Technical Memorandum TM-05

CITY OF PATEROS
WASTEWATER GENERAL SEWER PLAN AND FACILITIES PLAN

Treatment Facility Improvements

August 19, 2022

1.1 Introduction

This Technical Memorandum (TM) provides recommendations and costs for improvements to the City's wastewater treatment plant (WWTP).

Recommendations are based on a document review, interviews with City staff, and site visits conducted on February 9, 2022 and May 25, 2022. This technical memorandum (TM) supplements evaluation documented in TM-04 Treatment Facility Evaluation, and previous TM's.

1.2 Project North

As shown on the existing treatment plant design drawings, existing facilities are aligned to "Project North" which is 37-degrees east of true north. For ease of description herein facilities will be described using "Project North". Both "Project North" and true north are shown on the attached figures.

1.3 Treatment Facility Improvements

The treatment facility history is discussed in TM-04. In general, the facility has operated well since it's construction in 2000; and is in satisfactory condition. However, the treatment plant has been in service for 22 years and needs maintenance upgrades to provide reliable service through the planning period. Additionally, some capacity improvements are needed to meet future flows/loadings outlined in TM-02.

This section provides evaluation and recommendations for treatment plant improvements needed to extend the life of the wastewater treatment plant through the next 20-year planning period. The major components of the treatment plant are briefly described followed by observations/issues, recommended improvements, and estimated costs. A summary of cost estimates for each component is provided in **Section 1.4**.

1.3.1 *Influent Lift Station*

<u>Description:</u>

- The treatment plant influent lift station is located in the grass landscape area on the east side of the WWTP—east of the headworks building and paved access/parking area. The influent lift station receives raw sewage from the collection system via two (2) 10-inch diameter mains; and pumps it to the treatment plant headworks via a single 8" diameter force main.

- The lift station was originally constructed in 1966 and consists of a Smith and Loveless 23.5' wet well/drywell duplex pump system with 3HP vertical pumps rated for approximately 250 gpm.

- The station includes a 4-foot diameter concrete wet well with separate dry pit that houses the pumps, valving, electrical and influent metering. The wet well also includes a 10-in diameter emergency overflow that discharges to a manhole upstream of the outfall

- Minor upgrades to the lift station were made during the 2000 plant upgrade. The pumps were replaced in 2011 along with some lift station electrical components.

Observations and Issues / Recommendations:

- Overall, the influent lift station appears to be in satisfactory condition. The dry pit interior appears in satisfactory condition with conduit and access ladder in working order. Pumps and electrical components were replaced/upgraded in 2011 and are reportedly in good condition. The wet well was not observed during our site visits but the City reports no problems.

- The maximum single pump capacity of the existing pumps is 250 gpm+/- which meets current peak flows estimated at approximately 130 gpm +/-. However, duplex pump stations should be designed to meet future peak hour flow (PHF) with only a single pump operating. TM-02 projects future peak hour flow at 320 gpm (0.461 MGD). This exceeds the capacity of a single pump and thus pumping capacity needs to be increased to meet projected future flows. It is recommended VFD's be considered to allow pump capacity flexibility.

- The lift station is located outside the WWTP fence and can be accessed by the public. Also, the existing fiberglass lid is aged and secured only by chain and padlock. The City feels the dry pit is a vandalism risk due to its proximity to Ive's Landing Park and boat launch. It is recommended the lift station site be fenced; and given the age/condition of the dry pit lid, it is recommended the existing dry pit lid be replaced.

- The City reports the lift station ventilation system is old and no longer functioning. Given the confined space of the dry pit, a new ventilation system should be installed.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Influent Lift Station Upgrade Description:	Est. Cost
New 320gpm pumps	$45,000
Electrical and control panel upgrades to accommodate larger pumps	$35,000
Piping, plumbing, valves	$15,000
Pump installation	$10,000
Instrumentation upgrades	$5,000
Bypass pumping	$30,000
Wet well inspection/repair budget	$10,000
New dry pit lid replacement or refurbishment	$5,000
Ventilation system	15,000
Fencing	$10,000
Total:	**$180,000**

1.3.2 *Headworks*

Description:

- The treatment plant headworks room is located on the far east side of the treatment building which is immediately south of the treatment basins. The headworks receives raw sewage from the influent lift station and consists of dual concrete channels, 1′ 6″ in width and approximately 2′ 6″ in depth. A mechanical fine screen is installed in the west channel; the east channel includes a manual bar screen w/ 1″ openings. The channels also include a small rock trap located at the outlet of the force main.

- The headworks room is elevated to allow gravity flow through the WWTP. The finished floor elevation of the headworks room sits approximately 10′ above ground elevation and requires stair access. The room is accessed via a set of stairs located outside on the east side of the building. The room is equipped with a ventilation system, heater, and hose (for spraying down the screen).

- The mechanical fine screen is an Envirex Series 1000 chain and rack mechanical bar screen manufactured by WSG and installed during the 2000 plant upgrade. The screen opening size is 3/8″ and has a peak hydraulic capacity of approximately 1 MGD.

- The screen removes inorganic solids (i.e. manufactured inerts, plastics, etc.) from the wastewater before the biological process. Wastewater passes through the screen and solids (screenings) are captured on the outside of the screen. The screen is cleaned with a wiper lifted by a chain. The screenings discharge to a garbage can for disposal.

- The bar screen opening size meets the current state screening requirements for beneficial reuse of the biosolids (per WAC 173-308-205).

Observations and Issues / Recommendations:

- The City reports the mechanical screen has operated satisfactorily without significant issue since installation in 2000. However, typical service life for mechanical screening equipment is in the 20 to 30-year range. Pateros's screen is 22 years old and thus at, or near, the end of its service life. Given the screen's age and expected service life, we recommend Pateros plan to replace the existing screen. It is likely the most economical replacement will be with the same/make model; however, there may be other models/configurations worth considering.

- The most notable complaint the City has with the headworks system is the cumbersome and tedious job of removing and disposing of screenings. Currently screenings are wasted to a garbage can adjacent to the screen. The garbage can is then hauled out of the headworks room and either carried down a flight of stairs or dropped over the railing and disposed of in a waste dumpster located outside beneath the stairway.

- Options were considered to improve the wasting disposal method. One option includes installing a wash press compactor system after the influent screen to wash, compact, and convey the screenings to the waste bin located outside. This option would include replacing the screen with a screen compatible with a wash press system, installing a new wash press, and routing the discharge chute through the north side of the building down underneath the existing stairs above the treatment basin wall. See attached **Exhibit 1**. This option is labeled "Option 2" in the following cost section.

- In addition to replacing the mechanical screen (and possibly improving the screenings disposal method), it is also recommended the existing ventilation and electrical equipment in the screenings room be replaced during the upgrade. Headworks are filled with caustic gasses from raw sewage which decrease the service life of equipment housed in that environment. It is unlikely the existing equipment will last the full planning period and we recommend it be replaced when the screen is replaced.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Headworks Upgrade Description:	Est. Cost
Option 1: Replace screen (same make/model as existing)	
Replace existing mechanical fine screen with like equipment	$140,000
Delivery and installation	$30,000
Replace existing ventilation and electrical equipment	$25,000
Instrumentation/controls to tie into new plant SCADA system	$10,000
Misc. building improvements	$15,000
Option 1 Total:	**$220,000**
Option 2: Replace screen and add wash press system	
New mechanical fine screen (1)	$200,000
New wash press system (1)	$140,000
Building and stair system modifications to accommodate new screen and wash press system	40,000
Delivery and installation	40,000
Replace existing ventilation and electrical equipment	$25,000
Instrumentation/controls to tie into new plant SCADA system	$10,000
Misc. building improvements	$15,000
Option 2 Total:	**$470,000**

1. *Cost based on 18MR Raptor Multi-Rack bar screen and 35RWP Raptor Wash Press system. Pre-design to confirm actual screen and wash press system to be used as well as associated requirements and needed improvements.*

1.3.3 *Secondary Treatment System (Aero-Mod)*

Description:

- Secondary treatment is provided by an Aero-Mod proprietary treatment system that includes selector tank, aeration basins, clarifiers, and aerated digesters constructed in concrete common wall basins. Associated aeration equipment and controls are located in the treatment building south of the treatment basins. The Aero-Mod equipment was installed as part of the 2000 wastewater treatment plant upgrade project.

- The following table shows sizing characteristics/capacity for each of the secondary treatment system components.

Secondary Treatment System - Component Characteristics and Capacity:	
Selector Basin	Number of basins: 1 Volume: 4,700 gal Ave retention time: 0.4 Hours Diffused air mixing (anoxic)
Aeration Basins	Number of basins: 2 (1 per train - single stage aeration) Total volume: 125,000 gal Ave retention time: 24 hours
Clarifiers	Number of clarifiers: 2 (1 per train) Ave surface overflow rate: 390 gpd/sf Max flow through clarifier: 800 gpd/sf Ave solids loading rate: 23 lbs/d/sf Max solids loading rate: 41 lbs/d/sf
WAS/RAS	Aero-Mod solids wasting/recycle airlift system
Aerobic Digestors	Number of basins: 2 (1 per train) Total volume: 22,000 gal Ave sludge retention time: 23 days Digestor wasting pump: 5 HP (1 per tank)
Flow surge handling	Number of basins: 1 Volume: 8,000 +/- gals Flow surge capacity: 0.58 MGD for 1 hr Surge handled via basin storage and surge tank Surge return pump: 3/4 HP
Aeration	Numbers of blowers: 2 Horsepower (ea): 20 Capacity: 500 (sfcm)

Observations and Issues / Recommendations:

In general, the secondary treatment system has operated satisfactorily over its service life and met desired effluent limits. City staff does not report any significant known issues with the system.

During this evaluation both the existing condition and capacity of the Aero-Mod system and equipment were evaluated and discussed with the manufacturer. Given the age of the system (22 years) various maintenance replacements / upgrades are recommended to reliably provide treatment through the next planning period. Additionally, TM-04 evaluated the capacity of the treatment plant and identified capacity improvements needed to meet future flows/loadings. See TM-04 Section 1.7.

The following table provides observations/issues and recommended maintenance and capacity improvements needed for each individual component of the secondary treatment system. Note, this table is followed by additional comments/recommendations.

Component	Observations	Recommendations for 20-yr planning period
Concrete basins / structures	• Satisfactory condition. • No observed or reported structural concerns	None
Selector basin	• Satisfactory condition.	None
Aeration basins / aeration equipment	• Satisfactory condition considering age. • City reports aeration/DO adjustments are manual, and automation is desired • Adding DO/aeration automation will reduce energy costs	• Replace/upgrade aeration system including blowers, control valves (butterfly and pneumatically actuated valves), aeration assembly, compressor, etc. • Add DO sensors and aeration automation/ control system upgrade
Clarifiers / RAS system	• Satisfactory condition considering age. • No reported problems • Clarifier is limiting component for plant capacity	• Replace/upgrade inlet screens, fiberglass suction hoods, and concrete form brackets • Replace RAS airlift pump system • Additional clarifier volume is needed to increase plant capacity
WAS / Digestors	• Satisfactory condition considering age. No reported problems • Digestor volume is low—approx.15 days of storage • More volume is typical (in the 30-day range) for flexibility; and is likely needed if the biosolids dewatering method is changed	• Replace/upgrade digester pumps • Add additional digestor volume if biosolids dewatering method is changed
Piping / Valving / Pneumatic actuator valves	• Satisfactory condition • City reports some freezing issues with existing valves	• Replace/upgrade misc. piping/valves throughout • Add freeze protection to sensitive valves
Walkways / Handrails	• Satisfactory condition. • No additional walkways needed for existing basins/equipment	• None • If digestor volume is increased, add additional walkway to provide access to new basins
System Controls / Monitoring	• System controls are both outdated and at end of service life • No plant SCADA system • Monitoring and adjustments do not use current technologies	• Upgrade control system with current Aero-Mod control panel and system automation • Add plant SCADA system for control and data logging

Comments/Recommendations:

- The existing aeration basin configuration is not Aero-Mod's current standard which utilizes 2 stage aeration to allow for denitrification and higher efficiency aeration. Converting the existing system to a two-stage aeration system could be accomplished by installing an internal wall in the aeration basin with internal piping/appurtenances. However, since Pateros will not likely be required to denitrify, the efficiency savings alone will likely not be cost effective enough to justify the improvement. In the event future nutrient removal becomes a permit consideration, this will be revisited.

- The system currently manually adjusts aeration dose. We recommend the system be upgraded/retrofitted with Aero-Mod's current control system and DO sensors and automation. This will reduce O&M time and increase blower efficiency reducing energy costs.

- Capacity of the existing treatment plant is less than the projected 20-year flows/loadings (see TM-04). To safely meet projected flows/loading, plant capacity should be increased. This can be accomplished by: 1) adding clarifier capacity, and 2) increasing aeration capacity.

- Existing hydraulic capacity is limited by the clarifiers which are currently sized for 400 gpd/sf at 0.125 MGD. Increasing hydraulic capacity of the plant requires expansion of the clarifiers.

- The existing digestors are located adjacent to the clarifiers and are minimally sized and do not provide typical storage volumes. Given the projected higher organic loadings, and the changes the City is considering to the biosolids dewatering system (from drying beds to screw press), it is recommended additional digestor volume be added. See following sections regarding recommended improvements to the existing dewatering system.

- Expansion to the existing sludge digestors could be accomplished by constructing new digesters on the north side of the treatment basin. If this improvement is completed, the old digestor basins could be utilized for expanding the clarifiers. This would include removing the dividing wall between the existing clarifiers and the digestors, and expanding the clarifiers into the existing digestor basins. With this expansion, plant hydraulic capacity will be sufficient to meet future flows.

- If digestor and clarifier upgrades are made, it may also make sense to convert the surge tank into additional sludge storage, and adding telescoping valves, etc. to allow for sludge thickening and increasing the maximum sludge storage time.

- Future capacity increases (beyond what can be accomplished in the existing basins) will be accomplished by adding additional treatment basin volume to the west of the existing basin.

- It is recommended the treatment plant influent/effluent samplers be replaced.

- Given the age/condition of the buildings and site, it is recommended the City budget for some miscellaneous repairs/replacement etc.

- See attached **Exhibit 2**.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Secondary Treatment System (Aero-Mod) Upgrade Description:	Est. Cost
Aeration Basin - Replace aeration equip and expand capacity	
Remove / dispose of existing equipment	$10,000
Replace diffusers, piping, valving, etc	$260,000
Digestors – Add digestor capacity; new basins	
New basins (conc. walls, floor)	$100,000
Aeration equipment (diffusers, piping, etc.)	$65,000
Sludge pump system (Non-clog submersible)	$60,000
Sludge piping, valves, appurtenances	$15,000
New access walkway	$10,000
Overflow Chamber – convert to sludge storage / multi-use	
Aeration equipment	$60,000
Piping, valves, appurtenances (coring, etc.)	$15,000
Retrofit existing weirs with slide gates	$8,000
Sludge pump system (Non-clog submersible)	$30,000
Clarifiers – add clarifier capacity, replace equipment	
Demo wall between digestors and clarifiers	$10,000
Remove/dispose of existing clarifier equipment	$10,000
Concrete work for clarifier mech install	$25,000
New clarifier equipment and install	$170,000
Piping and appurtenances	$5,000
Electrical and Controls Upgrade and Misc. Equipment	
New plant control system (PLC)	$250,000
DO monitors and controls upgrades	$60,000
Misc. equipment (air comp, regenerative desiccant)	$30,000
Misc. other improvements	
Bypass pumping and temporary facilities during construction	$70,000
Site piping	$50,000
Minor building updates / improvements	$30,000
Samplers	$10,000
Site fencing	$30,000
Total:	**$1,383,000**

1.3.4 *UV Disinfection System*

Description:

- The UV disinfection system is manufactured by Trojan Technologies, Model UV3500 PTP. The system is located in the treatment building and was installed during the 2000 upgrade.
- The UV system consists of prefabricated stainless-steel channel, 5 UV lamp racks with 4 lamps per rack, level control weir, UV dose monitor, cleaning rack, and appurtenances. Lamp racks are situated such that lamps are horizontal and parallel to flow.

- The reactor channel was not constructed with additional length to add lamp banks in the future, rather a separate parallel channel to the existing UV channel was considered when sizing the building. An additional bank can be added in the future if increased capacity is needed.

Observations and Issues / Recommendations:

- The UV disinfection system appears to be in good working order.

- The maximum capacity of the UV system is 0.5 MGD. This meets the projected future peak flow of 0.461 MGD.

- Given the age of the system, the manufacturer recommends the following replacements be made for reliable service for the next 20 years:
    - Replace all 5 UV modules
    - Upgrade control panel
    - Replace intensity sensor/monitor

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

UV System Upgrade Description:	Est. Cost
Replace UV modules ($5,000 @ 5 each)	$25,000
Upgrade control panel	$10,000
Replace intensity sensor	$3,000
Delivery/markup and installation	$15,000
Total:	**$53,000**

1.3.5 *Biosolids Processing and Dewatering*

Description:

- Waste activated sludge (WAS) is pumped from two (2) aerobic digester tanks located in the treatment basin to one of five (5) sludge drying beds. Each drying bed is approximately 1,225 sq-ft with an allowable maximum depth of 18”. WAS is discharged to the drying beds through a 4” DI pipe system, and 2 ½” manual quarter turn ball valves are used to distribute the WAS into each drying bed. Sumps are located at the center of each drying bed which collect the drying bed filtrate. The drying bed filtrate flows from the drying bed sumps to the plant lift station via 4” PVC pipe. The drying beds are uncovered.

- Dried biosolids are removed and stockpiled onsite before being hauled to the Boulder Park (BPI) beneficial use facility as Class B biosolids.

- In 2019 (25) dry tons of biosolids were produced according to the City’s Biosolids annual report.

Observations and Issues:

- The drying beds are in satisfactory condition; and based on the bed design capacity has sufficient capacity to dry the projected future WAS volumes.
- The City reports that during winter months biosolids do not dry and accumulate in the drying beds. Drying beds are uncovered and are ineffective during winter and periods with high precipitation amounts leading to storage issues on-site. This leads to lack of drying during the winter and spring with related storage issues until the biosolids can be dried and hauled away. Covering the beds would likely improve WAS drying.
- Maintaining the drying beds is a time consuming and tedious job for the City requiring significant manual labor. The existing distribution equipment does not work properly and/or is problematic and the beds must be raked and leveled by hand.
- There is no room on-site to store biosolids. Capacity within the drying beds will likely become an issue in the future due to the increase in projected flows leading to increases in biosolids.

Recommendations:

- There are a variety of dewatering methods to replace the drying beds that were discussed with the City (screw press, centrifuge, belt filter press, etc.). A screw press dewatering system is recommended. Screw presses are reliable, require little maintenance, achieve a high percent dry solids, and are a commonly used cost effective choice for smaller treatment plants.
- A screw press system requires a new dewatering room to contain the screw press, controls, and chemical feed. This could be located as an extension to the treatment building (see **Exhibit 3**). The new room can be configured to allow for direct discharge of dewatered biosolids to a truck or container that can be used for haul to the Boulder Park (BPI) facility. Another option would be to locate a new dewatering building at the southwest corner of the site. However, for planning purposes, costs herein are based on extension of the existing treatment building.
- The existing sludge digestors have minimal storage volume—approximately 15 days of storage at design. More typical values are in the 30 day range. The treatment system manufacturer recommends increasing the volume of the aerobic digesters (see recommendations in the secondary treatment system section). It may also be beneficial to convert the surge tank into a sludge thickening tank which will also provide additional storage volume. Projected solids wasted from the sludge holding tank is 680 gallons per day of 2.5% solids, or 142 lbs/d of dried sludge (average of 6 lbs/hr).
- Screw presses used locally are manufactured by FKC, Huber, and PWT. This TM is based on evaluation of the smaller FKC screw press capable of processing 1.5 tons per day (60 lbs/hr). With chemical addition of a polymer, the screw press provides a discharge of 15% to 20% biosolids that are conveyed to a dried solids container and pressate pumped to the headworks. Biosolids would be stored onsite for transportation to BPI for incorporation into the soil.
- New Solids Processing Building – includes construction of a new one room treatment building addition approximately 30 foot by 25 foot. Solids Processing Building to house the screw press. Adjacent to the new building will be a covered dewatered biosolids storage area. The screw press requires footprint for both the screw press and space for controls, chemicals addition equipment, polymer storage, etc. The room will be lighted and heated. New building elements to include:

- Concrete footings/concrete floor/floor drainage system
- Metal sidewalls and roof, insulated (match existing building)
- Electrical lighting, fixtures and outlets (110, 220, 480-volt services)
- HVAC system to allow 4-5 air changes per hour, with dehumidifier
- Heating
- Domestic water supply
- WAS piping from aerated digester / sludge storage to screw press
- Chemical Storage Area (polymer storage)
- Fire detection system

- New Covered Storage Area for the dewatered biosolids should be constructed adjacent to the biosolids processing building. Based on a projected dried biosolids amount of 142 lbs/day at 15% solids. This equates to 450 cubic foot (cf) per month) of dried solids. At a five-foot depth 90 square feet of storage per month is required for storage. Converting two of the existing 1250 sf drying beds for storage can provide about 6 months of storage. The new storage area requirements include:

    - Floor drainage system (existing)
    - Concrete sidewalls at five feet high—utilize ecology blocks
    - Metal roof over storage area
    - Electrical lighting, fixtures
    - Yard plumbing for wash down water

- Electrical & Controls - The screw press is a skid mounted device, equipped with a NEMA 4 control panel to operate the polymer injection system, screw press, and conveyor. The press requires a 480-volt, 3 phase power supply.

- Odor Mitigation - Odor is not anticipated to be an issue during typical wasting and dewatering of biosolids; aerobic digestion produces a low odor sludge. In the event odor does create problems, screw press screen scrubbing is available to assist in odor mitigation inside the building. An HVAC system will be designed to perform 4-5 air changes per hour, minimizing odor buildup. Another condition odors may occur is during moving of piles of stored dewatered biosolids, which may have anaerobic conditions within the pile. This could produce temporary severe odors. If this occurs the operator should schedule moving/hauling of biosolids to minimize effects. If needed the new covered storage area can be closed in and equipped with odor mitigation.

- Beneficial Use of Biosolids - The proposed biosolids system is intended to provide treatment and operation flexibility for meeting Class B requirements for disposal of treated biosolids. Treated biosolids will be disposed at the Boulder Park Incorporated (BPI) facility near Mansfield, Washington as is currently done. BPI requires biosolids be dewatered to a minimum of 10% solids and to meet the pathogen reduction requirements of WAC 173-308-170 and vector reduction requirements of WAC 173-308-180.

- Conformance with pathogen reduction requirements will be met via fecal coliform testing (WAC 173-308-170 (5) Alternative 1). This is consistent with similar systems in the area meeting Class B requirements with similar facilities. If compliance is not met via fecal coliform testing, BPI will still receive the non-Class B biosolids for an additional fee; and will provide the additional treatment and/or immediate incorporation as needed to meet WAC 173-308 requirements for Class B.

- Compliance to meet vector attraction reduction requirements will be met via soil incorporation at BPI or SOUR test.

Costs:

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Dewatering System Upgrade (New Screw Press) Description:	Est. Cost
Demolish/remove 3 drying beds; modifications to keep 2 beds; covered biosolids storage area	$300,000
Building extension	$250,000
Screw press	$400,000
Delivery and installation	$30,000
Piping/pluming/valves	$60,000
Electrical/controls	$100,000
Site piping revisions around building extension	$15,000
Access driveway	$40,000
New gates and fencing	$10,000
Total:	**$1,205,000**

1. *Cost does not include submersible pump system from digesters. Refer to Secondary Treatment System Upgrade Description.*

1.3.6 *Outfall*

Description:

- Secondary treated and disinfected effluent is discharged from the facility via an outfall that extends approximately 550 feet offshore and terminates as an open-ended pipe. The outfall lies approximately 50-59 ft below the surface of the Columbia River at River Mile 524.1. According to the 2000 Wastewater Treatment Plant Upgrade design plans, the outfall consists of a 12-in concrete pipe.

Observations/Issues an Recommendations:

- The outfall is submerged below Lake Pateros and was not observed. City staff are unaware of the exact location or condition of the outfall.

- It is recommended the outfall be video inspected and the exact location end of the outfall discharge be located.

Costs:

- Estimated budget for video inspection of the outfall is $10,000

- Additional improvements and/or repairs unknown.

1.3.7 *Electrical/Lab Building/Site/Misc.*

Descriptions/Recommendations:

- The City does not report any known electrical issues with the existing treatment plant electrical system. No electrical system evaluation was completed as part of this evaluation. However, given the age of the plant, it is likely the electrical system is in satisfactory condition and adequate service life remains for the next planning period. Some controls components are known to be obsolete and/or problematic and need upgrading. Those items are covered in other improvements.

- The original lab/operations building was located on the east side of the site. That building was demolished and replaced with a building addition located on the north side of the City shop. The new lab provides adequate space for plant operations and testing. The City did not report any equipment needed at this time.

- The wastewater treatment plant site is located adjacent to the Columbia River. The site consists of 3 separate parcels that total approximately 1.7 acres. All parcels are owned by the City (parcel numbers: 2180010000, 2180020300, 2180020200). The treatment plant site is surfaced with gravel with little to no landscaping. The perimeter of the plant is fenced with a 6′ chain link fence. Access to treatment components and structures appears adequate. In general, site conditions are satisfactory. The treatment plant site is also being used to store a variety of old mechanical equipment and various items. During future treatment plant upgrades the City should consider removing any items that are no longer needed or useful.

- Cross connection for Pateros's WWTP is currently accomplished by use of individual backflow assemblies at various locations throughout the treatment plant. Premise isolation for the site is not provided. Department of Health (DOH) provides guidance on requirements for cross connection control for wastewater treatment plants. DOH guidance considers wastewater treatment plants "high severity" and requires premise isolation. This means typically treatment plants are required to provide complete hydraulic separation from the City's potable water supply; this is typically done using a reduced pressure backflow preventer with an additional air gap and repump system for process isolation. This requirement for Pateros's WWTP should be confirmed with the City's cross connection control specialist.

- An air gap repump system should be installed during the treatment plant improvements. The air gap system should be sized to accommodate anticipated current and future water demands and should include duplex pumps with flow pacing via VFD / pressure tank combination. Controls for the system should be integrated into the treatment plant SCADA system. It is assumed the air gap system will be housed in the biosolids dewatering building addition. Costs herein do not include construction of a new structure to house the CCC system.

<u>Costs:</u>

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

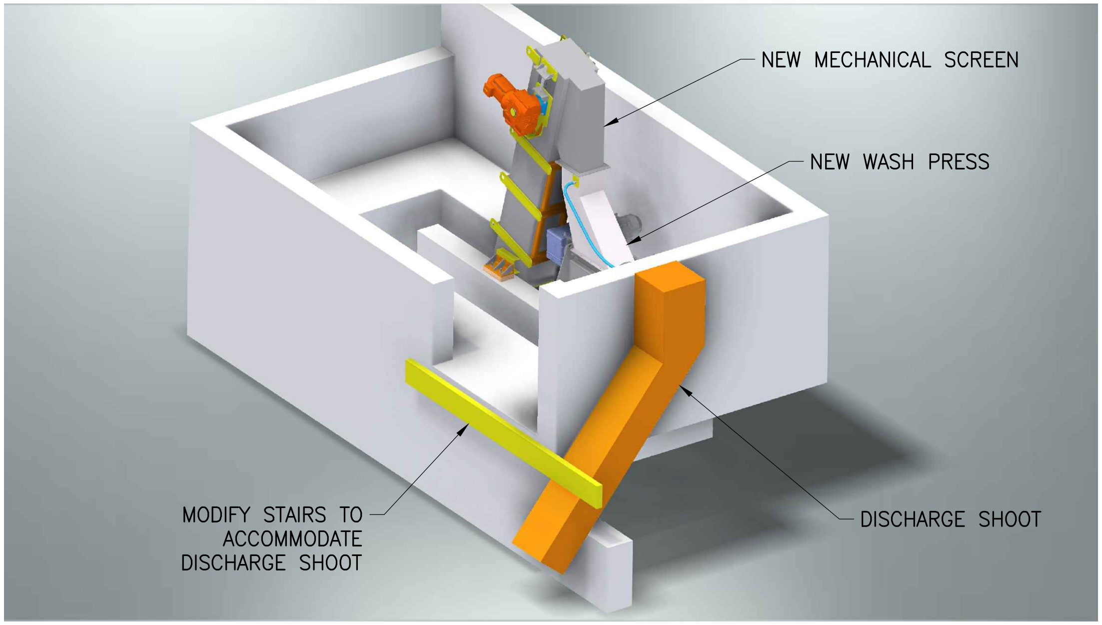
<u>Cross Connection Control System Description:</u>	<u>Est. Cost</u>
Reduced pressure backflow assembly for premise isolation	$25,000
Building/expansion	Use dewatering imp. addition
Skid mount cross connection control repump system	$180,000
CCC system installation	$30,000
Site piping revisions to accommodate new CCC system	$20,000
Electrical/controls/SCADA for CCC system	$70,000
Total:	**$325,000**

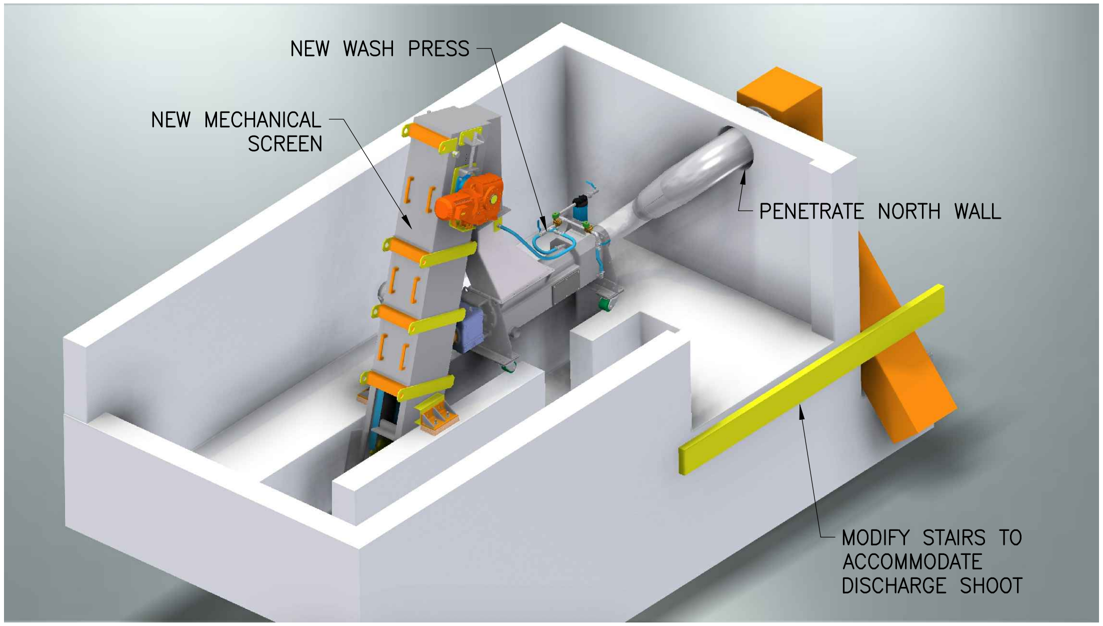
1.4 Summary of Costs

Recommended capital improvements and costs (not including additional project costs such as contractor overhead/profit, mobilization, administrative, as well as contingency and engineering):

Improvement Description (per TM-05)	Est. Cost [1]
Influent Lift Station Upgrade	$180,000
Headworks Upgrade [2]	$470,000
Secondary Treatment Upgrade	$1,383,000
UV System Upgrade	$53,000
Dewatering System Upgrade	$1,205,000
Outfall Video Inspection	$10,000
Cross Connection Control System	$325,000
Site and Misc.	$50,000
Subtotal:	$3,676,000
Contractor mob/admin/overhead/profit (15% of Subtotal)	$551,000
Subtotal Construction:	$4,227,000
Sales tax (8.6%)	$364,000
Contingency (25%)	$1,148,000
Construction Cost:	$5,739,000
Eng, admin, const mgt, insp (30%)	$1,722,000
Admin/environmental/funding	$80,000
Estimated Improvements Cost Total:	**$7,541,000**

1. *Costs rounded to the nearest thousand.*
2. *Assumes Option 2. See Section 1.3.2.*





572806–Headworks

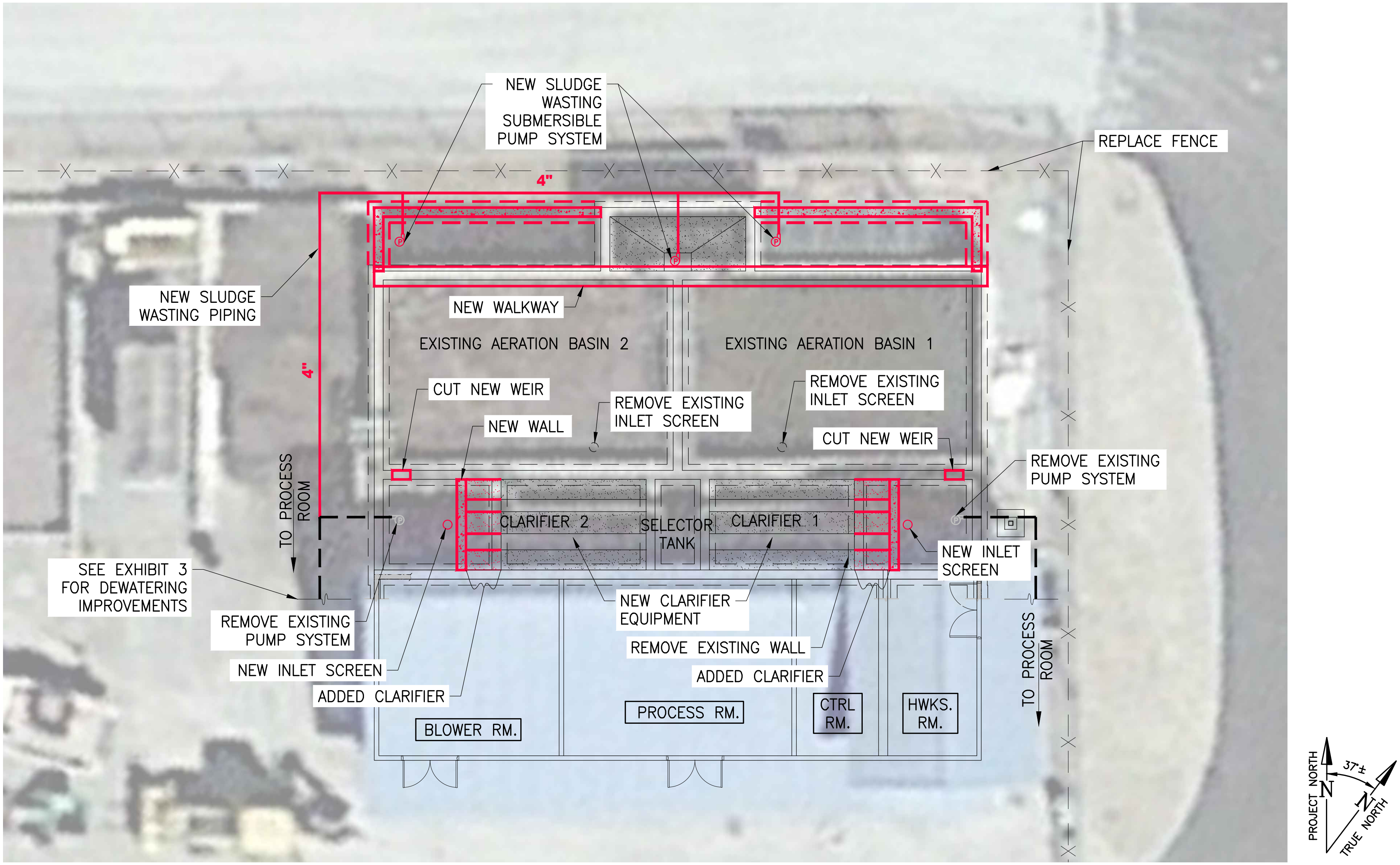
SCALE:	AS SHOWN
DESIGNED:	DDC
DRAWN:	TVP
CHECKED:	
APPROVED:	
PROJ. NO.:	57–28–06
DATE:	6/29/22

VARELA
Engineering & Management

CITY OF PATEROS, WASHINGTON
WASTEWATER TREATMENT PLANT EVALUATION

WASTEWATER TREATMENT PLANT IMPROVEMENT
HEADWORKS: REPLACE SCREEN AND ADD WASH PRESS OPTION

EXHIBIT
1



SCALE: 1/16"=1'-0"

GENERAL NOTES:

1. REPLACE ALL ELECTRICAL AND CONTROLS EQUIPMENT

572806-AeroMod Basins

SCALE: AS SHOWN
DESIGNED: NVH
DRAWN: TVP
CHECKED:
APPROVED:
PROJ. NO.: 57-28-06
DATE: 6/29/22

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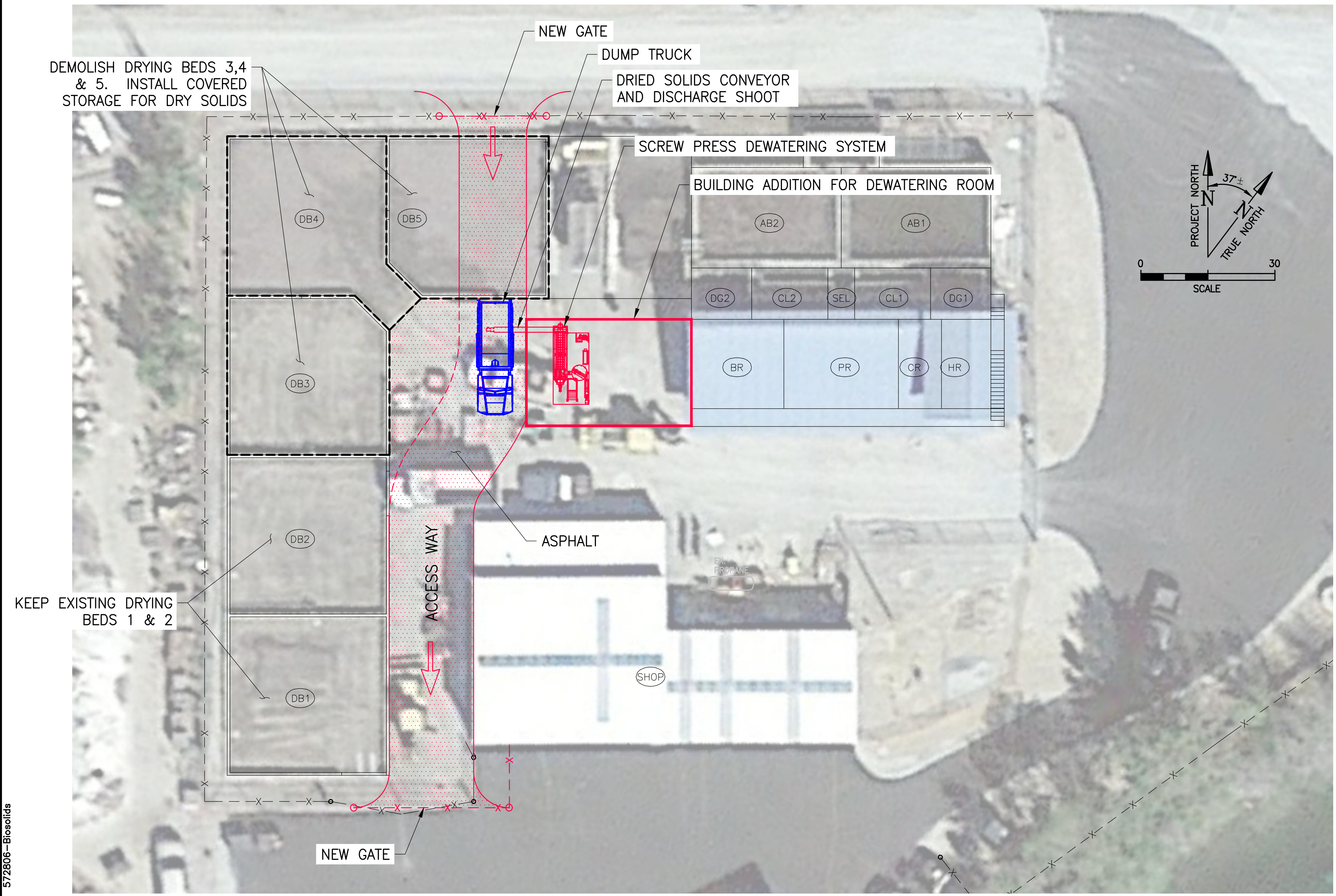
CITY OF PATEROS, WASHINGTON
WASTEWATER TREATMENT PLANT EVALUATION

SECONDARY TREATMENT SYSTEM IMPROVEMENTS

EXHIBIT
2



572806–Biosolids

SCALE: AS SHOWN
DESIGNED: NVH
DRAWN: TVP
CHECKED:
APPROVED:
PROJ. NO.: 57–28–06
DATE: 6/29/22

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DEWATERING SYSTEM IMPROVEMENTS

EXHIBIT
3