000.00
63110	DEPOSIT REFUNDS	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ -
64101	OPERATING SUPPLIES	$ 5,000.00	$ 4,000.00	$ 4,000.00	$ 4,000.00
64103	OFFICE SUPPLIES	$ 1,500.00	$ 1,500.00	$ 2,750.00	$ 2,750.00
64104	SOFTWARE & MAINTENANCE	$ -	$ 1,137.00	$ 3,500.00	$ 3,500.00
64105	POSTAGE-WATER BILLS	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00
64107	UNIFORMS	$ 500.00	$ 900.00	$ 650.00	$ 650.00
64108	SALES TAX EXPENSE	$ 4,142.00	$ 12,480.00	$ 13,200.00	$ 13,200.00
64109	CHEMICALS	$ 5,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
64113	OTHER SUPPLIES	$ 1,000.00	INACTIVATE		$ -
64115	WATER CONSERVATION EXPENSE	$ 2,500.00	$ 2,500.00	$ 2,616.00	$ 2,700.00
64201	FUEL	$ 10,000.00	$ 8,000.00	$ 8,000.00	$ 8,000.00
64203	VEHICLE MAINT & REPAIR	$ 6,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00
64204	EQUIPMENT PURCHASES	$ 6,000.00	$ 6,000.00	$ 2,500.00	$ 2,500.00
64205	EQUIPMENT LEASE / RENTAL	$ 500.00	$ 2,500.00	$ 500.00	$ 500.00
64305	EQUIPMENT MAINT & REPAIR	$ 20,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
64307	SYSTEM MAINT & REPAIR	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 30,000.00
64308	WATER & SEWER EXTENTIONS	$ 10,000.00	$ 13,700.00	$ 10,000.00	$ 10,000.00
64309	BUILDING MAINT & REPAIR	$ 2,000.00	$ 1,000.00	$ 1,000.00	$ 1,500.00
64311	TOOL PURCHASES	$ 3,000.00	$ 800.00	$ 1,500.00	$ 1,500.00
64401	TELEPHONE LAND LINE	$ 500.00	$ 450.00	$ 450.00	$ 450.00
64402	TELEPHONE CELLULAR	$ 1,200.00	$ 1,600.00	$ 1,600.00	$ 1,000.00
64403	ELECTRICITY	$ 38,000.00	$ 41,000.00	$ 35,000.00	$ 35,000.00

	WATER & SEWER PO BOX 190 WALLIS TX 77485	2017-2018 Budget	2018-2019 Budget	2019-2020 Budget	2020-2021 Budget
64407	TRANSFER TO EMERGENCY REPAIR F	$ 35,000.00	$ 34,500.00	$ -	$ -
64501	INSURANCE - LIAB SEWAGE BACKUP	$ 2,000.00	$ 495.00	$ 495.00	$ 123.75
64503	INSURANCE - AUTO LIAB & DAMAGE	$ -	$ 1,549.00	$ 1,549.00	$ 1,061.76
64504	INSURANCE - MOBILE EQUIPMENT	$ -	$ 505.52	$ 505.52	$ 512.28
64505	INSURANCE - REAL & PERS PROPERTY	$ -	$ 4,058.59	$ 4,085.40	$ 716.68
64701	TRAVEL / TRAINING EXPENSE	$ 2,000.00	$ 1,000.00	$ 1,500.00	$ 1,500.00
64901	ADVERTISING EXPENSE	$ 250.00	$ 200.00	$ 200.00	$ 250.00
64923	MISCELLANEOUS EXPENSE	$ 1,000.00	INACTIVATE		$ 500.00
66122	CDBG GRANT			$ 365,120.00	$ -
66123	PW544 GRANT			$ 138,818.91	$ -
66501	CAPITAL OUTLAY EQUIPMENT	$ 15,000.00	$ -		$ -
66502	CNH CAPITAL LOAN-CASE BACKHOE	$ -	$ 13,366.00	$ 27,035.28	$ 26,700.00
67103	ENTEX/NATURAL GAS	$ 1,500.00	$ 1,700.00	$ 1,700.00	$ 2,000.00
	TOTAL: EXPENSE	**$ 510,120.00**	**$ 548,912.07**	**$ 1,031,269.60**	**$ 565,675.74**
					$ -
	BUDGET SURPLUS (DEFICIT)	**$ 29,098.00**	**$ 32,518.10**	**$ (3,483.52)**	**$ 44,524.26**

	WATER & SEWER PO BOX 190 WALLIS TX 77485	2019-2020 Budget	2020-2021 Budget	2021-2022 Budget
	REVENUE:			
52101	WATER SALES	$ 220,000.00	$ 229,440.00	$ 230,000.00
52141	WATER TAP FEES	$ 3,000.00	$ 2,000.00	$ 1,500.00
52143	RECONNECT FEES	$ 6,000.00	$ 3,000.00	$ 3,500.00
52145	LATE FEES	$ 12,000.00	$ 9,000.00	$ 9,000.00
52150	SALES TAX	$ 13,045.00	$ 13,000.00	$ 12,000.00
52201	SEWER SALES	$ 168,000.00	$ 180,960.00	$ 177,000.00
52241	SEWER TAP FEES	$ 4,000.00	$ 4,000.00	$ 3,000.00
52301	GARBAGE FEES	$ 166,370.00	$ 166,800.00	$ 147,600.00
56121	INTEREST INCOME	$ 1,137.17	$ 2,000.00	$ 200.00
	CDBG GRANT	$ 330,120.00	$ -	$ -
	PW544 GRANT	$ 104,113.91	$ -	$ -
56149	W/S SALES TO SAVINGS ACCT	INACTIVATE	INACTIVATE	$ 34,000.00
56600	ACCOUNTANT'S ADJUSTMENTS	$ -	$ -	$ -
	TOTAL: REVENUE	**$ 1,027,786.08**	**$ 610,200.00**	**$ 617,800.00**
	EXPENSE:			
61100	LONGEVITY	$ 640.15	$ 359.60	$ 376.65
61101	SALARIES	$ 89,151.24	$ 188,698.88	$ 153,258.88
61104	OVERTIME	$ 6,000.00	$ 6,000.00	$ 5,000.00
61201	SOCIAL SECURITY	$ 5,527.36	$ 8,599.31	$ 10,404.75
61203	MEDICARE	$ 1,292.68	$ 2,011.12	$ 2,433.36
61205	STATE UNEMPLOYMENT TAX-SUI	$ 225.00	$ 135.00	$ 1,134.00
61207	WORKERS COMPENSATION	$ 4,645.76	$ 1,831.00	$ 3,640.40
61209	GROUP INSURANCE	$ 18,771.24	$ 24,604.44	$ 22,819.68
61211	RETIREMENT BENEFITS	$ 5,241.06	$ 8,321.92	$ 10,069.12
62101	AUDIT FEES	$ 5,000.00	$ 5,000.00	$ 7,000.00
62105	ENGINEERING FEES	$ 8,000.00	$ 6,000.00	$ 5,000.00

	WATER & SEWER PO BOX 190 WALLIS TX 77485	2019-2020 Budget	2020-2021 Budget	2021-2022 Budget
62840	EQUIPMENT RENTAL & MAINT	INACTIVATE	INACTIVATE	INACTIVATE
63101	ENVIRONMENTAL CONTRACTS	$ 10,000.00	$ 10,000.00	$ 10,000.00
63102	LICENSE PERMITS	$ 4,500.00	$ 4,500.00	$ 3,000.00
63103	CONTRACT LABOR-WATER TESTING	$ 38,400.00	$ -	$ 57,600.00
63107	BANK CHARGES & FEES	INACTIVATE	INACTIVATE	INACTIVATE
63109	GARBAGE PICKUP	$ 126,000.00	$ 126,000.00	$ 130,000.00
	DEPOSIT REFUNDS	$ 3,000.00	$ -	$ -
64101	OPERATING SUPPLIES	$ 4,000.00	$ 4,000.00	$ 4,000.00
64103	OFFICE SUPPLIES	$ 2,750.00	$ 2,750.00	$ 2,750.00
64104	SOFTWARE & MAINTENANCE	$ 3,500.00	$ 3,500.00	$ 3,500.00
64105	POSTAGE-WATER BILLS	$ 3,000.00	$ 3,000.00	$ 3,500.00
64107	UNIFORMS	$ 650.00	$ 650.00	$ 650.00
64108	SALES TAX EXPENSE	$ 13,200.00	$ 13,200.00	$ 13,000.00
64109	CHEMICALS	$ 5,000.00	$ 5,000.00	$ 5,000.00
64113	OTHER SUPPLIES	INACTIVATE	INACTIVATE	INACTIVATE
64115	WATER CONSERVATION EXPENSE	$ 2,616.00	$ 2,700.00	$ 2,700.00
64201	FUEL	$ 8,000.00	$ 8,000.00	$ 9,000.00
64203	VEHICLE MAINT & REPAIR	$ 5,000.00	$ 5,000.00	$ 12,000.00
64204	EQUIPMENT PURCHASES	$ 2,500.00	$ 2,500.00	$ 2,500.00
64205	EQUIPMENT LEASE / RENTAL	$ 500.00	$ 500.00	$ 500.00
64305	EQUIPMENT MAINT & REPAIR	$ 10,000.00	$ 10,000.00	$ 5,500.00
64307	SYSTEM MAINT & REPAIR	$ 20,000.00	$ 30,000.00	$ 30,000.00
64308	WATER & SEWER EXTENTIONS	$ 10,000.00	$ 10,000.00	$ 7,500.00
64309	BUILDING MAINT & REPAIR	$ 1,000.00	$ 1,500.00	$ 1,500.00
64311	TOOL PURCHASES	$ 1,500.00	$ 1,500.00	$ 4,000.00
64401	TELEPHONE LAND LINE	$ 450.00	$ 450.00	INACTIVE
64402	TELEPHONE CELLULAR	$ 1,600.00	$ 1,000.00	$ 1,100.00

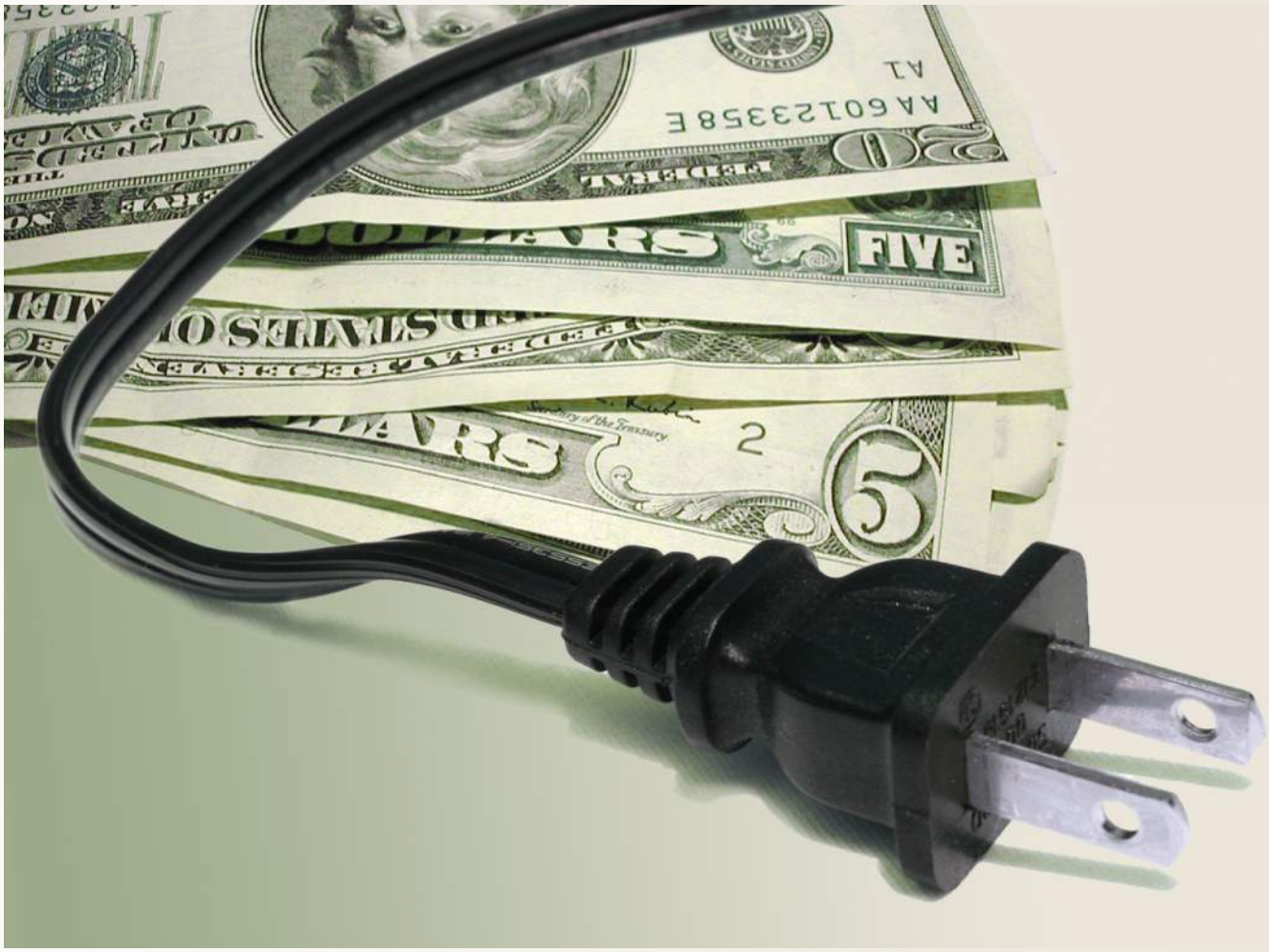
	WATER & SEWER PO BOX 190 WALLIS TX 77485	2019-2020 Budget	2020-2021 Budget	2021-2022 Budget
64403	ELECTRICITY	$ 35,000.00	$ 35,000.00	$ 33,000.00
64501	INSURANCE - LIAB SEWAGE BACKUP	$ 495.00	$ 123.75	$ 495.00
64503	INSURANCE - AUTO LIAB & DAMAGE	$ 1,549.00	$ 1,061.76	$ 2,287.52
64504	INSURANCE - MOBILE EQUIPMENT	$ 505.52	$ 512.28	$ 234.60
	INS REAL PROP	$ 4,085.40	$ 716.68	$ -
64701	TRAVEL / TRAINING EXPENSE	$ 1,500.00	$ 1,500.00	ZERO
64901	ADVERTISING EXPENSE	$ 200.00	$ 250.00	$ 200.00
64923	MISCELLANEOUS EXPENSE	INACTIVATE	$ 500.00	$ 500.00
	CDBG GRANT	$ 365,120.00	$ -	$ -
	PW544 GRANT	$ 138,818.91	$ -	$ -
66501	CAPITAL OUTLAY EQUIPMENT		$ -	$ 8,100.00
	CNH BACKHOE LOAN	$ 27,035.28	$ 26,700.00	$ -
67103	ENTEX/NATURAL GAS	$ 1,700.00	$ 2,000.00	$ 2,000.00
	TOTAL: EXPENSE	**$ 997,669.60**	**$ 565,675.74**	**$ 577,253.96**
	BUDGET SURPLUS (DEFICIT)	**$ 30,116.48**	**$ 44,524.26**	**$ 40,546.04**

	A	B	C	D	E	G
1		**CITY OF WALLIS - WATER & SEWER**				
2						
3			**2019-2020 Actual**	**2020-2021 Actual**	**2021-2022 Budget**	**2022-2023 Budget**
4		**REVENUE: WATER/SEWER**				
5	52101	WATER SALES	$ 208,398.83	$ 261,736.55	$ 230,000.00	$ 300,000.00
6	52141	WATER TAP FEES	$ 3,156.14	$ 1,000.00	$ 1,500.00	$ 1,500.00
7	52143	RECONNECT FEES	$ 5,650.00	$ 6,825.00	$ 3,500.00	$ 4,000.00
8	52145	LATE FEES	$ 11,965.88	$ 11,106.65	$ 9,000.00	$ 9,000.00
9	52150	SALES TAX	$ 11,982.32	$ 12,898.56	$ 12,000.00	$ 12,000.00
10	52201	SEWER SALES	$ 170,687.35	$ 200,267.76	$ 177,000.00	$ 200,000.00
11	52241	SEWER TAP FEES	$ 5,000.00	$ 2,250.00	$ 3,000.00	$ 3,000.00
13	52301	GARBAGE FEES	$ 166,900.67	$ 164,938.11	$ 147,600.00	$ 166,000.00
14	56121	INTEREST INCOME	$ 2,641.14	$ 308.86	$ 200.00	$ 250.00
15	56140	GLO 20-065-035-C115 GENERATORS				$ 253,318.50
16	56141	CDBG 22-085-054-D311 HARVEY MIT				$ 2,362,998.69
17	56149	WATER/SEWER SALES TO SAVINGS	INACTIVATE	INACTIVATE	$ 34,000.00	$ -
18	56150	RESERVES			$ 4,974.37	$ -
19	56600	ACCOUNTANT'S ADJUSTMENTS	$ -	$ -	$ -	$ -
20		**TOTAL: REVENUE**	**$ 586,382.33**	**$ 661,331.49**	**$ 622,774.37**	**$ 3,312,067.19**
21		**EXPENSE: WATER/SEWER**				$ -
22	61100	LONGEVITY	$ 103.85	$ 283.65	$ 376.65	$ 217.00
23	61101	SALARIES	$ 39,608.04	$ 181,452.33	$ 169,909.46	$ 224,590.07
24	61104	OVERTIME	$ 1,184.51	$ 7,375.27	$ 5,000.00	$ 5,000.00
25	61201	SOCIAL SECURITY	$ 2,620.82	$ 11,150.52	$ 11,491.10	$ 14,633.54
26	61203	MEDICARE	$ 539.46	$ 2,619.95	$ 2,677.90	$ 3,402.16
27	61205	STATE UNEMPLOYMENT TAX-SUI	$ 247.91	$ 1,073.97	$ 1,260.00	$ 1,260.00
28	61207	WORKERS COMPENSATION	$ 2,103.65	$ 3,487.45	$ 4,711.12	$ 3,500.00
29	61209	GROUP INSURANCE	$ 9,939.41	$ 23,459.38	$ 22,819.68	$ 34,836.48
30	61211	RETIREMENT BENEFITS	$ 450.73	$ 10,838.35	$ 11,080.78	$ 13,959.15
31	62101	AUDIT FEES	$ 5,568.13	$ 6,512.80	$ 7,000.00	$ 7,500.00
32	62105	ENGINEERING FEES	$ -	$ -	$ 5,000.00	$ -
34	63101	ENVIRONMENTAL CONTRACTS	$ 10,611.96	$ 10,656.97	$ 10,000.00	$ 10,000.00
35	63102	LICENSE PERMITS	$ 2,709.76	$ 2,973.26	$ 3,000.00	$ 5,000.00
36	63103	CONTRACT LABOR-WATER TESTING	$ 68,040.00	$ 37,905.70	$ 57,600.00	$ 57,600.00
38	63109	GARBAGE PICKUP	$ 130,755.70	$ 128,193.56	$ 130,000.00	$ 130,000.00
39	63110	DEPOSIT REFUNDS	$ 3,000.00	$ -	$ -	INACTIVE
40	64101	OPERATING SUPPLIES	$ 3,110.73	$ 4,214.53	$ 4,000.00	$ 4,000.00
41	64103	OFFICE SUPPLIES	$ 1,817.19	$ 2,589.04	$ 2,750.00	$ 2,750.00
42	64104	SOFTWARE & MAINTENANCE	$ 3,551.07	$ 3,567.08	$ 3,500.00	$ 3,500.00
43	64105	POSTAGE-WATER BILLS	$ 2,346.85	$ 4,374.23	$ 3,500.00	$ 3,750.00
44	64107	UNIFORMS	$ 256.24	$ 732.35	$ 650.00	$ 1,300.00
45	64108	SALES TAX EXPENSE	$ 13,081.71	$ 12,905.99	$ 13,000.00	$ 13,000.00
46	64109	CHEMICALS	$ 3,886.16	$ 5,555.00	$ 5,000.00	$ 7,000.00
47	64113	OTHER SUPPLIES	INACTIVATE	INACTIVATE	INACTIVATE	INACTIVE
48	64115	WATER CONSERVATION EXPENSE	$ -	$ 1,943.08	$ 2,700.00	$ 2,700.00
49	64201	FUEL	$ 5,410.14	$ 5,346.48	$ 9,000.00	$ 9,000.00
50	64203	EFLEET	$ 5,671.41	$ 11,578.26	$ 12,000.00	$ 12,950.00
51	64204	EQUIPMENT PURCHASES	$ 3,619.87	$ 3,309.17	$ 2,500.00	$ 2,500.00
52	64205	EQUIPMENT LEASE / RENTAL	$ -	$ -	$ 500.00	$ 500.00
53	64305	EQUIPMENT MAINT & REPAIR	$ 6,919.78	$ 3,406.15	$ 5,500.00	$ 5,500.00
54	64307	SYSTEM MAINT & REPAIR	$ 33,962.49	$ 29,260.41	$ 30,000.00	$ 45,000.00
55	64308	WATER & SEWER EXTENTIONS	$ 8,226.49	$ 4,608.66	$ 7,500.00	$ 5,000.00
56	64309	BUILDING MAINT & REPAIR	$ 574.95	$ 4,028.46	$ 1,500.00	$ 1,500.00
57	64311	TOOL PURCHASES	$ 745.21	$ 714.21	$ 4,000.00	$ 3,000.00
59	64402	TELEPHONE CELLULAR	$ 1,334.50	$ 992.18	$ 1,100.00	$ 1,100.00
60	64403	ELECTRICITY	$ 28,327.73	$ 35,998.19	$ 33,000.00	$ 33,000.00
62	64501	INSURANCE - LIAB SEWAGE BACKUP	$ 449.80	$ 618.75	$ 495.00	$ 495.00
63	64503	INSURANCE - AUTO LIAB & DAMAGE	$ 2,309.80	$ 2,785.42	$ 2,287.52	$ 2,100.00
64	64504	INSURANCE - MOBILE EQUIPMENT	$ 736.80	$ 332.34	$ 234.60	$ 391.00
66	64701	TRAVEL / TRAINING EXPENSE	$ -	$ -	$ -	$ -

	A	B	C	D	E	G
1		**CITY OF WALLIS - WATER & SEWER**				
2			**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**
3			**Actual**	**Actual**	**Budget**	**Budget**
67	64901	ADVERTISING EXPENSE	$ 32.00	$ -	$ 200.00	$ 300.00
68	64923	MISCELLANEOUS EXPENSE	$ 409.98	$ 500.00	$ 500.00	$ 500.00
69	66501	CAPITAL OUTLAY EQUIPMENT	$ -	$ -	$ 8,100.00	$ -
70	66502	CNH CAPITAL LOAN-CASE BACKHOE	$ 26,734.56	$ 20,051.10	$ -	INACTIVE
71	66503	GLO 20-065-035-C115 GENERATORS				$ 254,488.00
72	66504	CDBG 22-085-054-D311 HARVEY MIT				$ 2,384,554.15
73	67103	ENTEX/NATURAL GAS	$ 1,423.73	$ 1,868.13	$ 2,000.00	$ 1,800.00
74		**TOTAL: EXPENSE**	**$ 432,423.12**	**$ 589,262.37**	**$ 597,443.81**	**$ 3,313,176.55**
75						
76		**BUDGET SURPLUS (DEFICIT)**	**$ 153,959.21**	**$ 72,069.12**	**$ 25,330.56**	**$ (1,109.36)**

APPENDIX I – Guidance for Energy Assessments

Energy Use Assessments at Water and Wastewater Systems Guide



A means of assessing your system's baseline energy consumption and costs in order to identify areas for improved energy efficiency and operational savings

Using the Energy Use Assessment Tool

Table of Contents

Abbreviations and Common Terms

Amp	Amperage
Energy Baseline	An energy baseline is developed by measuring and documenting your energy usage and costs at a specific time. This establishes a reference point for evaluating the effectiveness of future changes in process and equipment.
FLA	Full Load Amperage
Hp	Horsepower output
HVAC	Heating, Ventilation, and Air-Conditioning
W	Watts
kW	Kilowatts

Introduction

Energy use assessments can help water and wastewater utilities identify energy and cost savings. This booklet contains practical direction on how to begin an assessment as well as potential steps that systems could take after an assessment is completed.

EPA's Energy Use Assessment Tool is available to address areas where utilities tend to get stuck and is meant to guide them through the process. Some commonly seen issues are:

Trouble Establishing an Audit/Baseline

- Utilities tend to stop even before they start because of the cost of hiring third-party energy auditors.
- Most facilities do not have extra personnel with the energy expertise to diagnose areas of improvement

Where to begin

- Utilities may not be able to appropriately identify or prioritize projects (or operational modifications).
- Utilities may not be able to compare energy impacts of current technologies versus more efficient technologies.
- They may be unfamiliar with funding opportunities for energy efficiency.

This booklet will discuss how to establish an energy baseline using the Energy Use Assessment Tool, the next steps and the resources available to help along the way.

Benefits of Improved Energy Efficiency

Reduced operating costs

With energy costs rising, increasing energy efficiency can reduce the impact on your operating budget.

Opportunity for financial savings reinvestment back into the system

Many systems have not received upgrades because of budget limitations. Additional room in the budget from monthly energy savings can be used to make updates and repairs where they are needed.

Less pressure on freshwater resources

A nexus exists between the amount of energy consumed and the use of freshwater resources.

Less strain on current energy grid

With the rise in electric consumption, energy grids are being strained. More efficient large scale consumers can help reduce that grid strain.

Less greenhouse gas emissions

Reducing energy use results in less greenhouse gas emissions.

Environmental stewardship

Reducing energy use, and thus freshwater use, ultimately conserves the overall environmental quality and resources that we all need.

There is a Nexus between Water and Energy

Processing drinking water and wastewater is an energy intensive activity. It accounts for a large portion of a municipality's energy needs. For drinking water systems, energy is typically needed for raw water extraction and conveyance, treatment, water storage and distribution. Energy usage can vary based on water source, facility age, treatment type, storage capacity, topography, and system size, which encompasses volume produced and service area.

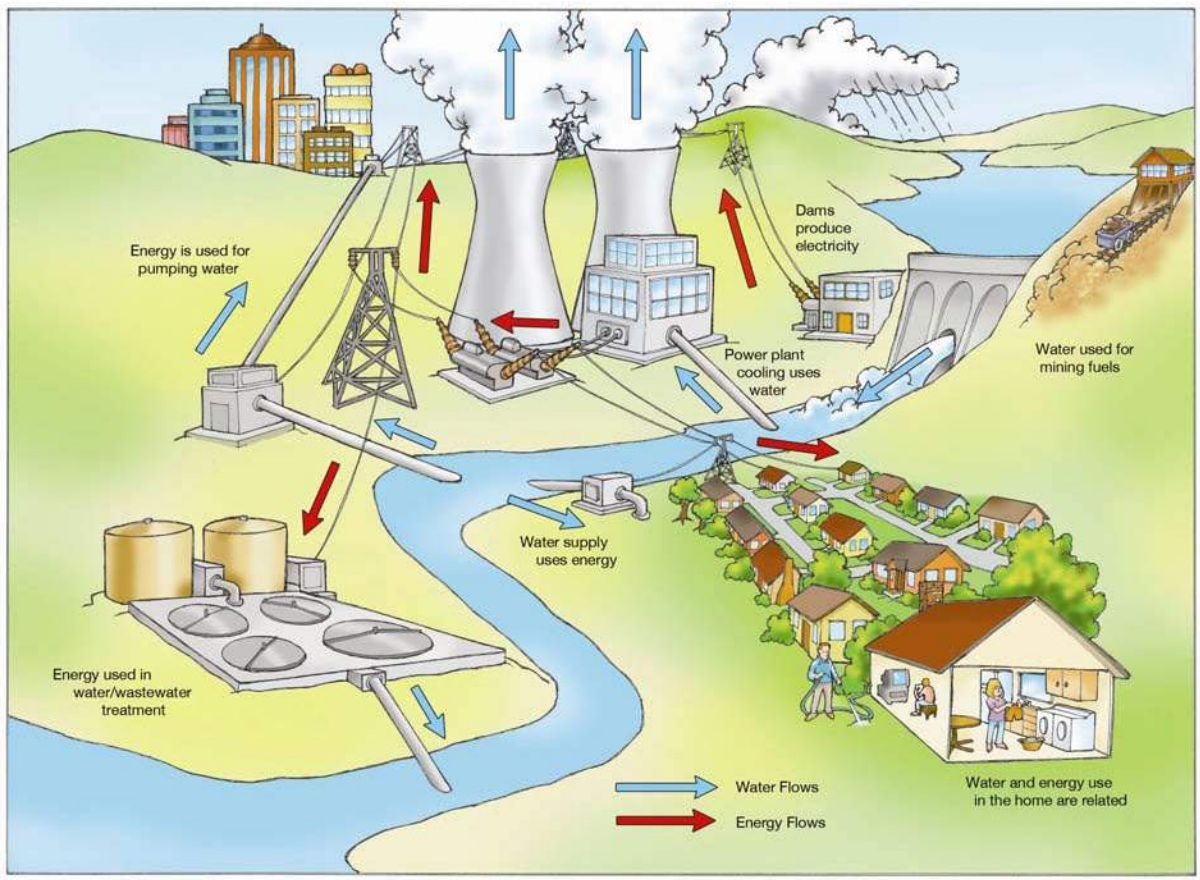


Image from "Energy Demands on Water Resources," U.S. Department of Energy, 2006 (pg. 13)

Producing energy needs water.

Extracting, treating and distributing water needs energy.

Conserving one reduces both.

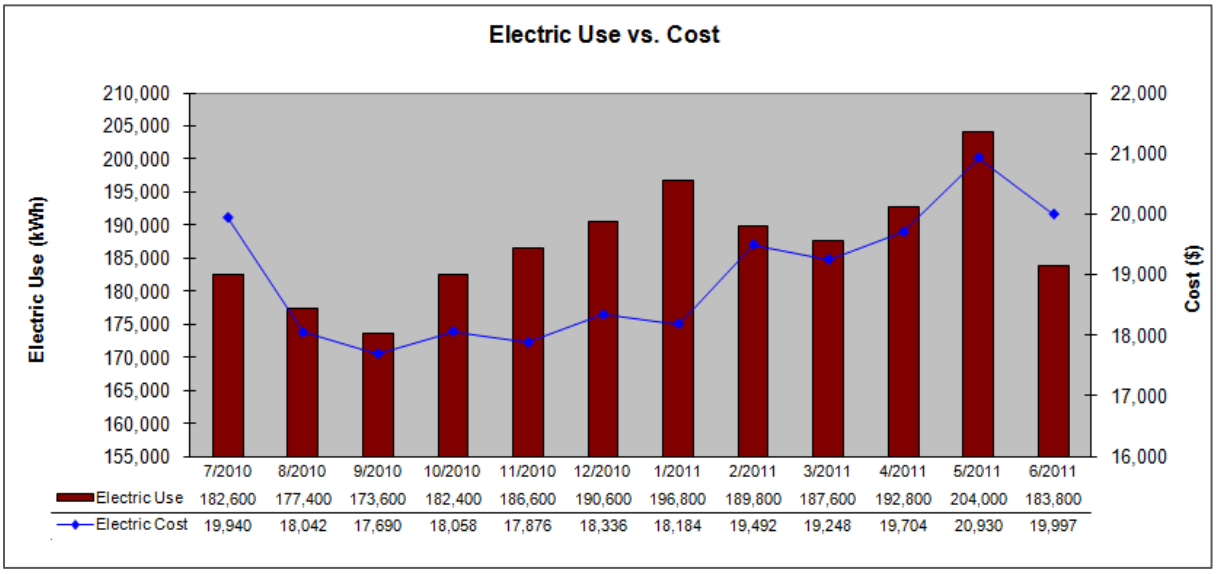
Energy Use Assessment Tool

Download the Energy Use Assessment Tool and User's Guide:

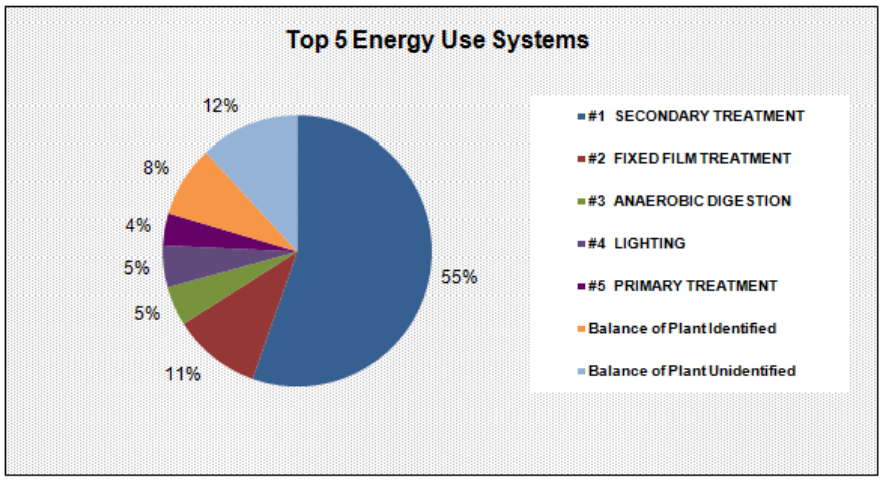
http://water.epa.gov/infrastructure/sustain/energy_use.cfm

The Energy Use Assessment Tool can be a key step in analyzing and ultimately reducing the energy usage at a small or medium sized water/wastewater system. The Tool helps to create an individual energy and cost baseline which can provide a utility an organized overall look at their facility's current energy usage.

This free, downloadable, Excel-based Tool helps to highlight areas of inefficiency that utilities may find useful in identifying and prioritizing energy improvement projects.

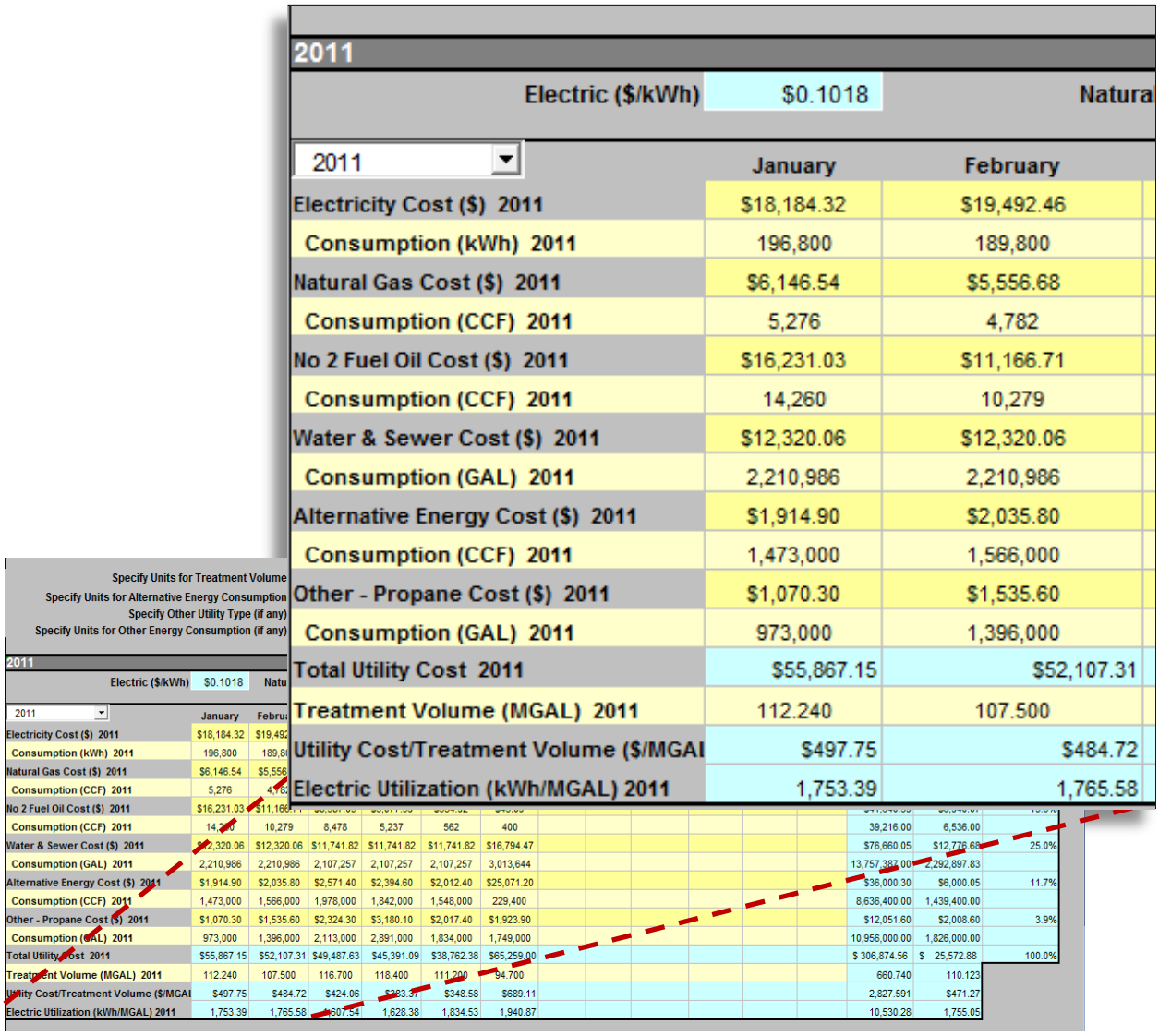


DISTRIBUTION OF ELECTRICAL ENERGY USE & COST BY MAJOR PROCESS FOR 7/2010 - 6/2011



Energy Use Assessment Tool

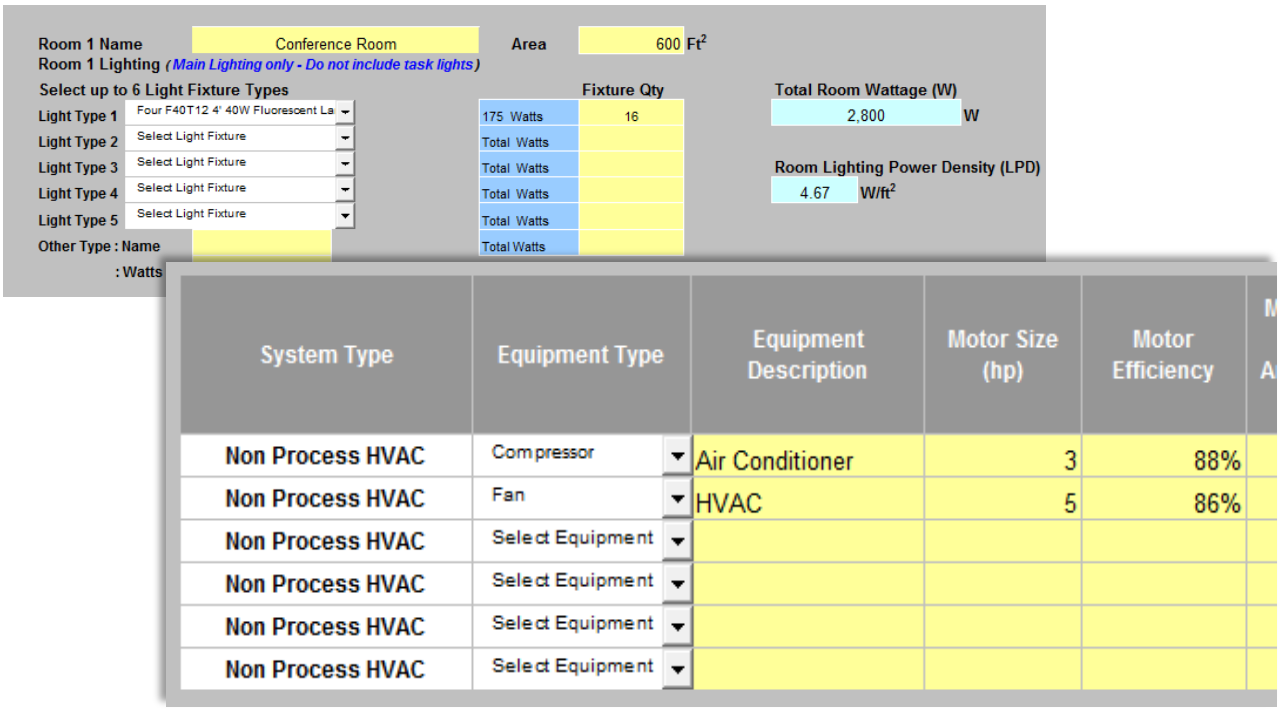
The Tool allows entry of up to five years of utility data. The Tool organizes the last five years of utility bills giving a clear look at how use and costs are trending. Use trends can show performance of existing or new equipment. It is recommended to enter more than just 12 months of data to develop useful trend comparisons.



2011		
Electric ($/kWh)	$0.1018	Natura
2011	January	February
Electricity Cost ($) 2011	$18,184.32	$19,492.46
Consumption (kWh) 2011	196,800	189,800
Natural Gas Cost ($) 2011	$6,146.54	$5,556.68
Consumption (CCF) 2011	5,276	4,782
No 2 Fuel Oil Cost ($) 2011	$16,231.03	$11,166.71
Consumption (CCF) 2011	14,260	10,279
Water & Sewer Cost ($) 2011	$12,320.06	$12,320.06
Consumption (GAL) 2011	2,210,986	2,210,986
Alternative Energy Cost ($) 2011	$1,914.90	$2,035.80
Consumption (CCF) 2011	1,473,000	1,566,000
Other - Propane Cost ($) 2011	$1,070.30	$1,535.60
Consumption (GAL) 2011	973,000	1,396,000
Total Utility Cost 2011	$55,867.15	$52,107.31
Treatment Volume (MGAL) 2011	112.240	107.500
Utility Cost/Treatment Volume ($/MGAL	$497.75	$484.72
Electric Utilization (kWh/MGAL) 2011	1,753.39	1,765.58

Energy Use Assessment Tool

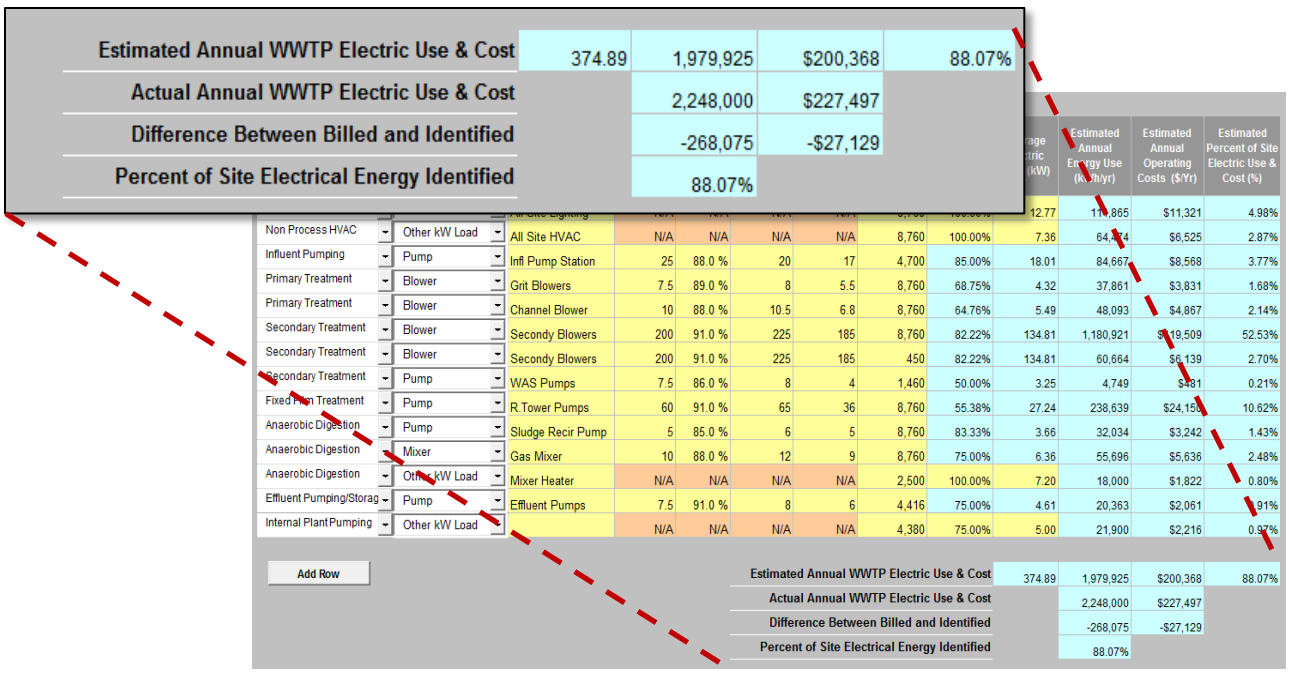
The Tool also assists in detailing lighting and HVAC in each building. Comparison of lighting density may highlight areas of energy inefficiency.



Room 1 Name	Conference Room	Area	600 Ft²
Room 1 Lighting (Main Lighting only - Do not include task lights)			
Select up to 6 Light Fixture Types		Fixture Qty	Total Room Wattage (W)
Light Type 1	Four F40T12 4' 40W Fluorescent La	175 Watts	16	2,800 W
Light Type 2	Select Light Fixture	Total Watts		
Light Type 3	Select Light Fixture	Total Watts		Room Lighting Power Density (LPD)
Light Type 4	Select Light Fixture	Total Watts		4.67 W/ft²
Light Type 5	Select Light Fixture	Total Watts		
Other Type : Name		Total Watts		
: Watts				

System Type	Equipment Type	Equipment Description	Motor Size (hp)	Motor Efficiency	A
Non Process HVAC	Compressor	Air Conditioner	3	88%	
Non Process HVAC	Fan	HVAC	5	86%	
Non Process HVAC	Select Equipment				
Non Process HVAC	Select Equipment				
Non Process HVAC	Select Equipment				
Non Process HVAC	Select Equipment				

Compiling the data of motor sizes, efficiencies and operating schedules into one place gives systems the ability to quickly assess opportunities for energy management of each area of the plant and determine whether it is more appropriate to replace equipment with newer technology or to instead change specific operational features of particular equipment.



Estimated Annual WWTP Electric Use & Cost	374.89	1,979,925	$200,368	88.07%							
Actual Annual WWTP Electric Use & Cost		2,248,000	$227,497								
Difference Between Billed and Identified		-268,075	-$27,129								
Percent of Site Electrical Energy Identified		88.07%									

									Estimated Annual Energy Use (kWh/yr)	Estimated Annual Operating Costs ($/Yr)	Estimated Percent of Site Electric Use & Cost (%)
Non Process HVAC	Other kW Load	All Site HVAC	N/A	N/A	N/A	N/A	8,760	100.00%	7.36	64,474	$6,525	2.87%
Influent Pumping	Pump	Infl Pump Station	25	88.0 %	20	17	4,700	85.00%	18.01	84,667	$8,568	3.77%
Primary Treatment	Blower	Grit Blowers	7.5	89.0 %	8	5.5	8,760	68.75%	4.32	37,861	$3,831	1.68%
Primary Treatment	Blower	Channel Blower	10	88.0 %	10.5	6.8	8,760	64.76%	5.49	48,093	$4,867	2.14%
Secondary Treatment	Blower	Secondy Blowers	200	91.0 %	225	185	8,760	82.22%	134.81	1,180,921	$119,509	52.53%
Secondary Treatment	Blower	Secondy Blowers	200	91.0 %	225	185	450	82.22%	134.81	60,664	$6,139	2.70%
Secondary Treatment	Pump	WAS Pumps	7.5	86.0 %	8	4	1,460	50.00%	3.25	4,749	$481	0.21%
Fixed Film Treatment	Pump	R.Tower Pumps	60	91.0 %	65	36	8,760	55.38%	27.24	238,639	$24,150	10.62%
Anaerobic Digestion	Pump	Sludge Recir Pump	5	85.0 %	6	5	8,760	83.33%	3.66	32,034	$3,242	1.43%
Anaerobic Digestion	Mixer	Gas Mixer	10	88.0 %	12	9	8,760	75.00%	6.36	55,696	$5,636	2.48%
Anaerobic Digestion	Other kW Load	Mixer Heater	N/A	N/A	N/A	N/A	2,500	100.00%	7.20	18,000	$1,822	0.80%
Effluent Pumping/Storag	Pump	Effluent Pumps	7.5	91.0 %	8	6	4,416	75.00%	4.61	20,363	$2,061	0.91%
Internal Plant Pumping	Other kW Load		N/A	N/A	N/A	N/A	4,380	75.00%	5.00	21,900	$2,216	0.97%

Add Row

Estimated Annual WWTP Electric Use & Cost	374.89	1,979,925	$200,368	88.07%
Actual Annual WWTP Electric Use & Cost		2,248,000	$227,497	
Difference Between Billed and Identified		-268,075	-$27,129	
Percent of Site Electrical Energy Identified		88.07%		

Establish an Energy Baseline

An energy baseline is developed by measuring and documenting your energy usage and costs at a specific time. This establishes a reference point for evaluating the effectiveness of future changes in process and equipment.

To establish a baseline you will collect utility bills and the operating data of process equipment, HVAC equipment and lighting.

The more information that's collected will produce a better baseline, but do not get frustrated "completing" the baseline because you do not have everything collected. What is a good amount to cover?

- **One to two years of utility bills are a good start for an initial baseline.** If more can be provided (up to five years), additional opportunities can be discovered in repeating bill trends.
- **Accounting for 80-90% of the electric load is ideal**, after totaling each piece of equipment's electric energy.
- **An operation schedule is just as important as energy use and efficiency data.** If possible capture daily information about how long and at what times the equipment is operated. Also note what factor(s) may influence the schedule (e.g., is it driven by demand, the process or an arbitrary schedule? Are these factors adjustable?)

Tips to Establish a Baseline

Break the process up into palatable slices ahead of time.

- Evaluate a new room or process every couple of days.
- **Focus on the big energy users first: motors 10 hp or greater, major HVAC equipment and significant groups of lighting.**
- After filling out equipment information in the Tool you will see what percentage of the billed energy usage you have documented.
- If this percentage is low or you have more time, go through and evaluate smaller equipment until you have reached a percentage you are comfortable with.
- Again, check the percentage of the billed energy usage you have accounted for prior to running the numbers.

What Exactly Am I Collecting?

You will be collecting the operating data of the facility's equipment to feed into the Energy Use Assessment Tool.

Motors –
horsepower output (hp),
motor efficiency (%),
full load amperage (FLA)

Electrical equipment –
watts (W) or
kilowatts (kW)

Energy Load & Operating Schedule

You want to collect the energy load and the operating schedule for major equipment to determine its energy consumption.

Sub-metering

If your facility has sub-metering after the initial utility company meter, collect this information to quickly identify where your energy is being used.

Equipment Consumption

To estimate equipment energy consumption you will collect equipment **nameplate data.** The Tool will show you how to easily calculate energy consumption.

The Tool will estimate your plant's electricity consumption from motors by utilizing their current operating load as compared to its rated load.

Collect the nameplate Full Load Amperage (FLA) information. If a motor does not have this information, the Tool will estimate its energy from its horsepower.

If your site has trained and authorized personnel, have them **measure the current** with an amperage (Amp) meter.

- Note that this reading may fluctuate slightly throughout the day from varying loads.
- A motor typically operates at a current (i.e., amperage) lower than its rated FLA.
- If an amperage reading is not available, then the Tool will use a default 75% load factor as an acceptable estimate.

Note: To save you time, the Tool will only estimate electric use for motors based on horsepower or current load factors. The Tool does not include voltage and power factor as these values typically do not vary and the additional time and effort to collect and enter this information is not required for entry in the Tool.

Review Your Calculated Metrics

As you are filling out your baseline pay attention to a couple of metrics which will be calculated by the Tool:

- Note the **percentage consumption for each system** compared to the site's total energy. (The WTP Energy Usage tab or the WWTP Energy Usage tab)
- Note the utility's **monthly energy consumed per gallon of water or wastewater treated**. This is your plant's energy utilization. (Summary Report tab)
- Note that a utility that has equipment which is rightly sized for its treatment flows will tend to have fairly consistent energy utilizations from month to month.
- Note that utilities which have opportunities for improved equipment sizing may have greatly varying utilization from month to month.

The point of the initial audit/baseline is to get a general understanding of what the big energy consumers are.

Identify the areas where you can get good value for making improvements by:

- **Focusing on assets consuming the most energy.** It is important to not get lost in the little things when developing the initial baseline. You can spend incredible amounts of time trying to capture every tiny piece of equipment and every little detail of each piece of equipment, but a perfect model of your facility is not the goal of the baseline.
- The point of the baseline involves working in some generalities, rough numbers, industry averages and rules of thumb. As you gain more experience the generalities become more evident, but realize **you want quality numbers, but you do not need to waste time chasing perfection**.

After "completing" the initial baseline, keep it up to date.

If you make equipment or process improvements or changes, make the quick update to the baseline. This will avoid large future updates when you need to evaluate a new situation.

Baseline Evaluation

Which systems are dominating your energy consumption?

The results can sometimes be surprising. Assets that you did not expect to be a large energy user may be identified as top energy use systems. This may be due to a large number of smaller assets with long operating hours. Examples include lighting or ventilation equipment. These can collectively contribute to a larger than expected percentage of energy usage.

Where should I focus my improvement efforts first?

Systems that consume a large percentage of the total energy consumption are those you want to initially focus your improvement efforts. If a vendor is recommending higher efficiency equipment, you can use the Tool's electrical balance to compare and contrast the potential impact to the site.

Will an improvement actually affect my bottom line?

Consider a scenario, a vendor approaches you with a 20% more efficient pump, which sounds great, but do you use that pump enough for the efficiency increase to save you energy and money? Once a baseline is developed then you will be able to more easily determine if an energy savings idea will actually affect the bottom line.

Energy bill usage trends can also provide opportunities for improvement.

Seasonal increases are expected, but drastic swings could point to a greater issue in HVAC or process design.

Increases in energy use per gallon of water or wastewater treated can show that aging major equipment is oversized or becoming ineffective.

What Will a Baseline Ultimately Do?

Having an organized baseline laid out in front of you can cause obvious improvements to become apparent that you may have never considered.

You may be shocked by what percentage of your energy use is consumed by lighting, digester pumps, etc.

A baseline allows you to quickly see the impact of changes to your budget.

Modifying your baseline to include new equipment being installed as part of a new process or expansion will quickly allow you to see the impact on the annual operating budget beyond the initial installation costs.

You are converting a garage to a chemical storage area, but it needs heat and ventilation. What is the potential impact of this change to your annual operating budget? You can use the Tool to enter the cut sheet data for the exhaust fan and electric unit heaters with expected run hours per year to determine the potential energy cost impact per year.

Having a baseline will help make day-to-day decisions easier.

The baseline can quickly be changed to see how replacing a piece of equipment may affect operating costs. It may be cheaper in one year's time to buy and install a new premium efficiency motor than to operate and maintain an older unit.

If the modified baseline shows a savings, use it as documentation to get approval for purchasing the new equipment.

Next Steps — Opportunities for Improvement

1. Prioritize further investigation of opportunities to reduce your energy use.

With energy evaluations the first goal is to find the "low hanging fruit." These are the changes to your operations or equipment that are cheap and/or quick to implement.

At first, focus on discovering opportunities for energy savings on the assets with the largest energy consumption; that is where your biggest savings can be made.

Once you have entered your information to a reasonable accuracy and create your energy usage baseline, you can identify where the majority of energy is being used.

As time permits, work down to progressively smaller assets until you have the "Balance of Plant Unidentified" as low of a value as possible. Focus on assets that run for long hours.

Next Steps — Opportunities for Improvement

Do not ignore lighting and HVAC as these areas have had recent technological improvements. Even an one-for-one replacement can provide great energy savings, sometimes at very low payback costs. Also, compare room lighting power densities as a first step to potentially identify where areas of the plant may be over lit.

Look to make operational changes before capital changes as these can often be at no cost.

Sometimes simple operation or technological changes can greatly reduce run time and cut large portions of energy consumption.

2. Determine operational improvements to reduce energy use.

Time is money when it comes to energy consumption and run time is a large factor in the amount of energy an asset uses. Changing operational procedures and schedules could reduce overall costs.

Shutting equipment down rather than leaving it idle during long periods of inactivity is an easy operator or programming change. Look for process equipment that is left on during non-processing periods or lighting and heating that are left on when a building is vacant.

Making these changes can provide great savings at little to no cost.

Ask yourself if you can operate this equipment during non-peak electricity hours when the $/kW or $/kWh is lower?

Next Steps — Opportunities for Improvement

Stagger equipment startup and the number of large pieces running simultaneously to avoid costly demand charges.

Electrical bills typically have Peak Demand charges which can be 25-50% of the plant's total electric bill. That means the more electric load the site consumes at one time, the larger the fee. Such peak demand is often carried over for months or years after it occurs. Starting or running multiple pieces of large equipment simultaneously multiplies the demand spike and your electricity bill.

Therefore, staggering equipment (such as those with cyclical operation) may reduce the system's peak demand and greatly reduce electrical fees.

Consult your utility rate schedule and/or utility representative to determine your plant's demand interval (e.g., 15 minutes, 30 minutes) to be sure you are making adjustments within the necessary time periods required by your rate schedule.

3. Determine equipment improvements to reduce energy use.

What technology is being used currently versus new alternatives that are available?

Do we need new equipment or can we retrofit existing equipment?

For buildings with no to low occupancy, lighting may be retrofitted with motion sensors. Also, depending on area ventilation requirements, ventilation fans may be retrofitted with controls that turn them down based on occupancy sensor or timer based devices.

Next Steps — Opportunities for Improvement

Compare current technology and equipment to alternatives that are higher efficiency. Ask yourself, what is the opportunity cost?

Lighting upgrades can result in large increases in efficiency. Payback results can be under a year or two.

Lighting and HVAC can often be oversized for the plant; however, it is important to consult an engineer who is an expert in regulations and safety before making fixture, lamp, ballast, quantity, heating, cooling, ventilation or control changes.

Should you get new equipment?

Gather capital, operating, and maintenance costs for new equipment and compare that to your existing operating costs. This is where you want to double check that you are accurately evaluating your existing equipment's energy usage.

- Don't get overly confident in theoretical claims. Actual results may not fully reach their manufacturer's claimed efficiencies.
- Replacing equipment that runs continuously will generally pay back faster than intermittently used equipment.
- Remember that you can have two identical pumps but different motors and net energy consumption. (The motors may be of different ages or different efficiencies.)
- Once high energy use equipment is identified, then analyze its efficiency.
- Can you turn existing waste into profit (e.g., Can digester gas be utilized for fuel in your boilers or a micro turbine)?
- See if there any local or federal programs that will assist in funding capital improvements for increasing your energy efficiency.
- Determine if your buildings and outdoor equipment are properly insulated. Improving insulation thickness, type and condition can dramatically decrease energy waste.

Next Steps — Opportunities for Improvement

4. Use the Tool to compare and contrast energy impacts (reductions or increases) from contemplated equipment upgrades or technology changes.

Save another copy of the Energy Use Assessment Tool to alter for hypothetical site changes. Change the baseline equipment listed in the Tool with different lighting types, more efficient equipment, or different operating schedules to see the possible yearly savings instantly. Note that these are estimates and there will always be differences in the actual utility savings.

Equipment Inventory: Breakdown of Electrical Energy Use for Major / Energy Intensive Equipment

Major Process/Top Energy Use Systems	Motor Efficiency (%)	Efficiency Rating	Electric Energy Use (%)	Electric Energy Use (kWh)	Electric Energy Cost ($)
Chemical Mix and Feed					
Blower - Blower 1	65	Low	0.29%	6,427	$650.42
Blower - Blower 2	65	Low	0.29%	6,427	$650.42
Clarification					
Mixer - Rapid Mixer	78	Low	2.12%	47,566	$4,813.71
Mixer - Tk Mixers Summer	9.6	Low	11.69%	262,707	$26,585.93
Decarbonation					
Mixer - Decarb Mixer 1	88	Medium	1.13%	25,364	$2,566.84

5. Use the Tool to confirm energy impacts (reductions or increases) as operational or equipment modifications or replacements are completed.

Keep the Energy Use Assessment Tool up-to-date as changes are made to the system and see the impact to utility consumption and provide a baseline for further work.

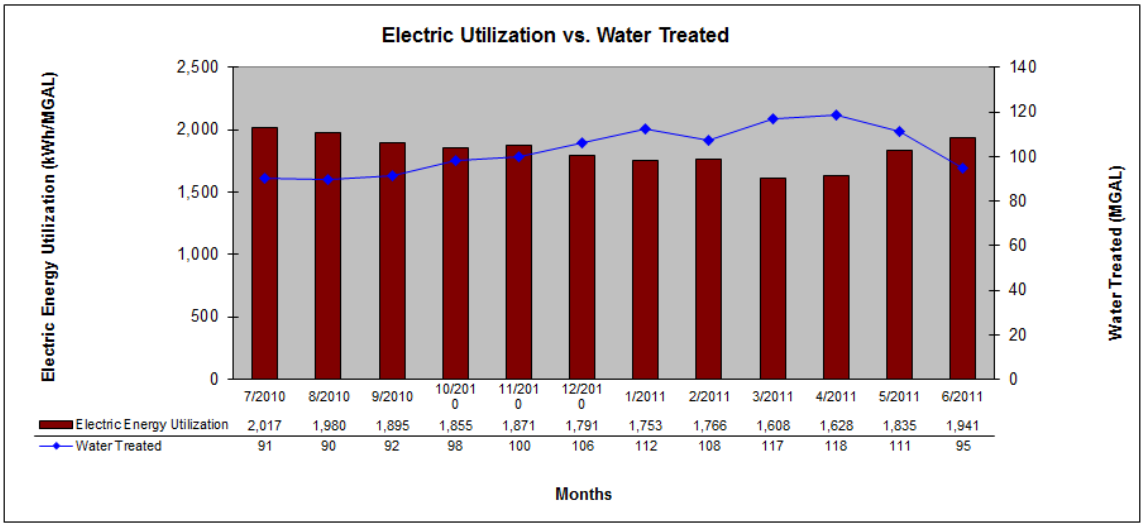
Next Steps — Opportunities for Improvement

6. Seek detailed engineering insight.

Process opportunities might exist beyond improving motor efficiencies and one-for-one upgrades. Seeking a detailed engineering analysis of the system's largest energy consuming processes could reveal new technologies or alterations to the original design that can reduce energy consumption.

7. Utilize the Summary Report.

- Provide a focused snapshot of the past and current energy utilization at the plant each month.
- Review trends to compare and contrast energy use and costs from month to month, season to season, and year to year.



8. Use the Tool to track site energy.

- Confirm use and cost impacts from operational and equipment improvements (and make sure these savings are captured each month).
- Identify quickly when use and/or costs have increased.
- Show where there may be system limitations at the plant requiring further analysis (e.g., where equipment is oversized and doesn't allow the plant to right size energy use as treatment volumes increase and decrease).

Resources

Getting Through an Energy Audit

EPA's EnergyStar Portfolio [www.energystar.gov/benchmark]

Understanding Your Electric Bill
[http://water.epa.gov/infrastructure/sustain/upload/Understanding-Your-Electric-Bill.pdf]

How to Hire an Energy Auditor
[www.energy.ca.gov/reports/efficiency_handbooks/400-00-001C.PDF]

Energy Action Plans and Request for Proposals (RFPs)

EPA's Ensuring a Sustainable Future: Energy Management Guidebook for Wastewater and Water Utilities
[www.epa.gov/waterinfrastructure/pdfs/guidebook_si_energymanagement.pdf].

Consortium for Energy Efficiency RFP Guidance for Water-Wastewater Projects
[www.cee1.org/ind/mot-sys/ww/rfp/index.php3]

5 Steps to Successful Energy Performance Contracting
[www.energyservicescoalition.org/resources/5steps.htm]

Best Practices

Water and Wastewater Energy Best Practice Guidebook
[www.werf.org/AM/Template.cfm?Section=Home&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=10245]

NYSERDA Water & Wastewater Energy Management Best Practices Handbook
[www.nyserda.ny.gov/Page-Sections/Commercial-and-Industrial/Sectors/Municipal-Water-and-Wastewater-Facilities/~/media/Files/EERP/Commercial/Sector/Municipalities/best-practice-handbook.ashx]

Saving Water & Energy in Small Water Systems
[http://watercenter.montana.edu/training/savingwater/default.htm]

Resources

A Closer Look at Pumps

Pump System Assessment Tool (PSAT)
[www1.eere.energy.gov/industry/bestpractices/software_psat.html]

Pump System Improvement Modeling Tool (PSIM)
[www.pumpsystemsmatter.org/content_detail.aspx?id=110]

Improving Pump System Performance: A Sourcebook for Industry
[www1.eere.energy.gov/industry/bestpractices/pdfs/pump.pdf]

A Closer Look at Motors

DOE factsheet Determining Electric Motor Load and Efficiency
[www1.eere.energy.gov/industry/bestpractices/pdfs/10097517.pdf]

U.S. DOE Motor Challenges Program
[www1.eere.energy.gov/industry/bestpractices/techpubs_motors.html]

Water Efficiency

U.S. EPA WaterSense [www.epa.gov/watersense]

American Water Works Association (AWWA) Water Audit Software
[http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx]

Green Energy

U.S. EPA Green Power Partnerships [www.epa.gov/greenpower]

U.S. DOE Energy Efficiency and Renewable Energy Clearinghouse [www.eere.energy.gov]

Saving Water & Energy in Small Water
[http://watercenter.montana.edu/training/savingwater/default.htm]

Resources

Funding

DWSRF Green Project Reserve Guidance [www.epa.state.il.us/water/financial-assistance/publications/green-project-reserve-guidance.pdf]

DWSRF Contacts by State [www.epa.gov/ogwdw/dwsrf/nims/dwagency2.pdf]

Database of State Incentives for Renewables & Efficiency (DSIRE) [www.dsireusa.org]

Federal Energy Management Program (FEMP) [www1.eere.energy.gov/femp/financing/energyincentiveprograms.html]

U.S. Department of Energy

- ✓ **Save Energy Now Program** is an initiative to reduce industrial energy intensity. Companies can participate in no-cost energy assessments. [www1.eere.energy.gov/industry/saveenergynow/assessments.html]
- ✓ **Energy Efficiency and Conservation Block Grant Program** (EECBG) [www1.eere.energy.gov/wip/eecbg.html]

U.S. Department of Agriculture (USDA)

- ✓ **Rural Energy for America Program Grants/Energy Audit and Renewable Energy Development Assist** (REAP/EA/REDA) [www.rurdev.usda.gov/rbs/busp/REAPEA.htm].
- ✓ **Rural Development through the Rural Energy for America Program Guaranteed Loan Program** (REAP LOAN) [www.rurdev.usda.gov/rbs/busp/9006loan.htm]

U.S. Department of Health and Human Services - Rural Assistance Center (RAC) [www.raconline.org/funding]

Questions?

Contact us at
EnergyUseTool@epa.gov

EPA United States Environmental Protection Agency

DRINKING WATER ACADEMY DWA

PRINT FORM RESET FORM

Preliminary Energy Assessment Service Request Form

Form# 50-852

SECO State Energy Conservation Office

Public Entity Name _____ *Telephone* _____

Contact Person _____ *Title* _____

Email Address _____ *County* _____

Street Address _____ *City* _____ *State* _____ *ZIP Code* _____

Mailing Address _____ *City* _____ *State* _____ *ZIP Code* _____

Preliminary Energy Assessment Service Eligibility

The State Energy Conservation Office (SECO) provides free preliminary energy assessments (PEAs) for existing public facilities and infrastructure. Eligible entities include municipal and county governments, public school districts, county hospitals, port authorities, major airports, public water authorities and municipally owned utilities. Leased or rented facilities and infrastructure are not eligible for this service.

Principles of Agreement

By submitting this request form, the entity listed above must agree to:

- select a contact person to work with SECO and its designated contractor to establish an energy policy and set realistic energy efficiency goals;
- allow SECO's designated contractor to provide walk-through assessments of selected facilities;
- schedule a time for SECO's designated contractor to make a presentation on the assessment findings to key decision-makers;
- consider implementing the PEA's energy savings recommendations; and
- allow SECO to post portions of this report on its website

Additional Questions

Has this organization used SECO's technical assistance or PEA services in the past? ◯ Yes ◯ No

Is the primary contact for this PEA familiar with SECO's LoanSTAR revolving loan program? ◯ Yes ◯ No

Has this organization used SECO's LoanSTAR revolving loan program in the past? ◯ Yes ◯ No

Signature

This agreement must be signed by your organization's chief executive officer or other signing authority.

Signature _____ *Date* _____

Print Name _____ *Title* _____

Submit completed forms to SECO at seco.forms@cpa.texas.gov

or by mail to: State Energy Conservation Office
Attn: SECO Program Manager
111 E. 17th Street
Austin, TX 78711-1440

TCEQ REGULATORY GUIDANCE
Environmental Assistance Division
RG-530b ● Revised October 2017

Managing Small Domestic Wastewater Systems: Part B, Sustainable Systems

Contents

Introduction

This publication is Part B of a five-part series *Managing Small Domestic Wastewater Systems* (TCEQ publication series RG-530) and includes information and resources for managing your system more efficiently through energy assessments and energy-efficiency improvements, water conservation, and public-participation programs. It includes information about managing your influent through pretreatment and a road map to sustainability.

As you work though Part B, you may find it beneficial to review other parts of the series, particularly Part A, *Asset Management* (RG-530a), to help you prioritize your upgrades. To view or download the complete series, go to the TCEQ Small Business and Local Government Assistance section's webpage at <www.tceq.texas.gov/goto/rg-530>. If you do not have internet access, call the SBLGA's toll-free hotline number 800-447-2827 to request a paper copy of the complete series *Managing Small Domestic Wastewater Systems* (RG-530).

What is sustainability?

If your system is "sustainable," that means it is well-managed—using energy and water responsibly, preparing to meet projected population changes through financial planning and technical know-how, and meeting compliance with the rules—while providing good service and encouraging communication with your customers. Many small wastewater systems are taken for granted by customers, and it's possible that you can improve your image by simple outreach to your customers directly and to the community at large.

There are many resources to help make your system more sustainable. The USDA and EPA have prepared the *Rural and Small Systems Guidebook to Sustainable Utility Management,* and you can use it to improve several management areas, including product quality, customer satisfaction, employee and leadership development, financial viability, infrastructure stability, and others. The guidebook also has a self-assessment worksheet

to help you find areas for improvement. It is available online at <www.tceq.texas.gov/goto/PartBResources>.

We will walk you through some components of sustainability. These are all best management practices that you can incorporate into your existing management plans. Some funding sources will want to see that you are considering the long-term management of your system before they offer you a loan.

Sustainable Systems: Best Management Practices

- **Develop an asset-management plan.** In Part A of this guide, *Asset Management* (RG-530a), we discuss developing an asset-management plan—which is a good place to start. The worksheets and instructions will help you conduct an inventory of the treatment system's resources; prioritize repairs and replacements, plan for future needs, and develop a budget.
- **Prepare an operation-and-maintenance plan.** In Part C, *Operation and Maintenance* (RG-530c), we detail the requirements for creating an operation-and-maintenance plan for your system. You can also create a program for scheduling and performing preventive and general maintenance.
- **Conduct an energy audit.** Consider changing equipment and processes, referring to your energy-audit results and asset-management plan.
- **Evaluate your effluent and influent.** You need to make changes to your treatment process or upgrade your pretreatment ordinances if you determine your current treatment system is not adequate. Worksheets in Part E, *Resources* (RG-530e), will help you identify trends in monthly sampling results.
- **Conduct inflow and infiltration analyses.** Capacity needs change over time. The EPA's *Guide for Estimating Infiltration and Inflow* and their *Quick Guide for Estimating Infiltration and Inflow* are available at <www.tceq.texas.gov/goto/PartBResources>.
- **Develop a water conservation plan**. Work with the water provider in your area to reduce water use by installing more efficient fixtures, encouraging reuse, and conducting water-use audits.

Review Your Energy Use

You should conduct an annual energy survey to determine where you can conserve energy or improve efficiency. This survey should review all energy-consuming processes, such as aeration and pumping. Through the results of the survey, combined with your asset-management plan, you should see what equipment upgrades will benefit your system.

Energy Audits

You can have a staff member who is knowledgeable about the process conduct your energy audit, or you may decide to hire a consultant. Monitoring the activities of the consultant takes time, but you may find it less time consuming than conducting the audit in-house. An in-house audit will require your staff member, as opposed to a contractor, to follow through with recommendations he or she identifies before your facility sees positive results.

There are three types of audits, ranging from simple to complex: preliminary, single-purpose, and comprehensive. A simplified audit will contain less detail and result in less money saved than a more comprehensive audit. A preliminary audit will indicate whether a more extensive review is required, whereas a single-purpose audit analyzes one aspect or function, such as lighting, motors, HVAC, etc. A comprehensive audit is facility-wide and evaluates all major energy-using systems.

Audit forms are available online to help guide you through an internal audit. We have modified a checklist created by the Consortium for Energy Efficiency and included it at the end of this publication. Once you've completed the checklist, you can discuss possible upgrades with your asset-management team. The team will have prioritized maintenance and replacement schedules and will be able to use the results of your audit to make more energy-efficient choices. For help creating an asset-management plan, see Part A of this series, *Asset Management* (RG-530a).

Energy Assessments

Energy assessments are a more intense energy audit. Some funding sources, like the Texas Water Development Board (TWDB) Clean Water State Revolving Fund, can fund energy efficiency projects, including the energy assessment, if the assessment is reasonably expected to lead to a capital project. Tools to assist you with your energy assessment are available through the EPA and the New York State Energy Research and Development Authority (NYSERDA). We will guide you through the general concepts.

Step 1: Conducting an energy assessment will help you determine your baseline power use, evaluate your plant, and identify opportunities to save energy. The first step to conducting an in-house assessment is to **form an energy team** to develop an energy management plan, establish goals, define resource needs for the team, and serve as an information clearinghouse. The energy team should consist of many layers of the facility staff and may include the manager, operator, mayor, and an accountant. The size of the team will depend on the size and complexity of the system.

Step 2: Your team will **develop baseline energy use** from historical records. By looking at the last 12 months of energy bills, you will begin to understand where and when energy is used most. You'll also better understand your energy costs, such as changes in rates during peak and non-peak hours. Determining baseline energy use will require organizing treatment processes by functional area, evaluating energy bills and understanding rate structures, assessing the energy use difference with hydraulic loading, and organizing data in a useful way.

Step 3: Once your baseline energy use is established, you're ready to **evaluate the system and collect current data**. This includes conducting a system walk-through to verify the equipment specifications and operations, performing staff interviews to determine operational history, identifying conservation opportunities, conducting measurements and collecting data on run times of motors, or calculating the energy used for millions of gallons of wastewater treated per day or biochemical oxygen

demand (BOD) removed. You will create a benchmark to compare future data. You might start with the largest pieces of equipment or more energy-consuming processes.

Step 4: **Identify opportunities for energy conservation.** This can include capital improvement or replacement of equipment, a change in process or operations, automation or change of controls, or improving maintenance. You might talk to neighboring facilities, associations, or consultants to help identify ways to improve efficiency at your plant.

Step 5: **Prioritize implementation of your changes.** Evaluate the areas where upgrades will improve energy efficiency the most. Some equipment may be due for replacement as part of your asset-management plan. When choosing new equipment, consider your energy goals. The most efficient equipment may have a higher cost up-front, but it may be easier to maintain and less expensive to operate for the long-term. This will require a cost-benefit analysis to evaluate the costs of buying and operating less expensive equipment that uses more energy as compared with more expensive energy-efficient equipment.

As you prioritize your changes, you will be developing an implementation plan. This plan should communicate what you plan to do, what resources (staff, time, and money) you will need, and what the results will be. Implementing an energy program can be difficult for several reasons, including cost, space, staff, engineering constraints, changes in chemical use, and changes in operations. The more effort you put into the assessment, the stronger your plan will be. A clear plan will help you inform stakeholders of your decisions.

Once new equipment and processes are put into place, keep track of how the change affected the system, staff, and energy use. More information is available in the *Best Practices Handbook* from the NYSERDA, including best management practices for energy conservation and spreadsheets for conducting your own energy assessment: <www.tceq.texas.gov/goto/PartBResources>.

Here are resources to help you conduct an audit, all available at <www.tceq.texas.gov/goto/PartBResources>:

- The EPA's Energy Use Assessment Tool can help you evaluate equipment and create a baseline of energy use.
- The Texas comptroller's State Energy Conservation Office can conduct preliminary energy assessments for you. This service is available to public utilities.
- The Department of Energy Industrial Assessment Centers conducts audits.

Energy-Efficiency Improvements

Some energy-efficiency improvements are easier to make than others. For example, you can make energy-saving changes by:

- Modifying lighting, updating HVAC, or making other building improvements.
- Reducing facility loading by using equalization basins to minimize peak flow and investigating inflow and infiltration.
- Using supervisory-control and data-acquisition (SCADA) software to monitor processes and use data to create a table of expected results for the system.
- Implementing an energy-management program by creating an energy team, monitoring power use, and reducing peak power demand.

The EPA's *Evaluation of Energy Conservation Measures for Wastewater Treatment Facilities* details equipment replacement, operational changes, and process-control enhancements to improve energy efficiency, including increasing efficiency of pumping systems, modification and control of aeration systems and blower types, and conservation measures for treatment processes. You can download the report at <www.tceq.texas.gov/goto/PartBResources>.

If you want to streamline the assessment and audit phases, you might consider contracting an energy services company. Resources are available to help you choose a contractor, including *How to Hire an Energy Services Company* from the California Energy Commission, available online at <www.tceq.texas.gov/goto/PartBResources>.

Water Conservation

To qualify for Clean Water State Revolving Fund funds greater than $500,000 from the TWDB, you must have a water-conservation plan. The goal is to reduce water use, which will ultimately reduce flow to the wastewater system. This may involve collaborating with your water provider and could be accomplished in several ways:

- **Water-saving fixtures.** Install or retrofit plumbing fixtures, such as shower heads, toilets, and faucets. Consider education and incentives to conserve water.
- **Water meters.** Make sure meters are functioning properly and consider upgrading meters that are old.
- **Water audits and conservation plans.** Assess large water users to determine ways they can conserve.
- **Develop a conservation program.** See the TWDB's Water Conservation Plans at <www.tceq.texas.gov/goto/PartBResources>to create a water-conservation program.
- **Use reclaimed water.** You can reuse treated water at your facility without authorization [30 TAC 210.4(c)*]. Your community can consider using reclaimed water for irrigation at parks, golf courses, and residential developments. Other uses include crop irrigation, dust control, and fire suppression. The analytical requirements and authorization levels vary. You can find more information about the TCEQ's Requirements for Reclaimed Water at: <www.tceq.texas.gov/goto/PartBResources>.

More information is available from the TWDB, including what to include in your conservation plan, conservation-plan checklists, and fact sheets.

Know Your Operation

In order to maintain your system and meet permit requirements, you need to understand a few things about your system:

- know your influent
- understand the effects of inflow and infiltration

* Short for 'Title 30, Texas Administrative Code, subsection 210.4(c).'

- control influent from lift stations
- maintain optimal solids

These topics and others are included in our publication *Troubleshooting Bacteria Levels at Wastewater Treatment Plants* (RG-515), wherein we discuss meeting bacteria limits, which are new to some permits.

Pretreatment

Wastewater plants are designed to handle five conventional pollutants: BOD, total suspended solids, fecal coliform, pH, and oil and grease. Industrial and commercial facilities that discharge toxic or non-conventional pollutants to your system could harm your plant in several ways, by:

- Causing damage to the infrastructure through corrosion.
- Killing your microorganisms and disrupting the system.
- Contaminating your sludge and affecting your ability to dispose normally.
- Exceeding your permitted effluent.

The national pretreatment program was designed to protect **publicly owned** wastewater systems from toxic or non-conventional pollutants, and the TCEQ has the delegated authority to run the pretreatment program in Texas.

To establish a pretreatment program at your facility, you must perform a survey to determine what types and amounts of pollutants industrial users will discharge. You will also develop a program for sampling, inspection, and reporting in accordance with Title 40, Code of Federal Regulations, Sections 403.8 and 403.12. There are other requirements, and the TCEQ can help you. If you have questions about the pretreatment program, call TCEQ's Pretreatment Program at 512-239-4671.

Your city should have specific ordinances to establish its pretreatment program, and you can make your program as stringent as you need to protect your plant and infrastructure.

The EPA has prepared an *Introduction to the National Pretreatment Program,* available at: <www.tceq.texas.gov/goto/PartBResources>. It

includes a good background on pretreatment and the requirements for your wastewater system and industrial users.

If you have a privately owned or investor-owned wastewater system, you can follow the federal guidelines and create a local program. You will want to incorporate user agreements into your program. Privately owned pretreatment programs are not regulated by the TCEQ.

Making Changes to Your System

Remember that your facility's permit is written specifically for the processes at your plant. You may determine that you need to make changes to your plant. Before you consider making changes, consult a permit writer on the Municipal Permits Team at the TCEQ to determine how you will need to amend your permit.

If the changes are not urgent, you may consider waiting to make them until your permit is scheduled for renewal. Depending on the type of changes you want to make, you may be able to renew your permit with a minor amendment. Extensive changes (e.g., potential modifications to address buffer-zone issues for a new treatment unit) will require a major amendment. Major amendments require mailed public notices to affected landowners in addition to the published notices. Your permit writer will be able to advise you on application timelines. You can contact the Municipal Permits Team at 512-239-4671.

Public-Participation Programs

Much of the wastewater that is received at your plant is likely from homes, apartment buildings, or commercial businesses. You have an opportunity to improve the wastewater coming into your plant through education and outreach.

We know that starting with young children is an effective way to improve behaviors of adults at home. Once you decide what message you want your customers to hear, you might consider going to the elementary schools to tell the kids where their toilet and sink waters go. You might

also consider teaming up with apartment management companies to supply them with outreach materials to be posted in a central location. The TCEQ's Small Business and Local Government Assistance section and Take Care of Texas Program may have some resources that suit your needs.

Here are several issues that you might consider talking about: fats, oils and grease; "flushable" products; and drug disposal.

Fats, Oils, and Grease

Fats, oils, and grease (FOG) can damage your system in a few ways. FOG can cause sanitary sewer overflows (SSOs); it can affect your ability to treat and disinfect your wastewater; and it can result in wear on your collection system.

When you have an SSO, not only do you have requirements to report the overflow to the TCEQ and remediation to conduct, you also have a public-relations problem. This costs you money in resources (equipment use, personnel, overtime pay), and it affects your image with the community. The best way to prevent SSOs is to reduce FOG in the system. The best way to reduce FOG is to let people know it's a problem.

There are many examples of FOG outreach. The most notable is the City of Dallas' Cease the Grease program. It's a complex combination of television ads, flyers, bill inserts, stickers, door hangers, and direct mail-outs. They also have locations where customers can have their used grease and cooking oil recycled into gas to run the wastewater plant. You may not be able to create a recycling program or multimedia outreach campaign, but the TCEQ has devoted a webpage to FOG to help you improve outreach in your area. To view this information click on the "TCEQ's Fats, Oils, and Grease (FOG)" link at: <www.tceq.texas.gov/goto/PartBResources>.

"Flushable" Products

Wastewater systems have encountered problems with items that should not be flushed (paper towels, personal hygiene items, cat litter, baby wipes, etc.). Within the last few years, use of "flushable" wipes has increased the number of clogs and amount of maintenance needed in

collection systems. You can consider outreach or you can consider installing grinder pumps to address the issue.

Some slogans for outreach include “wipes clog pipes” and “no wipes in the pipes, only toilet paper down the toilet.” King County, Washington, created a public-outreach webpage titled “Don’t flush trouble.” We provide a link to their webpage at <www.tceq.texas.gov/goto/PartBResources>. You could also consider contacting your local media outlets (tv stations, newpapers) to do a story on your plant and the issues flushable products create.

In addition, the San Jacinto River Authority has created a “Patty Potty” campaign that has generic outreach materials you can use. More information is available on the authority’s website, linked at <www.tceq.texas.gov/goto/PartBResources>, including the “don’t flush list” and “no wipes in the pipes.” The Galveston Bay Foundation is working to combine Patty Potty with its Cease the Grease campaign to create a one-stop shop for outreach.

Drug Take-Back Programs

Pharmaceuticals in wastewater are a growing water quality concern. You can let customers know not to flush medication. Resources are available to locate drug take-back programs, including the American Medicine Chest Challenge—see <www.tceq.texas.gov/goto/PartBResources>.

Customers should know about alternatives to flushing medication. These are some tips for proper disposal:

1. Pour medication into a sealable plastic bag. If the medication is solid (pill, liquid capsule, etc.), add water to dissolve it.
2. Add cat litter, sawdust, coffee grounds to the bag (or any material that mixes with the medication and makes it less appealing for pets and children to eat).
3. Seal the bag and put it in the trash.
4. Remove and destroy all identifying personal information (usually on the prescription label) from all medication containers before recycling them or throwing them away.

Need more help?

The TCEQ's Financial, Managerial and Technical Assistance Program offers free on-site assistance from a contractor to help you analyze your planning options and help you with all aspects of running and funding your wastewater system. For more information about the program, visit <www.tceq.texas.gov/goto/PartBResources>, call the Water Supply Division at 512-239-4691, or contact the SBLGA representative in your region by calling our toll-free, confidential compliance hotline: 800-447-2827.

Many state and federal funding agencies make grants and loans available for planning and development of new wastewater-treatment plants and infrastructure improvements. The Texas Water Infrastructure Coordination Committee (TWICC) is a group of local, state, and federal agencies that collaborate to identify issues with water and wastewater infrastructure and compliance, and to seek affordable, sustainable, and innovative funding strategies for the protection of public health and efficient use of government resources in Texas. You can contact TWICC by phone at 512-463-7870, by e-mail at <TWICC@twdb.state.tx.us>, or by fax at 512-475-2086 or visit <www.tceq.texas.gov/goto/PartBResources> to learn more about the program or the TWDB's financial assistance to wastewater systems.

References

Publications and webpages referenced throughout this module are available at <www.tceq.texas.gov/goto/PartBResources> and are listed in the order in which they appear in Part B.

Sustainability

USDA and EPA: *Rural and Small Systems Guidebook to Sustainable Utility Management*

Energy Assessments

California Energy Commission: *How to Hire an Energy Services Company*

Department of Energy Industrial Assessment Centers: EPA Energy Use Assessment Tool

EPA: *Evaluation of Energy Conservation Measures for Wastewater Treatment Facilities*

NYSERD: *Best Practices Handbook*

The State Energy Conservation Preliminary Energy Assessment

Operation Guidance

DEA: drug take-back programs

EPA: *Guide for Estimating I&I and Quick Guide for Estimating I&I*

EPA: *Introduction to the National Pretreatment Program*

King County, Washington: “Don’t flush trouble”

San Jacinto River Authority: “Patty Potty” Campaign

TCEQ: Requirements for reclaimed water

TCEQ: Developing a new pretreatment program

TWDB: Conservation-plan checklists

TWDB: Tools to create a water-conservation program

TCEQ: Fats, oils, and grease

TCEQ Financial, Managerial and Technical Assistance Program

Texas Water Infrastructure Coordination Committee

Energy Audit Checklist

Many wastewater facilities could save 20 to 40 percent of energy use by making energy-efficiency upgrades. You should conduct an energy survey every year to determine where you can conserve energy or improve efficiency. This survey reviews energy-consuming processes, such as aeration and pumping. Use the results of the survey and your asset-management plan to determine what equipment upgrades will most benefit your system.

Answer only the questions that apply to your system. For each section, include additional comments or notes about past or planned upgrades. **More than five responses in the shaded boxes, for Table 1 through Table 5 collectively, indicates potential for energy savings.**

Table 1. Influent and Effluent Pumps

Yes or No Questions on Influent and Effluent Pumps	*Yes*	*No*
a. Do you have influent or effluent pumps?		
b. For influent pumps: do they have variable speed control?		
c. For influent pumps: are premium-efficiency motors currently installed?		
d. For effluent pumps: do they have variable speed control?		
e. For effluent pumps: are premium-efficiency motors currently installed?		

Table 1 Notes:

Table 2. Aeration

Yes or No Questions on Aeration	*Yes*	*No*
a. Does your plant use aeration blowers or compressors for pre-aeration, post-aeration or other aerated channels?		
b. If yes, can you adjust the air output?		

Table 2 Notes:

Table 3. Intermediate Pumping

Yes or No Questions on Intermediate Pumping	*Yes*	*No*
a. Do you have intermediate pumps to convey flow from primary to secondary processes or from secondary to tertiary treatment processes?		
b. If yes, do you have variable speed control on these pumps?		
c. Are premium-efficiency motors currently installed on these pumps?		

Table 3 Notes:

Table 4. Activated-Sludge Processes

Yes or No Questions on Activated-Sludge Processes	*Yes*	*No*
a. Does your plant use aeration blowers orcompressors as part of the activated sludge process?		
b. If yes, can you adjust the air output?		
c. Are premium-efficiency motors currently installed?		
d. Does your plant use mechanical aerators (including mixers in pure oxygen systems)?		
e. If yes, do the aerators have variable speed control?		
f. Is your aeration system controlled via dissolved-oxygen levels or pressure differentials?		
g. If yes, are dissolved-oxygen or pressure sensors located within the aeration basins?		
h. Do you currently use a fine-bubble aeration system?		
i. If you have a pure oxygen system, do you have a vacuum–pressure-swing adsorption (VPSA) O_2-generation system?		
j. Do you currently have variable-speed return-activated sludge (RAS) pumps?		
k. Do you currently have variable-speed waste-activated sludge (WAS) pumps?		

Table 4 Notes:

Table 5. Biological Treatment Processes

Yes or No Questions on Biological Treatment Processes	*Yes*	*No*
a. Does your plant use supplemental aeration blowers or compressors as part of a fixed-film process?		
b. If yes, are there currently means to throttle the amount of air delivered or otherwise adjust output?		
c. Are premium-efficiency motors currently installed?		
d. Do you pump to convey flow to the trickling filters?		
e. If yes, do you have variable speed control on these pumps?		
f. Are your trickling-filter distribution arms mechanically driven?		

Table 5 Notes:

Table 6. Disinfection Systems

Yes or No Questions on Disinfection Systems	*Yes*	*No*
a. Do you currently use an ultraviolet disinfection system?		
b. If yes, does the UV system use low-pressure, high-output lamps?		
c. Is the system operated via flow pacing or a dosing set point based on water quality?		

Table 6 Notes:

Table 7. Sludge Pumping

Yes or No Questions on Sludge Pumping	*Yes*	*No*
a. Do you process sludge on intermittently (less than 24 hours per day)?		
b. If yes, do you currently process sludge during off-peak hours?		
c. Do you currently have any equalization capacity within your existing process for handling sludge?		
d. If no, do you have variable speed capability on your sludge-transfer pumps?		

Table 7 Notes:

Table 8. Sludge Stabilization

Yes or No Questions on Sludge Stabilization	*Yes*	*No*
a. Does your plant use aerobic digestion?		
b. If yes, has there been any discussion of switching to anaerobic digestion or other stabilization method (e.g., lime stabilization)?		
c. Do you currently have the capability to produce biogas (methane) from anaerobic digestion?		
d. Is biogas currently flared or vented?		
e. Is biogas currently being used for thermal or electrical power generation?		
f. Does your plant currently accept hauled waste at its headworks?		
g. If yes, is there equalization to allow hauled wastes to be introduced gradually or during low-loading periods?		

Table 8 Notes:

Table 9. Sludge Processing

Yes or No Questions on Sludge Processing	*Yes*	*No*
a. Does your thickening or dewatering equipment run intermittently (less than 24 hours per day on average)?		
b. Do you use centrifuges for thickening, dewatering, or both?		
c. Do you currently use sludge-drying beds for dewatering?		
d. Does your plant currently haul sludge to another location for processing?		
e. Does your plant use incineration for sludge stabilization or disposal?		

Table 9 Notes:

Table 10. Other Projects

Yes or No Questions on Other Projects	*Yes*	*No*
a. Has your plant undergone any energy improvement projects in the last five years?		
b. If yes, have any of these projects involved switching to more efficient lighting?		
c. If yes, have any of these projects involved load shedding or off-peak load shifting?		
d. If yes, have any of these projects involved installation of new or improved HVAC equipment?		
e. Is your plant or will your plant be undergoing capacity expansion to comply with 30 TAC 217?		
f. If yes, are energy-conservation measures included within the capacity improvements?		

Table 10 Notes:

These forms have been adapted from forms created for Efficiency Vermont and the New York State Energy Research and Development Authority by the Consortium for Energy Efficiency.

Remember, if you plan to make changes to your system, verify that a permit amendment or design approval isn't required by calling the TCEQ wastewater permitting at 512-239-4971.

For More Information

For confidential assistance with environmental compliance, contact the Small Business and Local Government Assistance Hotline at 800-447-2827, or visit <www.TexasEnviroHelp.org>.

APPENDIX J – Fiscal Sustainability Plan Certification

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

Fiscal Sustainability Plan (FSP) Certification

This certification applies to loan applications submitted on or after October 1, 2014, that involve the repair, replacement, or expansion of a publically owned treatment works in accordance with the Water Resources Reform and Development Act of 2014 (WRRDA), Section 603(d)(1)(E). FSPs are not required for new treatment works unless they are physically replacing an existing treatment works or expanding the treatment capacity of an existing system or for projects involving an upgrade that does not involve repair/replacement or expansion of the treatment capacity (e.g., adding advanced treatment).

Name of Entity: _____

TWDB Project Number: _____

Project Name: _____

WRRDA Section 603 (d)(1)(E) states that: *for a treatment works proposed for repair, replacement, or expansion, and eligible for assistance under subsection (c)(1), the recipient of a loan shall—*

- *(i) develop and implement a fiscal sustainability plan that includes—*
  - *(I) an inventory of critical assets that are a part of the treatment works;*
  - *(II) an evaluation of the condition and performance of inventoried assets or asset groupings;*
  - *(III) a certification that the recipient has evaluated and will be implementing water and energy conservation efforts as part of the plan; and*
  - *(IV) a plan for maintaining, repairing, and, as necessary, replacing the treatment works and a plan for funding such activities;* ***or***
- *(ii) certify that the recipient has developed and implemented a plan that meets the requirements under clause (i)*

Check the appropriate statement below and sign the signature block.

☐ By signing below, the loan recipient certifies a plan has been developed and is being implemented to meet the requirements under clause (*i*) above.

☐ By signing below, the loan recipient agrees to develop and implement a fiscal sustainability plan, and will certify, using this certification form, the plan meets the requirements under clause (*i*) above as a deliverable under the loan agreement. In this case, the loan recipient shall submit the certification form to the TWDB prior to the final funds disbursement on the final contract of the stated project.

_____ _____

Signature of Authorized Official Date

_____

Printed Name of Authorized Official

_____

Title of Authorized Official

TWDB Use Only – Review Engineer's Acceptance ☐ Initials _____

APPENDIX K – Public Participation Template Document

Sample article posting for Government Website:

These simple actions can help protect our environment, public health, and your pocketbook.

“Rags” is the sewer utility term for fibrous materials that don’t break down after being flushed down your plumbing. Rags and other items disposed of improperly within the city sewer system can damage sewer pumping equipment and impede pumping operations at our sewer lift stations and wastewater treatment plant.

They clog the impellers inside system pumps and then have to be manually removed. Such clogging hinders the operation of pumps and diminishes their efficiency, which subsequently causes back-ups and high levels in lift stations. This creates a threat of sewer system overflows that can be a serious hazard to public health and the environment.

Additionally, it creates unnecessary maintenance expense that can eventually impact customer rates and bills. Your assistance is needed to stop the practice of placing rags, towels, cleaning wipes, feminine hygiene products, as well as objects such as rope, mop-heads and even old clothing, into the city sewer system.

Please be sure to dispose of these items in the garbage, and make sure all floor drains within your home or business are protected with grating.

Don't Flush These Items!

Wipes

Paper Towels

Diapers

Feminine Pads

Moist Towelettes

Cloths

The City needs your help!
Why you should care.
These items can cause blockages and:

- Plugged and Overflowing Toilets
- Poorly draining sinks/showers
- Raw sewage backing up through your drain
- Manholes overflowing onto the ground
- Health hazards and bad odors
- Increases City's maintenance costs
- Costly maintenance and repair bills for you!

WALLIS TEXAS

The City needs your help!

- Please do not dump any liquids or solids down these "clean-out"lines
- Call the city public works department if you see one that is missing a lid or broken.

Dumping down "clean-out" lines can cause:
- Raw sewage backing up through your drain
- Manholes overflowing onto the ground
- Health hazards and bad odors
- Increases City's maintenance costs
- Costly maintenance and repair bills for you!

WALLIS TEXAS