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St. Mary's Glacier Water and Sanitation District
Wastewater Facilities Condition Assessment Memorandum

To: Mr. Jim Nikkel, District Manager
St. Mary's Glacier Water and Sanitation District
c/o-Pinnacle Consulting Group
550 West Eisenhower Boulevard.
Loveland, Colorado 80537

From: Lamp Rynearson, Inc.

Date: March 25, 2019

Subject: Wastewater Treatment Facility and Collection System Improvements Project Memorandum

Lamp Rynearson Project No.: 0219013.02

Introduction

St. Mary's Glacier Water and Sanitation District (District) has engaged Lamp Rynearson to determine the critical wastewater system liabilities, their relative priorities, and anticipated costs to improve those conditions. This information will serve to inform the District how to balance these needs and costs as the District determines the financial commitment to the Phase 2 Water System Improvements Project.

Purpose

This memorandum serves to provide the District with information regarding the wastewater facilities assessment and proposed improvements to bring the wastewater treatment and collection system into compliance with the discharge permit, eliminate public health and safety hazards, and reduce operations and maintenance requirements.

This memorandum is organized into the following sections:

- Wastewater Treatment Facility Assessment Observations and Discussions
- Wastewater Treatment Facility Recommended Improvements
- Collection System Evaluation and Recommended Improvements
- Cost Estimates for Recommended Improvements
- Project Next Steps

Wastewater Treatment Facility Assessment Observations and Discussions

Lamp Rynearson completed a Wastewater Treatment Facility (WWTF) site visit on March 1st, 2019 to perform a condition and performance assessment of current equipment and treatment processes. The site visit was attended by the following people:

Name	Organization	Role/Title
Chris Oeland	Saint Mary's Glacier Water and Sanitation District	Facilities Manager
Mike Creazzo	ORC Water Professionals	Contract Water and Wastewater Operator
Ted Wille, P.E.	Browns Hill Engineering & Controls	Electrical Engineering Subconsultant
Bob Orsatti, P.E.	Lamp Rynearson	Water and Wastewater Group Leader
Craig Matsuda, P.E.	Lamp Rynearson	Project Manager
Taylor Poynor, E.I.	Lamp Rynearson	Project Engineer

In the following subsections, Lamp Rynearson summarizes observations and conversations that occurred during the WWTF site visit related to the current WWTF condition and operation. When visual observations could not be conducted, Lamp Rynearson performed interviews with the Operations staff and document reviews of historical reports, discharge monitoring report (DMR) data, and the 2001 WWTF Record Drawings to gather needed information. Also included is discussion and comparison of the WWTF to Colorado Department of Public Health and Environment (CDPHE) design criteria, electrical and fire code, and other industry design and construction standards.

Headworks

The purpose of a headworks facility is to remove solids, grit, and other materials that negatively affect downstream treatment processes. A mechanical screen, like the step-screen stored in the WWTF yard but not used, will remove large materials from the influent such as rags, sticks, and other solids typically larger than 1/8th of an inch that may, for example, plug pipes or equipment intakes. A grit removal system typically follows the mechanical screen to remove solids less than 1/8th of an inch such as rock and grit that will damage pumping equipment and collect in downstream basins. Headwork facilities also include flow measurement devices (flume) to monitor flows into the WWTF, and sampling equipment to perform water quality analysis. Refer to Figure 1 for a view of the headworks area site.

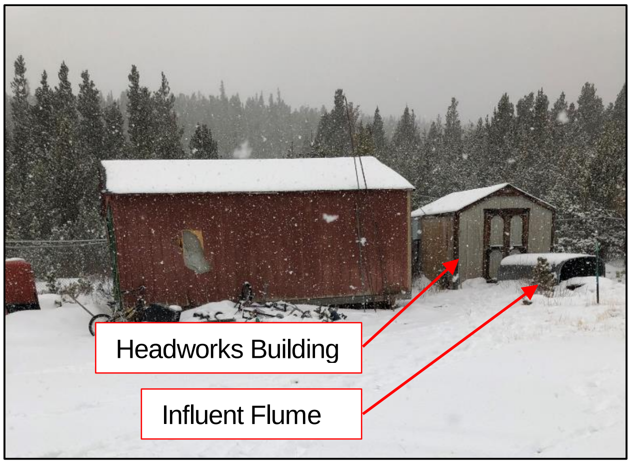

Figure 1: Headworks Facilities

The District's current WWTF headworks is located in the northwest corner of the site and consists of a Tuff Shed building and Quonset hut. The Tuff Shed building houses a perforated-plate manually cleaned influent screen and automatic composite sampler, and is used for storage. The Quonset hut shelters but does not fully enclose the palmer-bowlus flume which is used for influent flow monitoring. See Figure 2 for a photo of the existing headworks facilities.

Figure 2: Headworks Interior

The following list summarizes discussions and observations from the WWTF site visit regarding the existing WWTF headworks:

- No ventilation is provided in the Tuff Shed building which is rated as a Class I, Division 2 space (see Figure 3).
  - Without proper ventilation, the building is an unsafe and dangerous working environment for operations and facilities staff to enter.

  - Raw wastewater generates hydrogen sulfide. Most commonly known for its rotten egg smell, hydrogen sulfide is a dangerous gas that is life threatening with too much exposure. Hydrogen sulfide is also a major cause of corrosion in structures.
  - The headworks building requires ventilation improvements at a minimum to provide a safe working environment.
- The perforated plate (see Figure 4) used as a headworks screen is not acceptable by CDPHE design criteria and as stated by Operations staff, the plate allows solids to pass into the aeration basins where they eventually clog the RAS/WAS pumps and require maintenance.
- Per the Operations staff, the automatic composite sampler is fully functioning but not used due to the operator's sampling preference.
- The Quonset hut only shelters the palmer-bowlus flume, shielding the flume from direct sunlight and precipitation. However, the flume is still exposed to ambient air and freezing conditions that may affect the functionality and accuracy of the flow metering equipment. Upstream screen failures also contribute to flow measurement inaccuracies. The flume is equipped with an ultrasonic level transmitter that appears in good condition.
- No grit removal equipment is present and grit currently accumulates in the downstream aeration basins. Grit removal equipment is recommended to protect and improve efficiencies of downstream processes.

Figure 3: Influent Flume

Figure 4: Influent Screen

Aeration Basins

The WWTF aeration basins are at-grade concrete tanks split into three equal compartments. The concrete cover is equipped with access hatches, vents, and valve boxes. At the time of the site visit the basins were covered in snow and the basins were not drained, therefore an in-depth look at the condition of the aeration basin structure, piping, or diffusers was not completed. Per discussions with the Operations staff, the aeration basins will be drained in the spring and the Operations staff will photograph and video the interior of the basin to evaluate the condition of the structure, piping, and diffusers.

Since a visual assessment could not be completed, Lamp Rynearson interviewed the Operations staff to obtain institutional knowledge of the current operation and condition of the aeration basins. Lamp Rynearson also reviewed record drawings and specifications to gather more background information on the system. Findings are summarized in the bulleted list below. For reference, see Figure 5 for a plan and cross-section view of the existing aeration basins per the 2001 WWTF Record Drawings by Integra Engineering. Also see Figure 6 and Figure 7 for photos of the aeration basins.

- The aeration basin structure is in good condition and there are no known structural issues.
- The air piping and diffusers are presumed to be original equipment.
  - Per 2001 WWTF Record Drawings and specifications, the diffusers are 9-inch fine-bubble membrane disks, 36 disks per basin.

  - In the first aeration basin, Operations staff believes there are broken diffusers because of tumbling wastewater and non-uniform flow through the basin.
  - Operations staff does not know the current condition of the diffusers and when maintenance was last completed. IT is possible the equipment is original, approximately 18 years old.
  - With original equipment and some known broken diffusers, it is recommended the diffusers at a minimum be replaced with fine bubble diffusers. Proper air diffusion will improve oxygen transfer in the wastewater and increase operation efficiencies.
- With poor existing headworks screening and lack of grit removal, it is presumed that solids and grit are accumulated on the bottom of the aeration basins.
  - Operations staff does not know when the solids were last removed from the basins, or if this type of maintenance has ever occurred.
  - Accumulated solids and grit could be affecting the diffusion equipment.
- Each aeration basin is equipped with a 4-hp mixer.
  - The mixers circulate wastewater within the basins to keep solids in a consistent suspended mixture for balanced aeration and treatment.
  - The mixers are operated manually and are in good operating condition.
- Each aeration basin has submerged stainless steel slide gates to isolate flows into and out of each aeration basin.

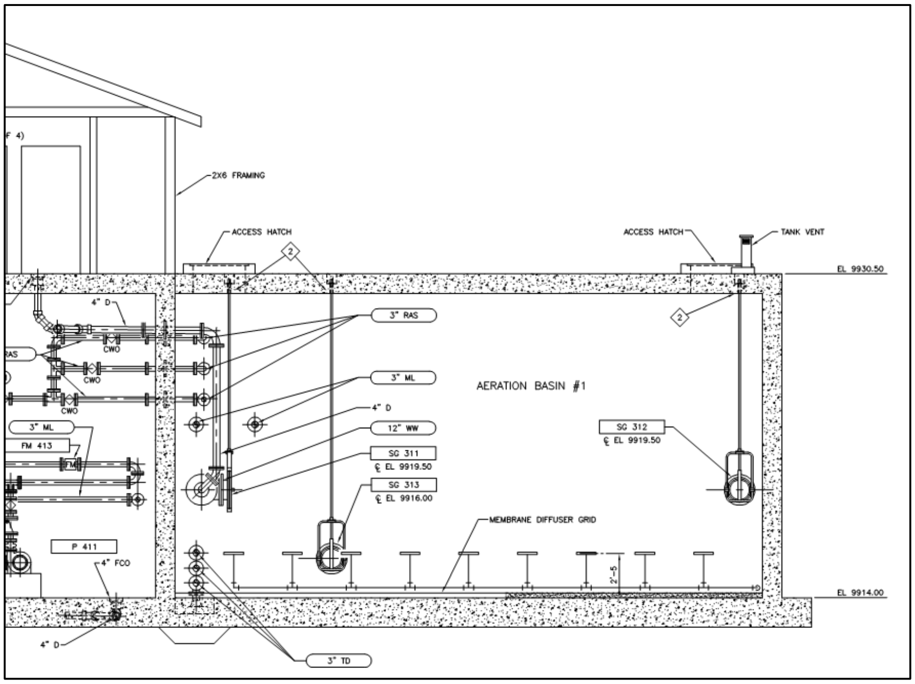

Figure 5: Aeration Basin Drawings

Figure 6: Aeration Basins

Figure 7: Aeration Basins Process Hatch

Process Building Aeration System

In the District's WWTF, the aeration system is responsible for delivering oxygen to the aeration basins where biology uses the oxygen to consume organic matter (remove BOD_5). The WWTF uses two Roots rotary lobe positive displacement (PD) blowers and air piping to deliver air to the aeration basins. The blowers and air piping gallery are located in the basement of the process building. See Figure 8 and Figure 9 for photos of the existing blowers and air piping.

- Per Operations staff, one of the blower motors has recently been replaced. The second blower motor requires constant maintenance and replacement soon due to the power issues at the site.
- The blowers operate at a constant speed and are not equipped with VFDs.
    - The blowers are particularly vulnerable to the XCEL Energy power issues.
    - The blowers during low voltage situations operate at higher amperage to maintain operation. The constant high amp draw forces the blowers to operate inefficiently and overheat, resulting in shortened life-spans and operating issues. This issue is magnified by the phase imbalance.
    - As mentioned in the electrical section above, installing VFDs on the blower motors will help the blowers operate through phase imbalances and lower voltage. Installing VFDs will also allow the Operations staff to optimize the system operation by modifying the amount of air delivered to the aeration basins.
- Given the constant water level in the aeration basins, lower air pressure requirements, and the variable influent wastewater flows and strength (BOD_5), the District may consider a change to centrifugal blowers. Centrifugal blowers may have greater initial capital costs than PD blowers, however they operate more efficiently over a wider operating range, are quieter, and are less maintenance intensive than PD's.
- Air piping from the blower equipment is corroded and aged. It is recommended the air piping be replaced and then coated to prevent corrosion.
- There are four air flow meters, one meter on the blower discharge header and one meter on each aeration basin lateral. Per the Operations staff, the meter on the discharge header does not work. None of the meters could not be read at the time of the visit. It is recommended all of these meters be replaced.
- The aeration system is operated manually at a constant speed. No dissolved oxygen (DO) or oxidation reduction potential (ORP) sensors are installed in the aeration basins to monitor oxygen concentrations or the oxidizing or reducing tendencies of the wastewater. Without these sensors or blower VFD's, the aeration system is operating inefficiently.
- Isolation ball valves are installed to control flow to each of the aeration basins.

Figure 8: Aeration Blowers

Figure 9: Aeration Controls

Process Building Secondary Clarifier

Following biological treatment in the aeration basins, wastewater then flows into the secondary clarifier. Secondary clarification is a physical treatment process that removes solids from the wastewater. Flow enters the feed well in the center of the clarifier which directs flow toward the clarifier bottom. Solids are settled at the clarifier bottom while clarified wastewater flows to the surface where it cascades over triangular v-notch weir and is conveyed to the disinfection system. The clarifier has a mechanical rotating vacuum arm connected to the RAS/WAS system that collects settled solids. The WWTF's lone secondary clarifier is located within the process building. See Figure 10 through Figure 12 for clarifier images.

- The surrounding room is wood-paneled which is concerning given the clarifier generates a high-humidity environment. However, the current wood-paneling is painted and seems to be in relatively fair condition.
- The 25-diameter clarifier has a surface overflow rate (SOR) of 1,222 gallons per square foot (gal/sf) of surface area at the WWTF's rated capacity of 0.60 mgd.
  - Per CDPHE Design Criteria, the SOR should not exceed 700 gal/sf.
  - Per DMR data, influent flows have ranged from 0.04 to 0.3 mgd. A 0.3 mgd flow results in an acceptable 611 gal/sf SOR.
  - Given actual flows compared to the WWTF rated capacity, Lamp Rynearson recommends coordination with CDPHE Engineering Section regarding the existing clarifier and potential variance from the design criteria.
- Clarifier's solids loading rate (SLR):
  - Per the Operations staff, the aeration basins are operated at a mixed liquor suspended solids (MLSS) concentration of 500-800 mg/l. This is a very low concentration when compared to the typical 1,500 to 3,000 mg/l MLSS concentrations in conventional activated sludge processes.
  - The SLR with an 800 mg/l MLSS and the rated 0.60 mgd flow is approximately 8.15 ppd/sf compared to the CDPHE design criteria maximum allowable SLR of 29 ppd/sf.
  - The clarifier from a SLR standpoint has more much more capacity than needed. The WWTF may consider operating at a higher MLSS concentration
- Based on discussions with the Operations staff and review of the WWTF Record Drawings:
  - The overflow weirs at the clarifier circumference are not level, however appear in good condition.
  - There is currently no automated mechanical skimmer to remove scum collecting on the water surface of the clarifier. Operations staff manually collects surface scum.
  - The clarifier, by design, has a flat bottom. Solids are collected by a rotating mechanical vacuum arm connected to the RAS/WAS system.
  - Operations staff indicated their intent to drain the clarifier this spring to assess the condition of existing clarifier equipment. However, given the age of the equipment, lack of surface skimmer, and uneven weir installation, Lamp Rynearson recommends replacement of the clarifier components, addition of a surface skimmer, and leveling of the existing weirs.

Figure 10: Secondary Clarifier

Figure 11: Secondary Clarifier Weir

Figure 12: Secondary Clarifier Drive

Process Building RAS/WAS System

The return activated sludge (RAS) and waste activated sludge (WAS) pumping system and piping are located in the basement of the process building. See Figure 13 through Figure 15 for photos of the RAS/WAS pumps and piping. The purpose of the District's WWTF RAS system is to recycle solids collected from the secondary clarifier back to the aeration basins where biology further consumes the organic material and reduces the volume of solids generated by the WWTF. The WAS system pumps solids from the clarifier to the solids holding pond for storage and further decomposition.

- The RAS/WAS system is currently operated manually and at a constant speed.
  - Operations staff wastes to the solids holding pond by opening and closing appropriate valves.
  - In normal operating conditions, the pumps are constantly returning solids from the clarifier to the aeration basins.
- The RAS/WAS pumps were observed to be in fair condition.
  - The pumps are rated per the 2001 WWTF Record Drawings for 200 gpm, but the Operations staff has indicated the pumps consistently operate at about 115 gpm.
  - One pump motor had recently been replaced and was running smoothly.
  - The other pump is scheduled to be replaced in 2019 as part of the Operation staff's routine maintenance.
  - Operations staff indicated potable water was used for the water seal on the pumps.
- There is one flow meter located on the pumped RAS/WAS line.
  - The meter appears in good condition.
  - At the time of the site assessment, the RAS flow was approximately 97 gpm.
- The piping gallery above the pumps is in poor condition with many corroded pipes and valves.
  - It is recommended that a majority of the piping be replaced and then coated to prevent corrosion.
  - The motorized plug valves appear in good condition and do not require replacement.

Figure 13: RAS Pump

Figure 14: RAS Piping

Figure 15: RAS Piping

Process Building Sump Pump

The basement floor is sloped towards a sump located under the stairwell where liquid collects and is pumped to aeration basin No. 1 by a submersible sump pump to prevent the basement from flooding.

- The current sump is only equipped with one sump pump that is connected directly to the facility's power.
  - When power outages occur, the sump pump is not able to operate and the basement is susceptible to flooding.
  - When flooded, electrical equipment may become submerged and accessing the basement becomes a major safety hazard.
  - Due to the significant amount of mechanical and electrical equipment in the basement, it is recommended that a second permanent sump pump and a duplex pump control panel be installed to control the pumps in a lead-lag configuration to increase the WWTF's protection from flooding.
  - The sump pumps should be connected to the backup power generator.
- The PVC sump pump piping and associated check valve, ball valve, and fittings appear in good condition.
  - The ½-hp sump pump and 2-inch piping have an estimated capacity of 65-gpm (approximately 17-ft of static head and 7-feet of dynamic pipe loss).
  - If a line were to break in the basement causing more than 65-gpm of flow, the sump pumps could not keep up and the basement may flood.
- The sump pump discharges into Aeration Basin No. 1. In the event that piping or wall seals fail between the basement and aeration basin or clarifier, causing flooding in the basement, the sump pump would only be recycling the water back to the source of the flood. The District may consider relocating the sump pump discharge to the solids holding pond for temporary storage.

Process Building Chemical Feed

As shown in Figure 16 through Figure 18 the building has no designated chemical feed and storage room. Currently barrels of chemical reside on the main floor of the process building in the same room as electrical control panels. Also located in this room are chemical feed pumps, access hatches to the basement, and access hatches to the chlorine contact channel. The facility's office and bathroom are immediately adjacent to the chemical feed and storage room.

- Chlorination and dechlorination:
  - There are two chemical feed pumps, one for sodium hypochlorite (disinfection), one for sodium bisulfate (removal of residual chlorine before stream discharge).
  - Per Operations staff, chemical within the chemical feed tubing often freezes and shuts down the system, thereby failing to disinfect the waste stream.
  - The Operations staff prefers 55-gallon drum storage of 10% sodium hypochlorite and 40% sodium bisulfate. Up to six barrels of each chemical are preferred for storage.
  - For the amount of chemical stored, there is inadequate secondary containment per OSHA standards.
- The chemical feed room is equipped with a unit heater, however lacks proper heating, ventilation, and air conditioning.
- Chemicals are also stored in the facility's restroom. The restroom is currently coupled as a laboratory for sample preparations. This small, poorly ventilated space is not intended to be used as a laboratory and presents safety hazards.
- Lamp Rynearson recommends that the chemical feed and storage be relocated to a new room with proper secondary containment and HVAC. Per discussion with Operations staff during the site visit and given the limited space within the existing building, the new chemical feed and storage room is likely located within a building addition. Relocating the chemicals will also protect the existing electrical equipment and provide space for proper storage and relocation of the facility's laboratory outside of the bathroom. The existing bathroom and office could remain in place.

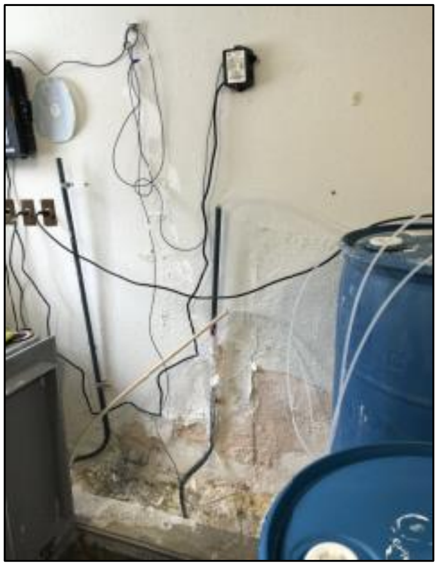

Figure 16: Chemical Feed Area

Figure 17: Chemical Feed Area

Figure 18: Chemical Feed Area

Solids Holding Pond

The WWTF's solids holding pond is located on the south portion of the site and is used for storage of WAS. The pond is also piped directly to the influent piping between the headworks and aeration basins so that influent flow can be diverted to the pond if needed. Per the 2001 Record Drawings, the pond has 16,000 sf of surface area, 1.0 million gallons of volume and is 15-feet deep.

- Due to snowy conditions during the site visit, a visual assessment of the pond was not completed. Rather, Lamp Rynearson interviewed the Operations staff and performed a document review to gather the following information:
  - Per the 2017 CDPHE sanitary survey and Operations staff, solids have not been removed from the pond in more than 20 years.
  - The pond is clay lined but the condition of the liner is unknown.
  - It is suspected that the pond requires re-grading and a new liner.
- Lamp Rynearson recommends that the solids holding pond is cleaned, re-graded, and relined with a synthetic liner.

WWTF Electrical Utility and Controls

The following list summarizes discussions and observations from the WWTF site visit and subsequent coordination with the Operations staff, XCEL Energy, and Browns Hill Engineering & Controls.

- The WWTF has two XCEL Energy electrical service entrances:
  - Main Service Entrance – Main Building

    The main service entrance (Panel PP-1) is located in the main building in the chemical storage room and is rated for 225 amps. The current WWTF has a total connected load of 65 amps. Therefore, the existing service entrance has sufficient capacity for existing and the recommended improvements described herein.

    Panel PP-1 being in the same room as stored chemicals without proper ventilation is being exposed to a corrosive environment. This is evident in the panel's corroded box and piping. See the figure below.

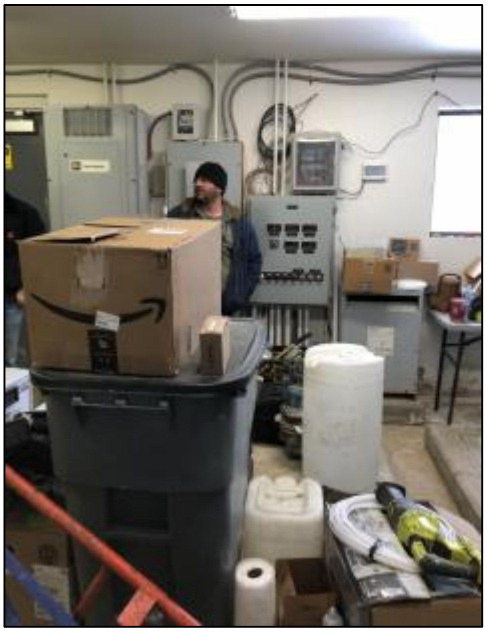

Figure 19: Electrical Panels

The electrical panel should be replaced and the chemical feed equipment and storage should be relocated to a separate room with proper ventilation. Additionally, it was observed that equipment is being stored within two feet of Panel PP-1, which is in violation of both electrical and fire codes. Direct access to Panel PP-1 should be provided with a minimum of two-feet separation between the face of the panel and anything that could obstruct the panel opening.

- <u>Secondary Service Entrance – Headworks</u>
  The second service entrance is located in the headworks "Tuff Shed" which power the shed's lighting, automatic sampler, and Palmer Bowlus ultrasonic level transducer. Electrical code only allows for one electrical service to each site, therefore this service entrance should be removed and the headworks improvements described herein should be connected to Panel PP-1.

- There are two seprate issues with the XCEL Energy power supply to the WWTF site.
  - <u>Issue No. 1 – Low Voltage</u>
    The WWTF site has 480V, 3-phase electrical service. However, XCEL Energy does not consistently deliver 480 V and equipment at the WWTF often shuts down or is not able to run due to low voltage. Equipment with larger motors are most affected by the low-voltage supply. As voltage drops, the amp pull from equipment increases. It is this fluctuation in amperage that causes damage to equipment and reduces the equipment lifetimes. Per discussions with the Operations staff, the blower motors have required replacement as a result of operating under continuous low voltage, and there was even an instance where one of the blowers caught on fire due to the blower's operation at high amperage.

    It is recommended the District protect all larger motors (480V, 3-phase) with either variable frequency drives (VFD) or phase monitoring protection. More information regarding phase monitoring protection is listed below:
    - When voltage drops to a pre-set level, the phase monitoring protection will trigger a shutdown of some or all equipment.
    - Doing so will prevent the equipment from pulling higher amps and potential equipment damage.
    - The backup generator can also be set to kick on when voltages to the facility reach a certain level.
    - The phase monitoring protection will be used on all larger motors (480V, 3-phase) since even minor changes in amperage can be damaging.
    - Smaller motors (120V, 1-phase), I&C, and other equipment with smaller electrical needs will likely continue working through the low voltage situations and can wait for the back-up power generator to turn on. Typically, the smaller motors and equipment can handle greater amp fluctuations without being damaged, therefore phase monitoring is not required.

One other option that may be considered by the District is to request XCEL Energy increase the transformer tap at the WWTF. Doing so will increase the voltage supplied to the site, thereby increasing the low voltage delivered to equipment. This modification may not fix the low voltage issue, but will help equipment operate closer to their designed amperages. These improvements are described in greater detail in the following sections.

- Issue No. 2 – Phase Imbalance
  Voltage measurements taken during the facilities assessment indicated that one-phase of the three-phase service had a 5.2% lower voltage than the other two phases. Similar to Issue No. 1 described above, the low voltage and voltage imbalances negatively affect the WWTF equipment. Through discussion with an XCEL Energy field representative, it was determined that XCEL Energy is investigating the phase imbalance and how to correct the issue.

- The WWTF is equipped with an autodialer. Per the Operations staff, the autodialer does not work properly and is difficult to use, and should be replaced with a new Supervisor Control and Data Acquisition (SCADA) system.
- The WWTF lacks automation, using only manually actuated valving and constant speed pumps and blowers. The WWTF could benefit greatly from a SCADA system to automate and optimize the treatment process. Additionally, the SCADA system sends alarms and updates to the Operations staff regarding the facility's status and operation.

Other WWTF Observations and Discussions

Additional observations from the WWTF site visit are detailed below.

- The WWTF is currently rated for 70 ppd BOD_5.
  - Between January 2017 and present day the WWTF has observed 30-day average influent BOD_5 loadings ranging from 13 ppd to 100 ppd (March and April 2017 influent BOD_5 loadings of 376 and 426 ppd, respectively, are much greater than historical loadings and were therefore eliminated as outliers).
  - Per CDPHE permitting requirements, the WWTF is required to start engineering planning for capacity rerating whenever the organic loadings to the WWTF exceed 80% of the rated capacity.
  - Since January 2017, the WWTF has exceeded 80% of the rated organic capacity 11 times and exceeded the capacity 6 times, most recently in January 2019 with an influent BOD_5 loading of 79.4 ppd.
  - Based on these historic organic loadings, the WWTF should be re-rated to increase its organic capacity.
  - Rerating the organic capacity of the WWTF may require an additional blower or larger units to deliver more air to the aeration basins. Per the 2001 WWTF Record Drawings, the aeration basins were sized for the build-out capacity of 360 ppd BOD_5, therefore no additional aeration volume should be required.
- The WWTF lacks automation, using primarily manually actuated valving and constant speed pumps and blowers. The lack of automation and variable speed equipment reduces both operator and equipment efficiencies.
- The WWTF does not have effluent flow monitoring. Per CDPHE design and permitting requirements, the WWTF must monitor both influent and effluent flows. An effluent flume should be installed.
- The door frame on the west side of the building is not weathertight and allows air and water to seep into the process building and drain into the basement. This door and door frame should be replaced, as shown in Figure 20.

Figure 20: Door Corrosion

- The facility lacks proper heating, ventilation, and air conditioning. Space heaters are currently installed in each room, however no fans or louvers are provided for air exchanges within the buildings. Rooms are often humid due to the lack of ventilation, which has led to corrosion of metallic objects. As discussed above, the chemical feed lines freeze due to improper heating. Building wide HVAC improvements are recommended.
- The access driveway into the WWTF site is steeply graded. Maintenance vehicles such as sludge hauling or chemical delivery trucks may have issues accessing the site. These issues are magnified with inclement weather. It is recommended that the access driveway be regraded and paved for safer vehicular travel.
- The WWTF is difficult to access in winter conditions and maintenance operations are difficult with accumulated snow. Currently, the Operations staff utilizes their personal vehicles for operation and maintenance. Per discussion with Operations staff, a District owned maintenance vehicle with plow and other tools and accessories would improve the staff's ability to operate and maintain the WWTF and collection system.
- Operations staff indicated the hydro-jetter used to clear obstructions in the sanitary sewer system must be stored off-site due to the lack of storage space. This off-site storage facility costs $750 per month, or $9,000 annually. It is recommended that storage space for the jetter and other tools and equipment be included in the building addition.

Discharge Permit and DMR Data Analysis

In addition to the on-site assessment, Lamp Rynearson analyzed the facility's current discharge permit and upcoming limitations and compared them to the facility's discharge monitoring report (DMR) data to assess potential or existing compliance concerns. Table 1 compares the WWTF's discharge permit limitations with 2014-2019 DMR data. Items in red text indicate an exceedance of the discharge limitations.

Table 1: Discharge Permit and DMR (2014-2019) Comparison

Parameter	**Discharge Permit Limitations**		**Discharge Monitoring Report**	
	30-Day Avg.	*Daily Max.*	*30-Day Avg.*	*Daily Max.*
Effluent Flow (MGD)	0.6	Report	0.04	0.3
pH (su)	--	6.5-9	--	9
E. coli (#/100mL)	148	--	1.1	--
TRC (mg/L)	0.01	--	0.005	--
Total Ammonia as N (mg/L)				
January	7.2	26.9	0.35	2.51

Parameter	Discharge Permit Limitations		Discharge Monitoring Report	
	30-Day Avg.	*Daily Max.*	*30-Day Avg.*	*Daily Max.*
February	7.8	21.1	0.073	0.14
March	8.4	27.8	0.083	0.14
April	7.2	21.1	4.21	16.62
May	8.1	28.6	3.49	13.22
June	4.5	31.8	1.24	3.41
July	1.8	30.5	1.92	4.35
August	1.6	28.3	1.85	5.89
September	2.2	30.4	0.93	8.81
October	7.5	30	0.05	0.07
November	7.3	26.5	0.15	0.4
December	7.1	27	0.75	2.1
BOD5, effluent (mg/L)	30	--	5.54	--
BOD5, effluent (lbs/day)	150	--	0.87	--
TSS, effluent (mg/L	30	--	9.1	--
TSS, effluent (lbs/day)	150	--	1.56	--
Cd, PD (µg/L)	Report	Report	0.1	0.3
Cd, PD (µg/L) (effective Oct. 1, 2020)	0.15	Report	0.1	0.3
Cu, PD (µg/L)	Report	Report	48.16	103.2
Cu, PD (µg/L) (effective Oct. 1, 2020)	2.7	3.6	48.16	103.2
Cu, PD (lbs/day)	--	0.15	--	0.103
Cu, PD (lbs/day) (effective Oct. 1, 2020)	--	0.015	--	0.103
Pb, PD (µg/L)	Report	Report	0.2	0.8
Pb, PD (µg/L) (effective Oct. 1, 2020)	0.5	Report	0.2	0.8
Zn, Dis (µg/L)	Report	Report	36.24	92
Zn, Dis (µg/L) (effective Oct. 1, 2020)	39	47	36.24	92

The table indicates the WWTF satisfies all current discharge limitations for flow, pH, *E. Coli*, TRC, ammonia, BOD$_5$, TSS, and metals. Metals with future limitations, such as copper, zinc, and cadmium, have concentrations either above or approaching the permitted levels. High copper concentrations have been attributed back to the water distribution system where copper is leaching out of the distribution piping and persisting through the WWTF. The District is currently addressing lead and copper drinking water compliance through a water system corrosion control plan. These improvements are expected to have a direct and positive impact on the copper levels entering the WWTF, however the impact cannot be quantified at this time and copper may still be an issue at the WWTF. Copper, zinc, and cadmium can be removed through chemical addition and filtration, however the WWTF does not incorporate treatment processes already in place to address these issues. Therefore, a new treatment process including chemical feed and filtration are recommended to address the metals removal. This new treatment equipment can be housed in the building addition.

Wastewater Treatment Facility Recommended Improvements

Through the document review, discussions with Operations staff, and observations from the WWTF assessment, the following sections outline recommended WWTF improvements to satisfy the District's highest priorities of regulatory compliance, public health and safety, and improved operations and maintenance. Refer to Figure 21 for a conceptual building layout associated with the recommended improvements.

Compliance

The following improvements are prioritized to bring the WWTF into compliance with the discharge permit and electrical and building related codes:

- Further monitor and evaluate influent BOD_5 loadings against current rated capacity;
- Install a tertiary treatment system (chemical feed and media filter) for removal of metals to satisfy future limitations;
- Install new influent and effluent flow monitoring equipment to record WWTF flows;
- Install proper HVAC in the WWTF building;
- Install backup power generator to provide emergency power to essential WWTF equipment;
- Clean and reline the lagoon;
- Replace corroding and damaged electrical equipment; and
- Relocate chemical feed and storage into separate rooms from electrical equipment.

Public Health and Safety

The health and safety of facility personnel is of utmost importance. The following improvements are intended to provide staff a safe working environment:

- Reconfigure the sump pump design with a local control panel and automated lead-lag pumping system to prevent flooding of the basement and potential electrical shock related hazards. The sump pumps will be connected to the backup power generator so they continue to operate during power outages;
- Install proper HVAC in the WWTF building;
- Replace the existing headworks with a new masonry headworks building with proper ventilation and access;
- Construct building addition on the south end of the existing building to house relocated chemical feed equipment and storage, backup power generator, and storage area; and
- Replace electrical equipment that is currently corroded and a risk to operate.

Improved Operations and Maintenance

Ease of access, operation, and maintenance of the WWTF is crucial for improved equipment life and efficiency, and reduced operating costs. The following priorities are included to improve the facility's operations and maintenance:

- Install a proper headworks mechanical screen to eliminate large debris that are currently clogging the RAS/WAS pumps and requiring constant Operations staff maintenance;
- Install a grit removal system to prolong the life of downstream equipment;
- Replace corroded and aged return activated sludge and aeration piping;
- Replace blowers with higher efficiency units equipped with VFDs to provide operational flexibility to optimize the aeration system. The VFDs will also provide added protection against the low-phase voltage and brownouts;
- Replace clarifier equipment, adjust weirs for improved operation, and add skimmer for automatic scum removal;
- Provide storage space in the building addition to accommodate the District's hydro-jetter and spare parts;
- Install a Supervisor Control and Data Acquisition (SCADA) system and related instrumentation and controls (DO probe in aeration basins, alarms) to automate the WWTF operation. Doing so will reduce the time and labor required to operate the facility and help optimize the facility's operation, leading to money saving efficiencies.
- Install new influent and effluent flow monitoring equipment. Tie into SCADA system for automated data recording;
- Re-grade the driveway into the WWTF site for easier access by all vehicle types;
- Purchase a new maintenance truck with plow, storage boxes, hitch and other accessories to properly maintain and access WWTF site, roadways, and collection system during inclement weather, and;
- Relocate and install a new hot water heater.

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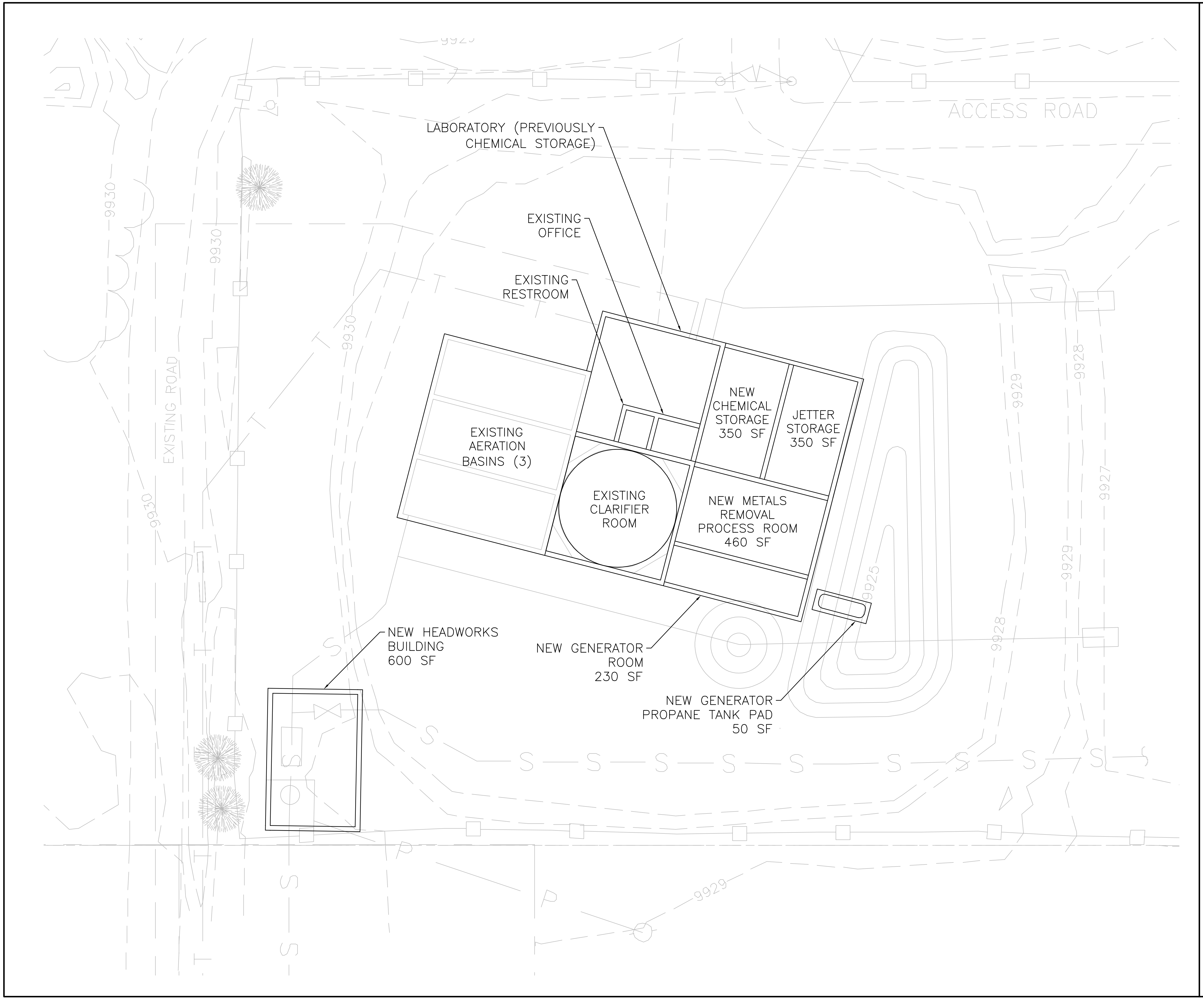

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12596 W. BAYAUD AVE., STE. 300
LAKEWOOD, CO 80228
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LampRynearson.com

Figure 21
Preliminary WWTF Improvements Layout

St. Mary's Glacier Wastewater Improvements
St. Mary's Glacier Water and Sanitation District

REVISIONS

DESIGNER / DRAFTER
Taylor Poynor
DATE
03/20/2019
PROJECT NUMBER
0219013.02
BOOK AND PAGE

SHEET

OF

Collection System Evaluation and Improvements

According to the District's December 2015 *Water Preliminary Engineering Report* and as modelled in District GIS data, the sanitary sewer collection system is comprised of:

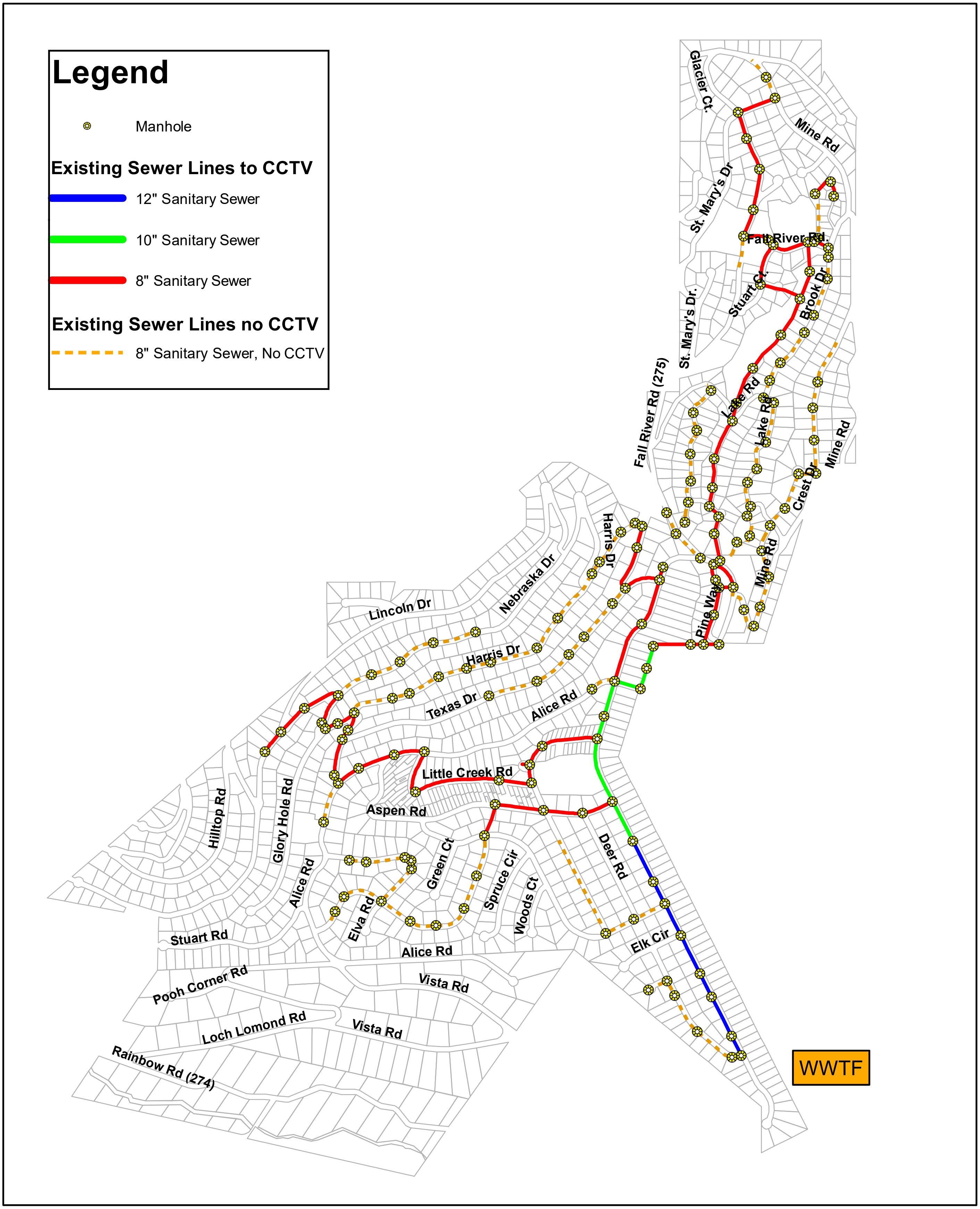
- Primarily original VCP pipe, with approximately 1,300-ft of replaced or sliplined pipe.
- 41,900-ft 8" pipe
- 2,270-ft 10" pipe
- 2,180-ft 12" pipe
- 46,350-ft total collection system.
- 159 manholes

It is well known that the District's aging collection system has severe infiltration and inflow (I&I) issues that contribute high hydraulic loads to the WWTF. What are not well known are collection system locations in the greatest need for improvements. It is suspected the entirety of this system was constructed using poor trenching techniques and was not backfilled properly. Over time, the improper pipe installation has resulted in pipe cracks and breaks that contribute to sanitary sewer overflows (SSO) and I&I issues.

Due to the size of the collection system and availability of funding, the entire system cannot be rehabilitated or replaced. To maximize the impact of collection system improvements within the District's budgetary constraints, Lamp Rynearson has utilized historical SSO logs, WWTF Compliance Inspection findings, and the December 2015 *Water Preliminary Engineering Report* to generate the following priority list of improvements:

- Remove and replace 3,630-ft of 8" pipe
- Rehabilitate through sliplining 9,075-ft of 8" pipe
- Replace 568-ft of 10" pipe
- Rehabilitate through sliplining 1,135-ft of 10" pipe
- Replace 2,180-ft of 12" pipe
- Within these collection system segments there were 80 manholes identified. It has been assumed that 25% of manholes require removal and replacement, 50% of manholes require only rehabilitation and lining, and 25% of manholes do not require work.

Figure 22 summarizes the proposed collection system improvements. It is recommended the District perform closed circuit television (CCTV) inspection on these identified segments of pipe. Through CCTV investigation, Lamp Rynearson will gather needed information to identify the exact scope of collection system improvements. Provided the limited available information, Lamp Rynearson has conservatively assumed that pipeline replacement is required, however through the CCTV investigation, segments of pipe may be identified as requiring only point repairs. The CCTV may also identify areas where pipe sliplining is acceptable and more cost effective than complete replacement. Similarly, the CCTV inspection will help determine the scope for manhole improvements.



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0 490 980 Feet

Figure 22: Proposed CCTV Investigation

St. Mary's Glacier Wastewater Improvements

LAMP
RYNEARSON

Date: 3/25/2019 Created By: Taylor Poynor Document Path: L:\Engineering\0219013.02 SMGWSD Wastewater Improvement\GIS\MXD\SMGWSD_0219013.02_Sanitary Sewer Figure_03-20-19_8x11.mxd

Cost Estimates for Recommended Improvements

The total estimated costs for the recommended WWTF and collection system improvements are listed below and summarized in . The costs do not take into consideration the District's $3.0 Million budget, however the costs were included in case additional funding sources become available and improvements in excess of $3.0 Million can be completed.

If $3.0 Million is the District's limit for construction, the recommended WWTF improvements will be prioritized over collection system repairs because the WWTF must be improved to maintain and comply with current and future discharge permit requirements. Therefore, only a portion of the recommended collection system improvements will ultimately be implemented due to the District's limited funding. Please refer to Attachment A for a more detailed description of costs:

- Total construction costs including contractor overhead and profit, contingency, mobilization/general conditions:
  - WWTF Improvements: $2,333,176
  - Collection System Improvements: $1,954,219
  - Total Construction Project Costs: $4,287,395

- Estimated Engineering Fees for the recommended WWTF and Collection System Improvements:
  - Planning and Design Phase Services
    - Planning phase engineering services include but are not limited to development of site location application and engineering report, assistance with preliminary effluent limitation (PEL) request and review, CCTV investigation, geotechnical analysis, and survey reconnaissance.
    - Design phase engineering services include development of design drawings, specifications, and Process Design Report, and coordination with CDPHE Engineering Section and all engineering disciplines associated with the design. Also included in the design phase services is construction bidding.
  - Construction Phase Services (assuming SRF funding only, for a $3.0 M construction project): $180,000
    - Construction phase services include administrative tasks such as submittal reviews and processing contractor pay applications. Other construction phase services may include periodic construction observations, start-up assistance, and substantial and final completion coordination.

Table 2: WWTF and Collection System Improvements Construction Cost Estimates

Item	Installed Cost
WWTF Improvements	*$ 1,703,048*
Collection System Improvements	*$ 1,426,438*
Construction Subtotal	*$ 3,129,486*
Bonds/Insurance/Mobilization/General Conditions	*$ 219,064*
Contingency (20%)	*$ 625,897*
Contractor Overhead and Profit (10%)	*$ 312,949*
WWTF Total Construction Cost	**$ 4,287,395**
Planning and Design Phase Engineering Services (10%)	*$ 429,000*
Construction Phase Engineering Services (5%)	*$ 215,000*
Total Estimated Project Cost	**$ 4,931,395**

Project Next Steps

With completion of this memorandum and upon Board approval to proceed with the recommended improvements, Lamp Rynearson will assist the District with development of the Pre-Qualification Form as part of the SRF funding process. The following sequence describes the District's next steps in the SRF process and concurrent planning and design phases:

Step 1. SRF Pre-Qualification: Lamp Rynearson will assist District with development of a Pre-Qualification Form. District shall submit the form to the CDPHE Grants and Loans Unit (GLU) for review and approval. GLU through the pre-qualification process will verify the District's eligibility for SRF funding and disadvantaged community status, then schedule a pre-application meeting with the District to discuss the project and SRF funding process.

Step 2. SRF Water Pollution Control Project Needs Assessment (PNA): Lamp Rynearson will assist the District with development of the PNA, which is a submittal to GLU that describes the District's intended project and includes alternatives analyses and estimated construction costs. The District shall submit the PNA for GLU review.

Step 3. CDPHE GLU PNA Review Process: The CDPHE GLU will review the submitted PNA to confirm the District's financial status, environmental clearances, and project intent are acceptable. GLU will also determine if the District is eligible for a Design and Engineering (D&E) Grant. If eligible, the District may be awarded a grant to cover a portion of the engineering fees associated with planning and design of the WWTF and collection system improvements. During the PNA review process, the District may proceed with the site approval and design phases of the project which require development and CDPHE reviews and approvals of the following engineering documents:

a. Site location application and engineering report
b. Design drawings, including process, architectural, structural, civil, electrical, and mechanical engineering disciplines
c. Specifications, including SRF bidding requirements, for process, architectural, structural, civil, electrical, and mechanical engineering disciplines
d. Process Design Report

It is at the beginning of this phase of the project that Lamp Rynearson recommends the District conduct the collection system CCTV investigation. This will provide the greatest detail and information needed to focus the subsequent design efforts. It is also during this phase that the District is required to conduct a public meeting with minimum 30-day advertisement period to notify and describe to the interested public details of the proposed project.

Step 4. PNA Approval and SRF Loan Application: Upon PNA approval, the District can submit the SRF loan application. Application deadlines throughout the year are as follows:

a. January 15
b. February 15
c. April 15
d. June 15
e. August 15
f. October 15
g. November 15

Design reviews and approvals through the CDPHE Engineering Section may coincide with the SRF loan application review and approval process, however design approval must be obtained prior to the SRF loan execution.

Step 5. SRF Loan Execution and Construction Bidding: The District shall coordinate with its legal counsel to negotiate the terms and conditions of the SRF loan with the CDPHE GLU. Final execution of the loan marks the earliest date that a construction contract can be executed. This means construction bidding may occur prior to full execution of the SRF loan contract if necessitated by the project schedule.

Step 6. Construction Phase: The WWTF and collection system improvements will be constructed in accordance with the CDPHE approved design documents. Periodic construction observations by the design engineer will be required during the construction phase to verify construction progress is proceeding in general conformance with the design documents. A full-time onsite resident project representative to observe all construction activities is not anticipated for the SRF funded project. If alternative or additional funding sources are obtained, additional construction observation requirements may exist and the estimated engineering fees described herein may be incorrect.

The attached Gantt chart (Attachment B) includes an estimated project schedule beginning with development of the SRF Pre-Qualification Form and ending with construction completion. This schedule is based on estimated SRF review periods, planning and design document development timeframes, CDPHE reviews and approvals, construction duration, and WWTF discharge permit compliance schedule deadlines. Listed below are major milestones included in the estimated project schedule:

- Request Preliminary Effluent Limitations from CDPHE Permits: March 26, 2019

- Pre-Qualification Form Submittal to CDPHE GLU: April 9, 2019
- Project Needs Assessment Submittal to CDPHE GLU: May 2, 2019
- Site Application Submittal to CDPHE Engineering Section: June 7, 2019
- SRF Loan Application Submittal to CDPHE GLU: August 15, 2019
- Process Design Report Submittal to CDPHE Engineering: September 20, 2019
- Final Design Submittal to CDPHE Engineering: November 15, 2019
- Final Design Approval from CDPHE Engineering: December 27, 2019
- Construction Bidding Advertisement: January 8, 2020
- Construction Bid Opening: February 19, 2020
- Construction Completion to satisfy Compliance Schedule: September 30, 2020

Attachments

- Attachment A: Construction Cost Estimates
- Attachment B: Estimated WWTF and Collection System Improvements Project Schedule

ATTACHMENT A: CONSTRUCTION COST ESTIMATES

Attachment A: Construction Cost Estimates

WWTF Improvements Construction Cost	
Item	**Installed Cost**
Headworks	
Mechanical Screen	$ 117,300
Diversion Gates	$ 25,000
Influent Flume	$ 18,960
Headworks Building ($180)	$ 108,000
Grit Removal System	$ 283,645
Headworks Subtotal	*$ 552,905*
RAS/WAS System	
Replace Select Pipe and Valves	$ 17,897
RAS/WAS Subtotal	*$ 17,897*
Aeration System	
Blowers (3)	$ 75,000
Air Diffusers	$ 13,125
Replace Select Pipe and Valves	$ 4,265
Aeration Subtotal	*$ 92,390*
RAS/Blower Room Sump	
Sump Pumps (2)	$ 1,305
RAS/Blower Room Subtotal	*$ 1,305*
Clarifier	
Clarifier repairs	$ 68,125
Clarifier Subtotal	*$ 68,125*
Effluent Flume	
Packaged Effluent Flume Manhole	$ 18,960
Effluent Flume Subtotal	*$ 18,960*
Solids Handling Pond	
Clean out and dewater material	$ 100,000
Relining	$ 24,463
Solids Handling Pond Subtotal	*$ 124,463*
Metals Removal Process	
Tertiary Package System	$ 242,114
Metals Removal Process Subtotal	*$ 242,114*
Electrical	
SCADA system	$ 50,400
Generator	$ 59,500
DO/ORP	$ 5,900
Basement flood switch	$ 700
Plant influent flow monitor	$ 6,700
Conduit Coating	$ 4,200
Hot water heater replacement and relocation	$ 2,950
Electrical Equipment Replacement	$ 15,600
VFD - blowers	$ 22,500
Headworks Lighting	$ 10,800
Headworks HVAC	$ 8,340
Building Addition Lighting	$ 2,400
Building Addition HVAC	$ 2,780

3-Phase Motors for Building Addition	$ 20,000
Sump Control Panel	$ 6,520
Electrical Subtotal	*$ 219,290*
General	
Additional Structure for Chemical Feed, Storage, and Tertiary Process ($180/SF)	$ 250,200
Door Fixture Replacements/Interior improvements LS	$ 9,600
Truck	$ 40,000
Truck Tool Box	$ 500
Tow hitch	$ 300
Plow	$ 5,000
Miscellaneous Coating	$ 30,000
Miscellaneous Concrete	$ 30,000
General Subtotal	*$ 365,600*
WWTF Improvements Construction Subtotal	**$ 1,703,048**
General Conditions, Mobilization, and Bonds (7%)	$ 119,213
Contigency (20%)	$ 340,610
Contractor Overhead and Profit (10%)	$ 170,305
WWTF Improvements Construction Total	**$ 2,333,176**

Sanitary Sewer Improvements Construction Cost

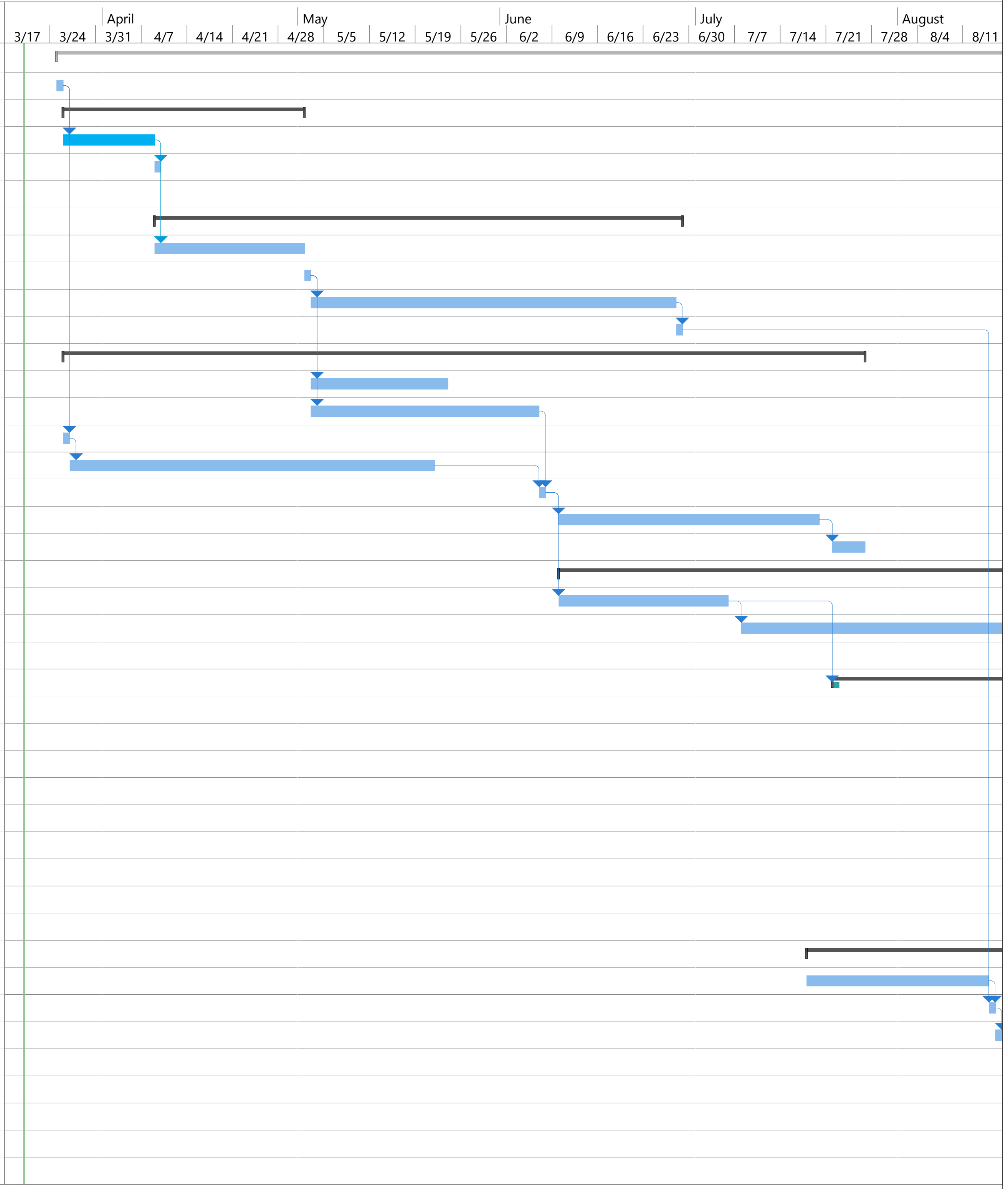
Item	Installed Cost
12" Pipe Replacement	$ 284,050
10" Pipe CIPP Rehabilitation	$ 68,100
10" Pipe Replacement	$ 59,588
8" Pipe CIPP Rehabilitation	$ 363,000
8" Pipe Replacement	$ 326,700
Manhole Rehabilitation	$ 165,000
Manhole Replacement	$ 160,000
Sanitary Sewer Improvements Construction Subtotal	**$ 1,426,438**
General Conditions, Mobilization, and Bonds (7%)	$ 99,851
Contigency (20%)	$ 285,287.5
Contractor Overhead and Profit (10%)	$ 142,643.8
Sanitary Sewer Improvements Construction Total	**$ 1,954,219**

ATTACHMENT B: ESTIMATED WWTF AND COLLECTION SYSTEM IMPROVEMENTS PROJECT SCHEDULE

Attachment B
March 25, 2019
Page 1

St. Mary's Glacier Water and Sanitation District
WWTF and Collection System Improvements Project
Estimated Project Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
0	**SMGWSD_0219013.02_Attach B - WWTF and Collection System Improvement Schedule**	**399 days**	**Mon 3/25/19**	**Thu 10/1/20**	
1	**Board Approval to Proceed with Recommended Improvements**	**1 day**	**Mon 3/25/19**	**Mon 3/25/19**	
2	**SRF Pre-Qualification**	**27 days**	**Tue 3/26/19**	**Wed 5/1/19**	
3	Pre-Qualification Form Development	10 days	Tue 3/26/19	Mon 4/8/19	1
4	District Submittal to CDPHE GLU	1 day	Tue 4/9/19	Tue 4/9/19	3
5	Pre-Application Meeting	1 day	Wed 5/1/19	Wed 5/1/19	4FS+15 days
6	**SRF Project Needs Assessment**	**59 days**	**Tue 4/9/19**	**Fri 6/28/19**	
7	PNA Development	17 days	Tue 4/9/19	Wed 5/1/19	3
8	District Submittal to CDPHE GLU	1 day	Thu 5/2/19	Thu 5/2/19	5
9	CDPHE GLU PNA Review Period	40 days	Fri 5/3/19	Thu 6/27/19	8
10	CDPHE GLU Issues PNA Approval	1 day	Fri 6/28/19	Fri 6/28/19	9
11	**Site Location Application and Engineering Report**	**89 days**	**Tue 3/26/19**	**Fri 7/26/19**	
12	Complete CCTV Investigation	15 days	Fri 5/3/19	Thu 5/23/19	8
13	Site Location Application and Engineering Report Development for WWTF Improvements	25 days	Fri 5/3/19	Thu 6/6/19	8
14	Request Preliminary Effluent Limitations (PEL) from CDPHE Permits Section	1 day	Tue 3/26/19	Tue 3/26/19	1
15	PEL Development by CDPHE Permits Section	40 days	Wed 3/27/19	Tue 5/21/19	14
16	Site Approval Submittal to CDPHE Engineering Section for Review	1 day	Fri 6/7/19	Fri 6/7/19	13,15
17	CDPHE Engineering Section Site Approval Review Period	30 days	Mon 6/10/19	Fri 7/19/19	16
18	Obtain Site Approval for WWTF Improvements	5 days	Mon 7/22/19	Fri 7/26/19	17
19	**Design Drawings and Specifications**	**145 days**	**Mon 6/10/19**	**Fri 12/27/19**	
20	Develop 30% Design Drawings and Specifications	20 days	Mon 6/10/19	Fri 7/5/19	16
21	Develop 60% Design Drawings and Specifications	45 days	Mon 7/8/19	Fri 9/6/19	20
22	Develop Final Design Drawings and Specifications	45 days	Mon 9/9/19	Fri 11/8/19	21
23	Develop Process Design Report	45 days	Mon 7/22/19	Fri 9/20/19	20
24	*All milestones include design review meetings and other coordination with District				
25	Submit to CDPHE Engineeering Section for Design Review and Approval	5 days	Mon 11/11/19	Fri 11/15/19	22
26	CDPHE Engineering Section Design Review Period	25 days	Mon 11/18/19	Fri 12/20/19	25
27	Obtain Design Approval for WWTF Improvements	5 days	Mon 12/23/19	Fri 12/27/19	26
28	**Construction Bidding**	**48 days**	**Wed 1/8/20**	**Fri 3/13/20**	
29	Advertisement for Bids	1 day	Wed 1/8/20	Wed 1/8/20	27FS+7 days
30	Bidding Period and Bid Opening	30 days	Thu 1/9/20	Wed 2/19/20	29
31	Notice of Award to Successful Contractor	1 day	Thu 2/27/20	Thu 2/27/20	30FS+5 days
32	Notice to Proceed with Construction Period	1 day	Fri 3/13/20	Fri 3/13/20	31FS+10 days
33	**SRF Loan Application**	**118 days**	**Thu 7/18/19**	**Mon 12/30/19**	
34	Develop SRF Loan Application	20 days	Thu 7/18/19	Wed 8/14/19	
35	District Submittal to CDPHE GLU	1 day	Thu 8/15/19	Thu 8/15/19	34,10
36	SRF Loan Application Review and Negotiation Period	60 days	Fri 8/16/19	Thu 11/7/19	35
37	SRF Loan Approval	1 day	Fri 11/8/19	Fri 11/8/19	36
38	SRF Loan Execution	1 day	Mon 12/30/19	Mon 12/30/19	37,27
39	**Construction**	**144 days**	**Mon 3/16/20**	**Thu 10/1/20**	
40	Estimated Construction Period	143 days	Mon 3/16/20	Wed 9/30/20	32
41	Deadline Per WWTF Discharge Permit Compliance Schedule to Satisfy Limitations	1 day	Thu 10/1/20	Thu 10/1/20	



Task	▬	Summary	▬	Inactive Milestone	◇	Duration-only	▬	Start-only	[	External Milestone	◆
Split	┈	Project Summary	▬	Inactive Summary	▬	Manual Summary Rollup	▬	Finish-only	]	Deadline	⬇
Milestone	◆	Inactive Task	▭	Manual Task	▬	Manual Summary	▬	External Tasks	▬	Progress	▬
Manual Progress	▬										

St. Mary's Glacier Water and Sanitation District
WWTF and Collection System Improvements Project
Estimated Project Schedule

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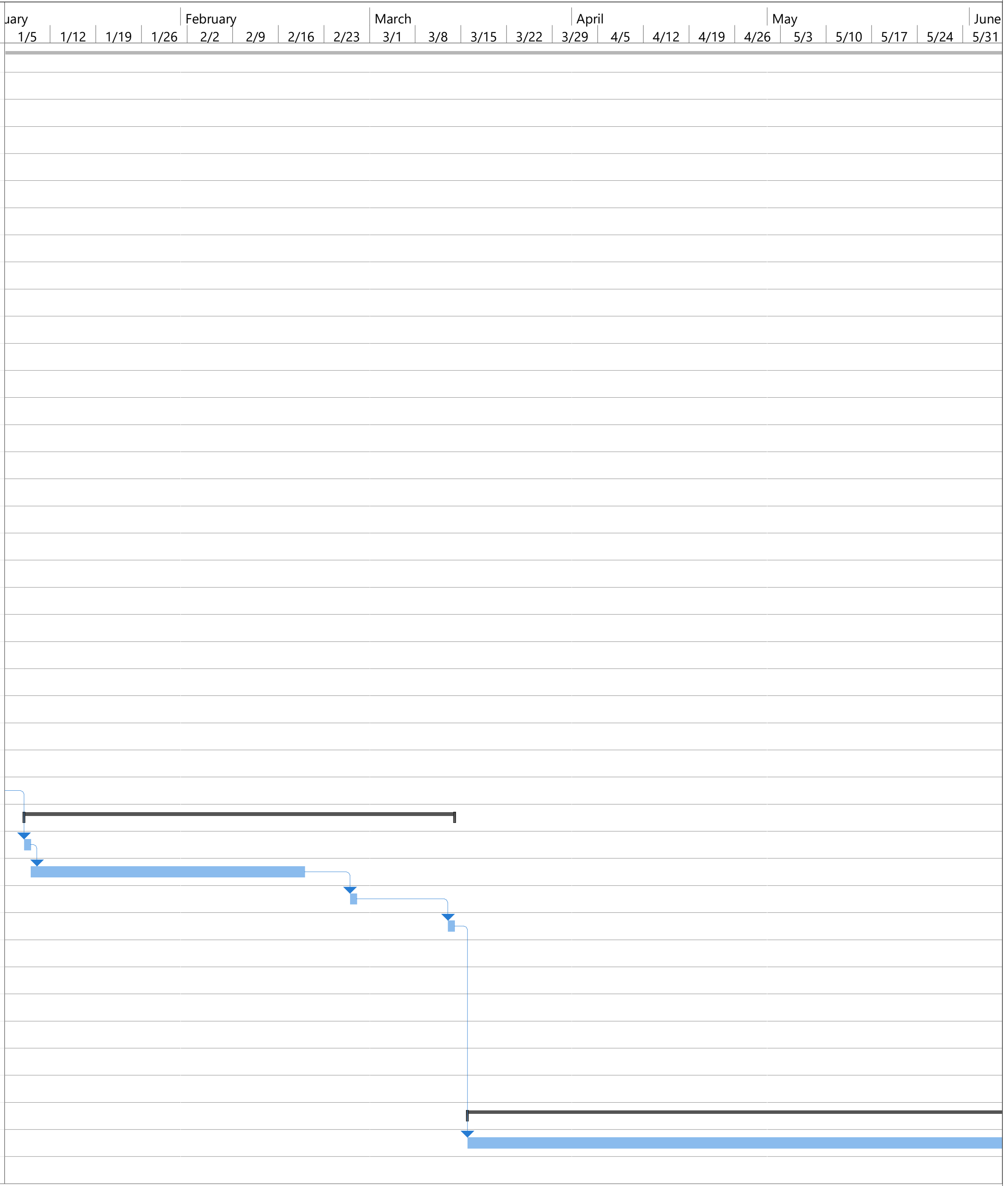
Task	▬	Summary	┌─┐	Inactive Milestone	◇	Duration-only	▬	Start-only	[	External Milestone	◆
Split	┈┈	Project Summary	┌─┐	Inactive Summary	┌─┐	Manual Summary Rollup	▬	Finish-only	]	Deadline	⬇
Milestone	◆	Inactive Task	▭	Manual Task	▬	Manual Summary	┌─┐	External Tasks	▬	Progress	─
Manual Progress	─										

St. Mary's Glacier Water and Sanitation District
WWTF and Collection System Improvements Project
Estimated Project Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
0	**SMGWSD_0219013.02_Attach B - WWTF and Collection System Improvement Schedule**	**399 days**	**Mon 3/25/19**	**Thu 10/1/20**	
1	**Board Approval to Proceed with Recommended Improvements**	**1 day**	**Mon 3/25/19**	**Mon 3/25/19**	
2	**SRF Pre-Qualification**	**27 days**	**Tue 3/26/19**	**Wed 5/1/19**	
3	Pre-Qualification Form Development	10 days	Tue 3/26/19	Mon 4/8/19	1
4	District Submittal to CDPHE GLU	1 day	Tue 4/9/19	Tue 4/9/19	3
5	Pre-Application Meeting	1 day	Wed 5/1/19	Wed 5/1/19	4FS+15 days
6	**SRF Project Needs Assessment**	**59 days**	**Tue 4/9/19**	**Fri 6/28/19**	
7	PNA Development	17 days	Tue 4/9/19	Wed 5/1/19	3
8	District Submittal to CDPHE GLU	1 day	Thu 5/2/19	Thu 5/2/19	5
9	CDPHE GLU PNA Review Period	40 days	Fri 5/3/19	Thu 6/27/19	8
10	CDPHE GLU Issues PNA Approval	1 day	Fri 6/28/19	Fri 6/28/19	9
11	**Site Location Application and Engineering Report**	**89 days**	**Tue 3/26/19**	**Fri 7/26/19**	
12	Complete CCTV Investigation	15 days	Fri 5/3/19	Thu 5/23/19	8
13	Site Location Application and Engineering Report Development for WWTF Improvements	25 days	Fri 5/3/19	Thu 6/6/19	8
14	Request Preliminary Effluent Limitations (PEL) from CDPHE Permits Section	1 day	Tue 3/26/19	Tue 3/26/19	1
15	PEL Development by CDPHE Permits Section	40 days	Wed 3/27/19	Tue 5/21/19	14
16	Site Approval Submittal to CDPHE Engineering Section for Review	1 day	Fri 6/7/19	Fri 6/7/19	13,15
17	CDPHE Engineering Section Site Approval Review Period	30 days	Mon 6/10/19	Fri 7/19/19	16
18	Obtain Site Approval for WWTF Improvements	5 days	Mon 7/22/19	Fri 7/26/19	17
19	**Design Drawings and Specifications**	**145 days**	**Mon 6/10/19**	**Fri 12/27/19**	
20	Develop 30% Design Drawings and Specifications	20 days	Mon 6/10/19	Fri 7/5/19	16
21	Develop 60% Design Drawings and Specifications	45 days	Mon 7/8/19	Fri 9/6/19	20
22	Develop Final Design Drawings and Specifications	45 days	Mon 9/9/19	Fri 11/8/19	21
23	Develop Process Design Report	45 days	Mon 7/22/19	Fri 9/20/19	20
24	*All milestones include design review meetings and other coordination with District				
25	Submit to CDPHE Engineeering Section for Design Review and Approval	5 days	Mon 11/11/19	Fri 11/15/19	22
26	CDPHE Engineering Section Design Review Period	25 days	Mon 11/18/19	Fri 12/20/19	25
27	Obtain Design Approval for WWTF Improvements	5 days	Mon 12/23/19	Fri 12/27/19	26
28	**Construction Bidding**	**48 days**	**Wed 1/8/20**	**Fri 3/13/20**	
29	Advertisement for Bids	1 day	Wed 1/8/20	Wed 1/8/20	27FS+7 days
30	Bidding Period and Bid Opening	30 days	Thu 1/9/20	Wed 2/19/20	29
31	Notice of Award to Successful Contractor	1 day	Thu 2/27/20	Thu 2/27/20	30FS+5 days
32	Notice to Proceed with Construction Period	1 day	Fri 3/13/20	Fri 3/13/20	31FS+10 days
33	**SRF Loan Application**	**118 days**	**Thu 7/18/19**	**Mon 12/30/19**	
34	Develop SRF Loan Application	20 days	Thu 7/18/19	Wed 8/14/19	
35	District Submittal to CDPHE GLU	1 day	Thu 8/15/19	Thu 8/15/19	34,10
36	SRF Loan Application Review and Negotiation Period	60 days	Fri 8/16/19	Thu 11/7/19	35
37	SRF Loan Approval	1 day	Fri 11/8/19	Fri 11/8/19	36
38	SRF Loan Execution	1 day	Mon 12/30/19	Mon 12/30/19	37,27
39	**Construction**	**144 days**	**Mon 3/16/20**	**Thu 10/1/20**	
40	Estimated Construction Period	143 days	Mon 3/16/20	Wed 9/30/20	32
41	Deadline Per WWTF Discharge Permit Compliance Schedule to Satisfy Limitations	1 day	Thu 10/1/20	Thu 10/1/20	



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External Tasks
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Manual Progress