West Point Treatment Plant
Critical Gate Scope TM

Project Formulation Services

Prepared for:

King County Department of Natural Resources and Parks
Wastewater Treatment Division

September 16, 2022

West Point Treatment Plant Critical Gate Scope TM

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ACRONYMS AND ABBREVIATIONS

EPS	effluent pump station
FDS	flow diversion structure
ft	foot/feet
ft^2	square feet
ICS	influent control structure
in	inch/inches
IPS	intermediate pump station
Jacobs	Jacobs Engineering Group Inc.
MGD	million gallons per day
RSP	raw sewage pump
WPTP	West Point Treatment Plant
WTD	Wastewater Treatment Division

1 INTRODUCTION AND OBJECTIVES

Jacobs Engineering Group Inc. (Jacobs) was contracted by the King County (County) Department of Natural Resources and Parks, Wastewater Treatment Division to conduct a critical gate replacement formulation plan for the West Point Treatment Plant (WPTP) located inside Discovery Park in Seattle, Washington (Figure 1-1). The project was initiated under King County's Capital Project Formulation Program. The objective of this program is to provide decision-makers with information necessary to evaluate and develop proposed projects.

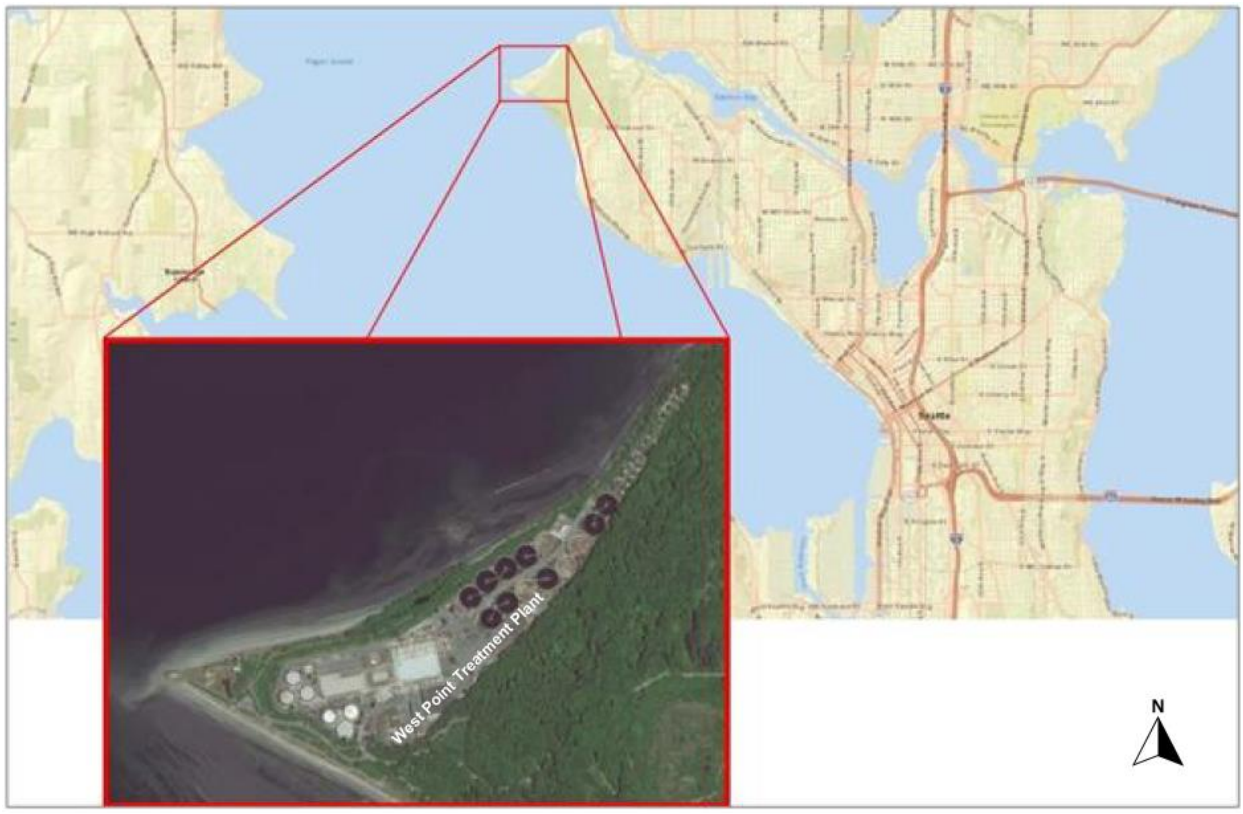

Figure 1-1: WPTP Vicinity Map

The County identified more than 150 gates that are at or near the end of their useful life and need to be replaced or rehabilitated to restore full functionality to critical processes prior to the WPTP Raw Sewage Pump Replacement Project. County Operations staff provided a preliminary inventory of existing gates and appurtenances with information for gate types, sizes, locations, priority, and known condition. This document includes preliminary inventory data for the benefit of future project teams and references the preliminary inventory for scope development throughout the following sections. Future project teams should conduct further evaluation of gates, actuators and appurtenances to expand upon and verify the accuracy of the inventory for design and the construction planning process.

This scope does not include the following gates as they are included as part of other projects or were recently replaced:

- The four effluent pump station (EPS) gates located in the EPS wet well. These gates have been addressed by another project (Project 1139051 West Point EPS Isolation Gate Rehabilitation).
- A total of six automated, influent slide isolation gates were installed in conjunction with the 2013 screenings upgrade by the County in the screenings area of the raw sewage pump building (see Table 3.2).
- WPTP staff have also identified 72 primary sedimentation tank effluent gates (six per tank; total of 12 tanks).

2 BACKGROUND

An overview of West Point Treatment Plant (WPTP) and the plant's facilities, listed by number, is provided in Figure 2-1. These facility numbers will be referenced throughout this document to relate the facility location to the WPTP site map.

2.1 Existing Conditions

WPTP receives inflows from trunks, interceptors, pump stations, and regulator stations that make up the Wastewater Treatment Division's (WTD) west section wastewater collection system. Two influent tunnels, the Fort Lawton parallel tunnel and the Old Fort Lawton tunnel, convey the collected wastewater to WPTP.

Although WPTP is rated for a peak influent flow rate of 440 million gallons per day (MGD), only the primary treatment system, chlorine contact channels, and effluent pump station (EPS) are designed to handle the peak influent rate of 440 MGD. The secondary treatment facilities (intermediate pump station [IPS], aeration tanks, and secondary sedimentation tanks) have a maximum capacity of 300 MGD. When primary effluent flows exceed 300 MGD, the excess flow is diverted around secondary treatment directly to the chlorine contact channels.

The influent control structure (ICS) receives plant influent from the Old Fort Lawton tunnel and Fort Lawton parallel tunnel, as well as side streams from solids handling. From the ICS, wastewater flows by gravity to the raw sewage pumps (RSPs) wet well, where the wastewater is screened and then lifted by the RSPs into the division channel. The primary effluent weir gates at the end of each primary effluent channel are used to control the level in the primary sedimentation tanks.

The flow diversion structure (FDS), located underground in the north-central section of WPTP, receives primary effluent from the east and west primary sedimentation tanks and diverts flows above 300 MGD (the capacity of the secondary treatment system) directly to the chlorine contact channels. Therefore, the secondary effluent gates receive a maximum of 300 MGD flow (combined) regardless of the operation mode.

The IPS, located at the northeast corner of the secondary sedimentation tanks, receives primary effluent from the FDS and conveys it to the secondary treatment aeration tanks. The EPS, located at the south-central section of the WPTP in the maintenance building, receives flow from the chlorine contact channels, which receive flows from either the secondary sedimentation tanks, the FDS, or a combination of both, after chlorination. Depending on flow and tide conditions, either gravity or the EPS pumps convey final effluent through the 96-inch-diameter outfall line. Flow through the EPS gates depends on the plant operation mode. At normal operation, combined flow through the EPS gates is up to 300 MGD. During high flow, combined flow through the EPS gates can reach up to 440 MGD.

Figure 2-1 presents the facilities at WPTP with a key to facility numbers, and Figure 2-2 presents the hydraulic facilities and gate locations in schematic form. Table 2-1 summarizes the types, sizes, and condition of gates found at each facility.

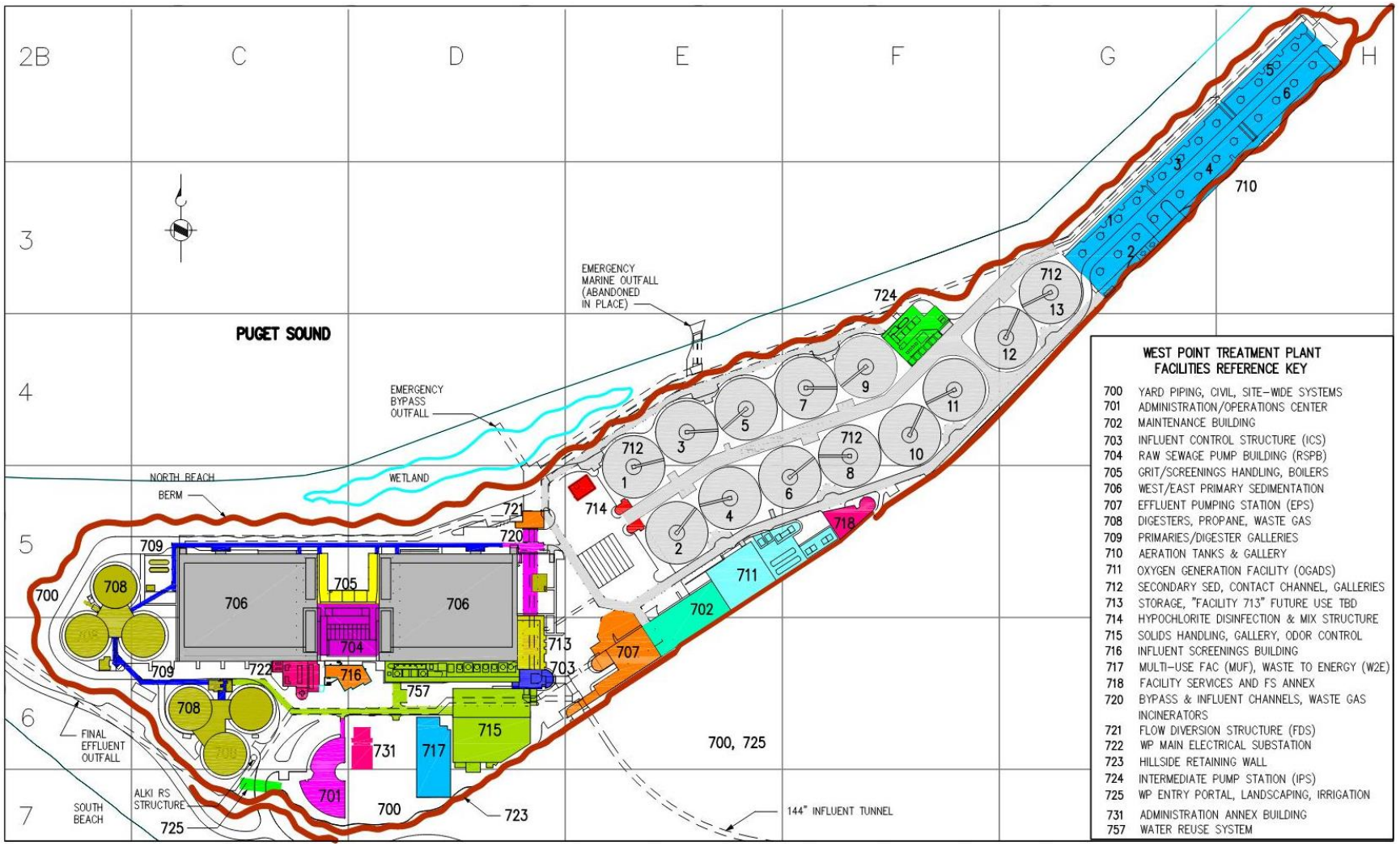

Figure 2-1: Hydraulic Facilities Map

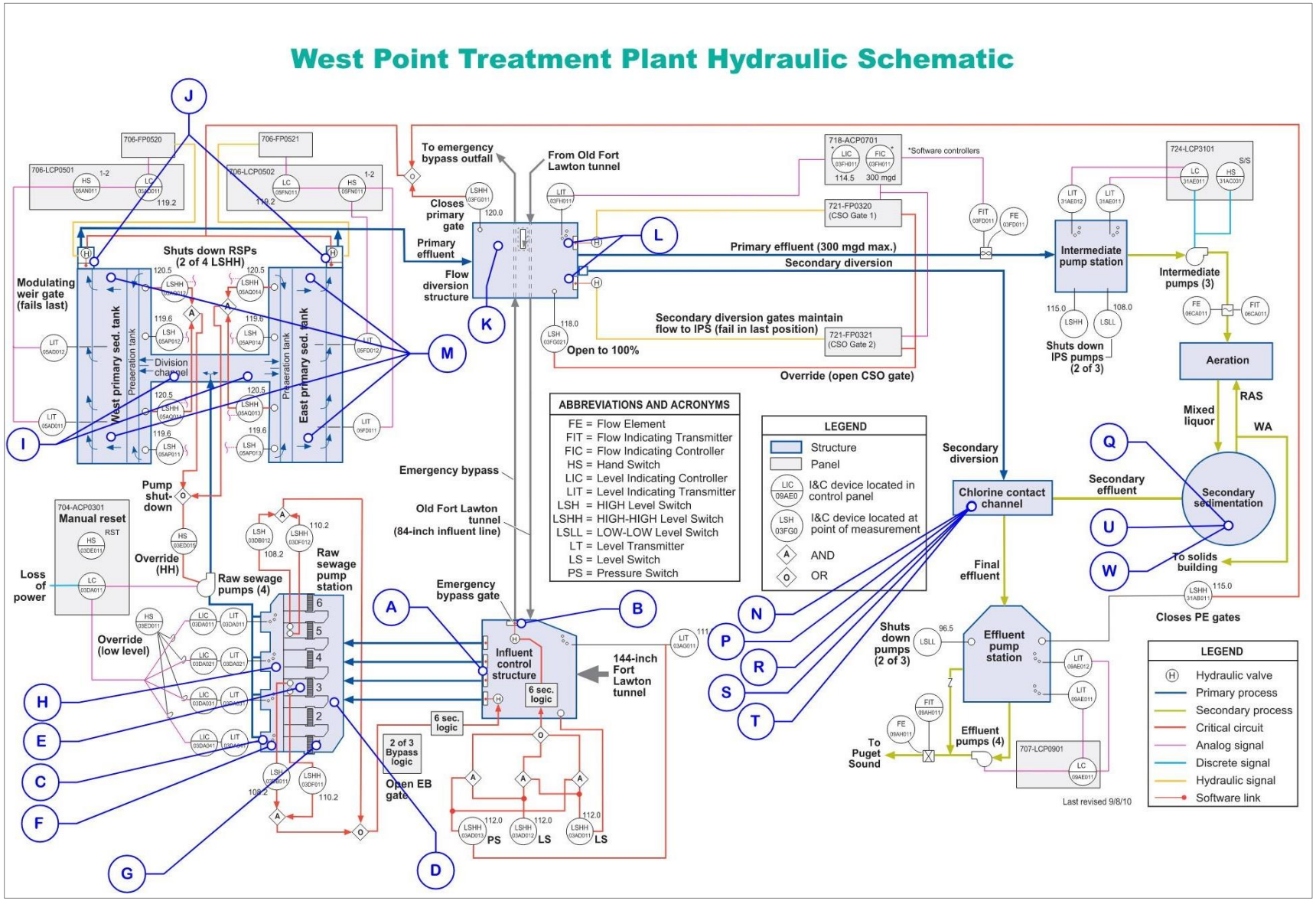

Figure 2-2: Plant Hydraulic Schematic and Gate Locations

King County conducted a preliminary assessment of gate conditions, which categorized gates as inspect (I), refurbish (U), replace (R), anchorage (A), and refurbish/controls (UC) (Table 2-1). The preliminary assessment also categorized gates by priority based on the objective of restoring full functionality to critical processes. Group "A" are highest priority due to the critical nature for life or process safety management; Group "B" gates are secondary priority.

Table 21: Map ID Gates

Map ID	Facility	Priority	Quantity	Gate Type	Operator Type	Condition	Size
A	ICS	A	4	Sluice	Hydraulic	UC	6 ft x 6 ft
B	ICS	A	1	Sluice	Hydraulic	UC	12 ft x 12 ft
C	Screening In RSP	A	4	Sluice	Manual	R	6 in x 6 in
D	Screening In RSP	B	6	Slide	Electric[1]	U	25 ft x 5.75 ft
E	Screening In RSP	A	2	Sluice	Manual	R	6 in x 6 in
F	Screening In RSP	A	4	Slide	Manual	I	6 ft x 6 ft
G	Screening In RSP	A	6	Sluice	Manual	R	6 in x 6 in
H	Screening In RSP	A	2	Slide	Manual	I	6 ft x 6 ft
I	Screening In RSP	B	4	Unknown	Manual	U	Unknown
J	Primary Sedimentation	A	2	Weir	Hydraulic	UC	10 ft x 9 ft
K	Flow Diversion Structure	A	1	Sluice	Hydraulic	UC	6 ft x 6 ft
L	Flow Diversion Structure	A	2	Sluice	Hydraulic	UC	10 ft x 12 ft
M	Primary Sedimentation	B	8	Slide	Manual	U	2 ft x 2.5 ft
N	Cl Mix Structure	A	2	Sluice/Slide	Manual	U	10 ft x 10 ft
P	Cl Mix Structure	A	2	Sluice/Slide	Manual	U	10 ft x 10 ft
Q	Secondary Sedimentation	B	13	Sluice	Manual	I	8 in x 8 in
R	Cl Mix Structure	A	4	Sluice	Manual	U	6 ft x 10 ft
S	Cl Mix Structure	A	2	Weir	Manual	U	12 ft x 30 in
T	Cl Mix Structure	B	6	Sluice	Manual	U	12 ft x 12 in
U	Secondary Sedimentation	B	13	Sluice	Manual	I	3 ft x 3 ft

Map ID	Facility	Priority	Quantity	Gate Type	Operator Type	Condition	Size
W	Secondary Sedimentation	B	13	Sluice	Manual	I	4 ft x 4 ft
Unknown	Secondary Sedimentation	B	48	Sluice	Manual	R	3 ft x 3 ft
Unknown	Secondary Sedimentation	A	5	Sluice	Manual	I	1 ft x 1 ft
Unknown	Secondary Sedimentation	B	2	Weir	Manual	I	1 ft x 2 ft
Unknown	Solids Building	B	1	Sluice	Manual	I	Unknown

ft = foot/feet
in = inch/inches

The ICS, RSP wet well, primary effluent weir gates, FDS, IPS, and EPS are the critical hydraulic control facilities at WPTP. Since these facilities are interconnected, hydraulic activity at one facility generally affects the hydraulic activity at the other facilities.

2.2 Options Criteria

For this formulation effort, an in-kind replacement of all gates is assumed due to the uncertainty of the actual conditions of each gate. A condition assessment consisting of visual observation of each gate including gate operation was not completed for this Formulation effort. Prior to initiation of future project(s) to replace the gates, the condition of each gate should be inspected and assessed to determine if full gate replacement is required or if rehabilitation/refurbishment would be an adequate and more cost-effective alternative to extend the gate life. This may present a significant opportunity for future project teams and is noted in the basis of estimate. For those gates that future project teams select to replace, field engineering should be conducted to confirm the accuracy of the electrical, mechanical, and structural details assumed in this planning level technical memorandum and represented in available as-built documentation. Field engineering is included in the cost estimate and basis of estimate.

2.3 Documents Received

The following documents (Table 2-2) were provided by the County and have been reviewed as part of this project formulation.

Table 2-2: WPTP Documents

Drawings	Operations and Maintenance	Miscellaneous Documents
Drawing G21, Hydraulic Profile, Rev 1 (Dec. 2012)	O&M-WPTP HYDRO GATES BOOK 1 OF 2	Asset-WO_Data
Drawing G22, Hydraulic Profile, Rev 1 (Dec. 2012)	O&M-WPTP HYDRO GATES BOOK 2 OF 2	REQ2011 WPTP Critical Gate Rehab Est
West Point Treatment Plant Primary Effluent Launder Gates Replacement (June 2016)	—	REQ2011 WP Gate inventory
—	—	REQ2011 Gate Location 1 of 2
—	—	REQ2011 Gate Location 2 of 2
—	—	REQ2011 WP Critical Gate
—	—	WPTP Facilities Map

3 SCOPE OF WORK DEVELOPMENT

The scope of work is for the replacement of more than 150 gates and their associated actuators throughout West Point Treatment Plant (WPTP). For this planning document, the following are assumed:

- The replacement gates will be in kind in size and operability. The type of actuator (electric, hydraulic, or manual) will not be changed (i.e., hydraulic actuators switched to electrical). The actuator will need to be replaced due to age and is assumed to be included.
- The replacement effort will require an extensive condition assessment and field engineering as part of the project development, which will include accessing gates that are not normally visible and may require planned outage plans and confined space entry or remote cameras to assess. A field engineering allowance is included in the cost estimate.
- Construction phasing will need to be evaluated by the future design team. Six years of construction have been assumed for this Formulation effort to allow appropriate costs for multi-year mobilization and construction.
- There will be no other planned changes to existing electrical, hydraulic, or mechanical infrastructure (i.e., increasing in size or type), however a per gate allowance is included in the cost estimate to account for unexpected replacement due to condition or code required updates. The actuator control will be replaced in kind.
- The new gates and actuators will make use of the existing electrical supply and distributed control system (Ovation), and control strategies will remain the same.
- Stop log rehabilitation or replacement may be necessary to isolate the gates for inspection and replacement. The cost estimate includes an allowance for stop log rehabilitation or replacement.
- This formulation does not include the four effluent pump station (EPS) gates located in the EPS wet well within the scope of this project. These gates have been addressed by another project (Project 1139051 West Point EPS Isolation Gate Rehabilitation).

The WPTP's existing critical flow control gates are in various states of operational readiness with some non-functioning gates. All gates were installed in the early 1990s and have since deteriorated and are approaching the end of useful life. The gates are located within active and critical plant process locations and were not designed to be isolated for inspection, repair, or replacement. Bypass plans may be required for the replacement of gates at the influent control structure, flow diversion structure and the chlorine mix structure.

3.1 Influent Control Structure (Facility 703)

The Influent Control Structure (ICS) receives influent from the Old Fort Lawton tunnel and the Fort Lawton Parallel tunnel, as well as side streams from solids handling (Figure 3-1). The facility includes four influent gates that can stop the flow of influent to the RSP wet well, the 144-inch emergency bypass gate that diverts influent to the emergency bypass channel during high levels, and an overflow weir that releases wastewater to the bypass channel if the ICS wastewater elevation exceeds 111.5.

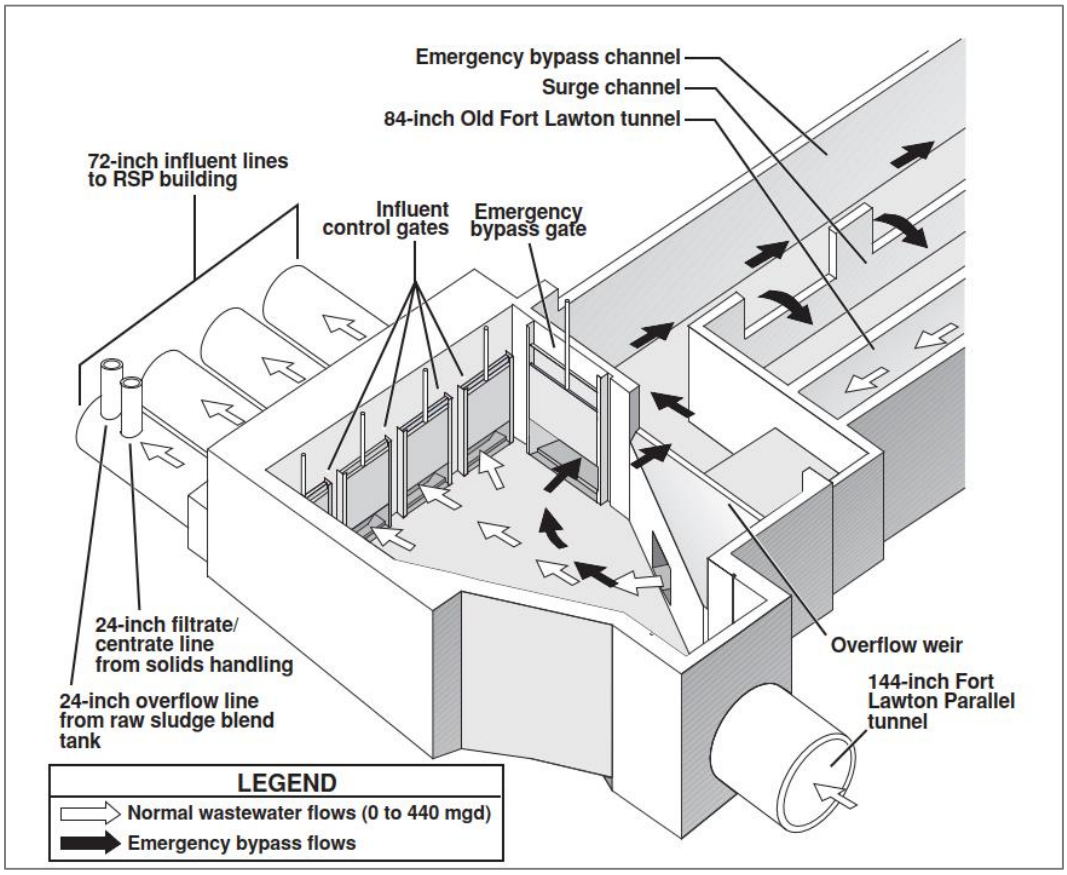

Figure 3-1: Influent Control Structure

Under normal operating conditions, the four influent control gates are open, and the emergency bypass gate and emergency marine outfall gate are closed.

Table 3-3 lists the ICS gates and their characteristics. The County's preliminary assessment of these gates is that each gate needs to be refurbished and controls need to be upgraded. The County rated each of these gates as Priority A.

Table 3-1: Influent Control Structure Gates

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
703-SG0301011	ICS-Sluice Gate 1	A	Refurbish Gate and Upgrade Controls	Sluice	Hydraulic	6 ft x 6 ft
703-SG0301021	ICS- Sluice Gate 2	A	Refurbish Gate and Upgrade Controls	Sluice	Hydraulic	6 ft x 6 ft
703-SG0301031	ICS- Sluice Gate 3	A	Refurbish Gate and Upgrade Controls	Sluice	Hydraulic	6 ft x 6 ft
703-SG0301041	ICS- Sluice Gate 4	A	Refurbish Gate and Upgrade Controls	Sluice	Hydraulic	6 ft x 6 ft
703-SG0302011	ICS-Emergency Bypass Gate	A	Refurbish Gate and Upgrade Controls	Sluice	Hydraulic	12 ft x 12 ft

Accessing the ICS for inspection and construction will require confined space entry and installation of a temporary bulkhead for manual gate isolation. Bypass pumping will also likely be required so that influent flows continue while this facility is offline.

3.2 Screening Facility and Raw Sewage Pump Building (Facility 704)

From the ICS, wastewater flows by gravity to the RSP wet well, where the wastewater is screened and then lifted by the RSPs into the division channel (Figure 3-2). Isolation slide gates can be used to isolate the RSPs from the wet well and division channel.

A total of six automated, influent slide isolation gates were installed in conjunction with the 2013 screenings upgrade by the County (Figure 3-3). These actuated gates are permanently installed upstream of each bar screen and isolate bar screens when not in use. The gates are fabricated of galvanized steel with stainless steel gate guides. The gates are raised and lowered using a motorized actuator on a regular basis to open and close the flow path to the respective bar screen, as individual bar screens are placed in or out of service. These gates are not included in Table 3-4 because they were recently installed and do not need refurbishment or replacement.

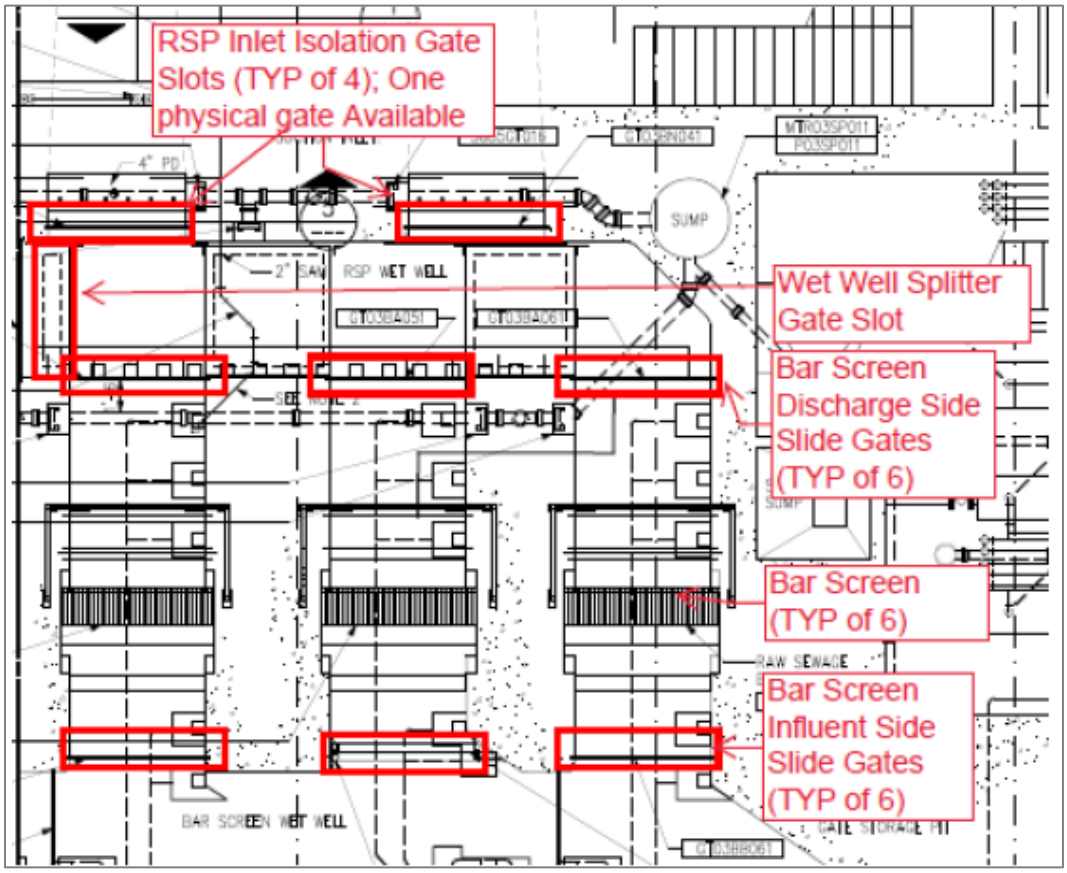

Figure 3-2: Raw Sewage Pump wet well component locations (eastern half, Gates 4 to 7)

Figure 3-3: Bar screen influent side isolation slide gate

Six discharge side isolation slide gates were installed as part of the initial RSP wet well construction in the 1960s (Figure 3-4). These gates are fabricated of galvanized steel and are housed in galvanized steel gate guides, normally in the up position. When used, these gates are lowered and raised manually using a bridge crane. Because flow to the bar screen is generally controlled on the influent side, these gates are infrequently used except for preventative maintenance, confined space entry into the RSP wet well, or to isolate a bar screen entirely. On average, these activities result in moving the gates approximately once per year per gate.

Figure 3-4: Bar screen discharge side isolation slide gate

Based on communication with Operations staff, the gates are functional in their existing condition and there is not a strong desire to provide motorized actuation of these gates or replacement of the gates due to their infrequent use. Further, dimensional constraints in and around the gates could make for a challenging conversion to motorized actuation. Re-establishing corrosion protection on the gates is required in several places. Restoring a corrosion protection system would include a thorough cleaning with detergent, abrasive blasting, and application of a chemical-resistant coating or a zinc or zinc/aluminum coating applied by a thermal spray process.

In addition, the inspection revealed that the RSP wet well sluice gates were covered with debris and/or ragging at the time and the condition could not be verified. One of the 6-inch channel drain system sluice gates was found to be defective in sealing (Figure 3-5). It is likely that the leakage occurring during the time of inspection was the result of the gate unsuccessfully trying to resist an unseated head due to the water level behind the gate being greater than within the drained wet well. If this was the case, it would not be considered normal operation for the gate, in which case gate modifications may not be required. A second potential modification to these sluice gates may include a debris screen to reduce the likelihood of ragging. Debris screens were not considered as a potential modification as they run the potential for becoming their own source of ragging collection, but future project teams may take the opportunity to include these as part of gate improvements.

Figure 3-5: 6-inch channel drain system sluice gate at RSP 404

A condition assessment was conducted on two of the RSP discharge isolation gate frames (unknown asset numbers in Table 3-4) on July 6 through 9, 2020. The underside of the cover for gate slots 401 and 404 had evidence of corrosion, and the frames were corroded to a state of needing substantial repair or replacement (Farmer and Moffat 2020).

Table 3-4 lists the RSP and screening gates and their characteristics.

Table 3-2**: RSP and Screening Gates**

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
704-SG35GT011	RSP 1 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-SG35GT013	RSP 2 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-SG35GT014	RSP 3 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-SG35GT016	RSP 4 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704GT03BB011	RSP Bar screen 1 isolation gates (influent)[1]	B	Refurbish	Slide	Electric[1]	25 ft x 5.75 ft
704GT03BB021	RSP Bar screen 2 isolation gates (influent)[1]	B	Refurbish	Slide	Electric[1]	25 ft x 5.75 ft
704GT03BB031	RSP Bar screen 3 isolation gates (influent)[1]	B	Refurbish	Slide	Electric[1]	25 ft x 5.75 ft
704GT03BB041	RSP Bar screen 4 isolation gates (influent)[1]	B	Refurbish	Slide	Electric[1]	25 ft x 5.75 ft
704GT03BB051	RSP Bar screen 5 isolation gates (influent)[1]	B	Refurbish	Slide	Electric[1]	25 ft x 5.75 ft
704GT03BB061	RSP Bar screen 6 isolation gates (influent)[1]	B	Refurbish	Slide	Electric[1]	25 ft x 5.75 ft
Unknown	RSP Bar screen 1 isolation gates (effluent)[2]	B	Refurbish	Slide	Manual	25 ft x 5.75 ft
Unknown	RSP Bar screen 2 isolation gates (effluent) [2]	B	Refurbish	Slide	Manual	25 ft x 5.75 ft
Unknown	RSP Bar screen 3 isolation gates (effluent) [2]	B	Refurbish	Slide	Manual	25 ft x 5.75 ft
Unknown	RSP Bar screen 4 isolation gates (effluent) [2]	B	Refurbish	Slide	Manual	25 ft x 5.75 ft

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
Unknown	RSP Bar screen 5 isolation gates (effluent) [2]	B	Refurbish	Slide	Manual	25 ft x 5.75 ft
Unknown	RSP Bar screen 6 isolation gates (effluent) [2]	B	Refurbish	Slide	Manual	25 ft x 5.75 ft
704-SG35GT012	RSP Wet Well West Drain Gate	A	Replace	Sluice	Unknown	6 in x 6 in
704-SG35GT015	RSP Wet Well East Drain Gate	A	Replace	Sluice	Unknown	6 in x 6 in
704-GT03BN011	RSP 1 Wet Well Isolation Gate[3]	A	Inspect	Slide	Manual[3]	26 ft x 6.5 ft[3]
704-GT03BN021	RSP 2 Wet Well Isolation Gate[3]	A	Inspect	Slide	Manual[3]	26 ft x 6.5 ft[3]
704-GT03BN031	RSP 3 Wet Well Isolation Gate[3]	A	Inspect	Slide	Manual[3]	26 ft x 6.5 ft[3]
704-GT03BN041	RSP 4 Wet Well Isolation Gate[3]	A	Inspect	Slide	Manual[3]	26 ft x 6.5 ft[3]
704-SG35GT021	Barscreen 1 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-SG35GT022	Barscreen 2 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-SG35GT023	Barscreen 3 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-SG35GT024	Barscreen 4 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-SG35GT025	Barscreen 5 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-SG35GT026	Barscreen 6 Drain Gate	A	Replace	Sluice	Manual	6 in x 6 in
704-GT03BM031	RSP Barscreen 3-4 Wet Well Isolation Gate[5]	A	Inspect	Slide	Manual	6 ft x 6 ft
704-GT03BM051	RSP Barscreen 5-6 Wet Well Isolation Gate[5]	A	Inspect	Slide	Manual	6 ft x 6 ft
Unknown	RSP Discharge Isolation Gate[4]	B	Refurbish	Slide	Manual	6 ft x 10 ft

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
Unknown	RSP Discharge Isolation Gate[4]	B	Refurbish	Slide	Manual	6 ft x 10 ft
Unknown	RSP Discharge Isolation Gate[4]	B	Refurbish	Slide	Manual	6 ft x 10 ft
Unknown	RSP Discharge Isolation Gate[4]	B	Refurbish	Slide	Manual	6 ft x 10 ft

[1] The bar screen influent side slide gates are excluded from cost estimate as explained in section 3.2. Actuator type updated based on WPTP Influent Screening Improvement Project Contract No. C00730C12. Text in name column updated to clarify that these gates are on the influent side of the screens.

[2] Added six manual slide gates located on the effluent side of the screens. These gates were not included on the asset list provided. Assumed gate size is the same as upstream gates recently replaced in as part of the WPTP Influent Screening Improvement Project.

[3]Gates appear to be isolation gates at inlet to the four raw sewage pumps. Only one physical gate onsite. Actuator type updated to be manual by Jacobs. Size of gate updated by Jacobs based on information received from WPTP staff. Asset numbers may be for the gate frames (four frames) vs. the gates.

[4] RSP Discharge Isolate Gate – only one physical gate onsite. Updated dimensions based on slide gate schedule provided in drawing S5 from the May 1963 drawings for the construction of the WPTP. Asset numbers may be for the gate frames (four frames) vs. the gates.

[5] Location of these gates are unknown. Each screen has its own discharge manual gate that are included in the table.

The RSP area is generally accessible and much of the assets within are accessible from the surface for inspection. It should be expected that some construction will still require confined space entry, such as when accessing the RSP wet well. The RSP is divided into several channels, so isolating individual channels should allow for flows to continue through the facility during inspection and construction. It should not be necessary to install temporary bulkheads for manual gate isolation. Bypass pumping is not anticipated unless it is required to fully dewater areas for access.

3.3 Primary Sedimentation Basins (Facility 706)

The pre-aeration tanks remove grit from wastewater. An out-of-service pre-aeration tank will influence the flow split through WPTP by affecting the levels and the detention times in the primary sedimentation tanks (Figure 3-6). The primary effluent weir gates at the end of each primary effluent channel are used to control the level in the primary sedimentation tanks. The primary sedimentation tanks remove settleable and floatable solids from wastewater and provide limited hydraulic storage. The weir gates can also be used in an emergency to protect downstream facilities from flooding. The primary effluent weir gates raise and lower to maintain a level set point in the primary sedimentation tanks. The weir gates are located at the northern ends of the east and west primary effluent channels.

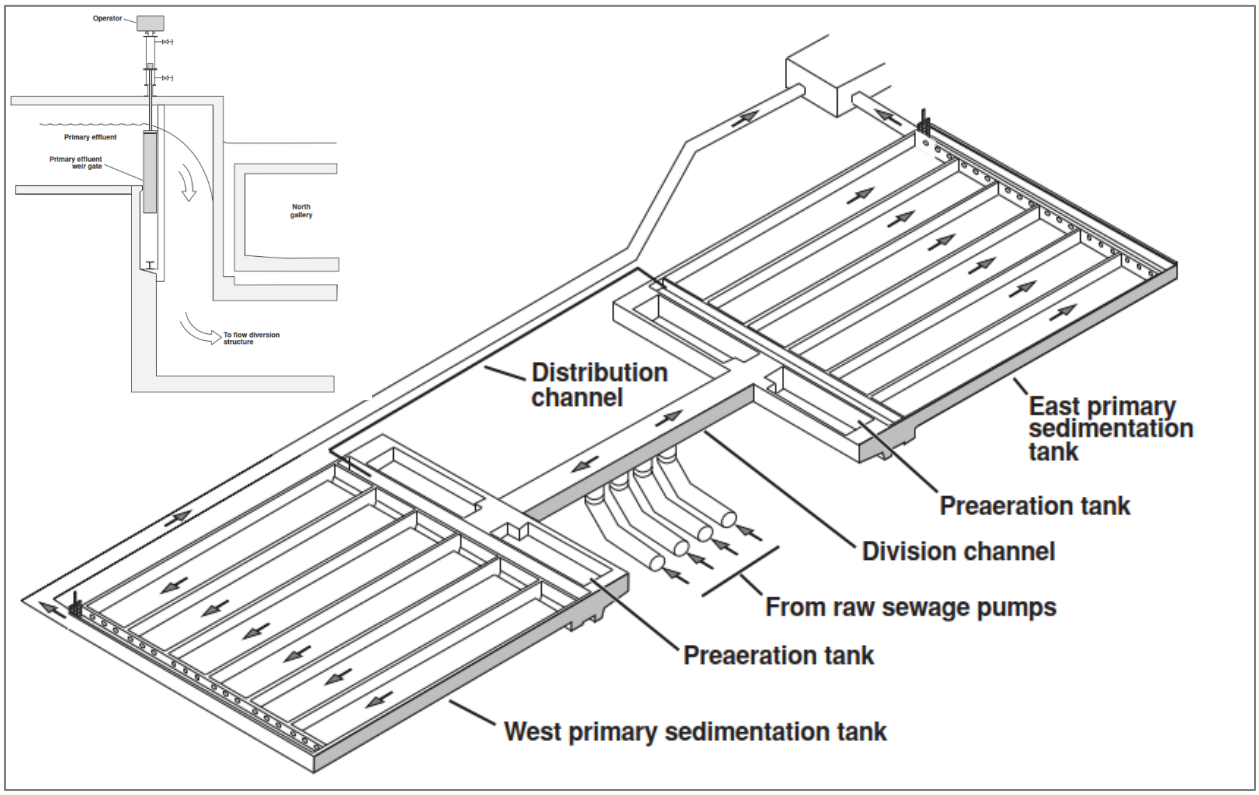

Figure 3-6: East and West Primary Sedimentation Tanks

Table 3-5 lists the primary sedimentation gates and their characteristics.

Table 3-3: Primary Sedimentation Gates

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
706-GT05AD011	SED-PRI West Outlet Gate	A	Refurbish Gate and Upgrade Controls	Weir	Hydraulic	10 ft x 9 ft
706-GT05FD011	SED-PRI East Outlet Gate	A	Refurbish Gate and Upgrade Controls	Weir	Hydraulic	10 ft x 9 ft
706-GT05AT011	SED-PRI West Distribution Channel Inlet Gate	B	Refurbish	Slide	Unknown	2 ft x 2.5 ft
706-GT05AT012	SED-PRI West Distribution Channel Inlet Gate	B	Refurbish	Slide	Unknown	2 ft x 2.5 ft
706-GT05AT013	SED-PRI West Distribution Channel Inlet Gate	B	Refurbish	Slide	Unknown	2 ft x 2.5 ft
706-GT05AT014	SED-PRI West Distribution Channel Inlet Gate	B	Refurbish	Slide	Unknown	2 ft x 2.5 ft
706-GT05AT021	SED-PRI East Distribution Channel Inlet Gate	B	Refurbish	Slide	Unknown	2 ft x 2.5 ft
706-GT05AT022	SED-PRI East Distribution Channel Inlet Gate	B	Refurbish	Slide	Unknown	2 ft x 2.5 ft
706-GT05AT023	SED-PRI East Distribution Channel Inlet Gate	B	Refurbish	Slide	Unknown	2 ft x 2.5 ft
706-GT05AT024	SED-PRI East Distribution Channel Inlet Gate	B	Refurbish	Slide	Unknown	2 ft x 2.5 ft
706-GT05GE011	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE012	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE013	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE014	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE021	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE022	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE023	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
706-GT05GE024	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE031	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE032	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE033	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE034	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE041	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE042	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE043	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE044	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE051	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE052	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE053	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE054	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE061	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE062	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE063	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GE064	East Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW011	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW012	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW013	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW014	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW021	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW022	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW023	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW024	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW031	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW032	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW033	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW034	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW041	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW042	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW043	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW044	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW051	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW052	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
706-GT05GW053	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW054	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW061	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW062	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW063	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft
706-GT05GW064	West Prim Sed In	A	Inspect	Sluice	Manual	3 ft x 3 ft

Note: 72 primary sedimentation tank effluent gates (6 gates per tank) located on the submerged launders are not included in this formulation because they were replaced in 2018. These gates were not included in the asset list provided by the County.

The pre-aeration tanks and primary sediment channels will need to be drained for gate inspection and construction, but because there are separate east and west sections and several sedimentation channels within each, gate isolation should be achievable without interruption to flows through the facility and without the use of temporary bypass or diversion efforts. Accessing the tanks and channels in this facility will require confined entry permitting.

3.4 Flow Diversion Structure (Facility 721)

The flow diversion structure (FDS) is located underground in the north-central section of WPTP (Figure 3-7). The FDS's only aboveground components are the secondary diversion gate operators and accumulators. Based on flow or level conditions, the FDS either directs primary effluent from the east and west primary sedimentation tanks to the intermediate pump station (IPS) (where it is pumped to the secondary treatment facilities), diverts primary effluent to the chlorine mix structures, or distributes flows to both the IPS and chlorine mix structures.

The FDS includes two secondary diversion gates and the Old Fort Lawton tunnel bypass gate (this gate is functionally separate from the FDS).

When flows exceed 300 MGD, the secondary diversion gates modulate to maintain a flow of 300 MGD to secondary treatment; excess flows are diverted to the chlorine mix structures. If the level in FDS continues to rise, then the gates are transferred from flow control to level control to divert more primary effluent to the chlorine mix structures.

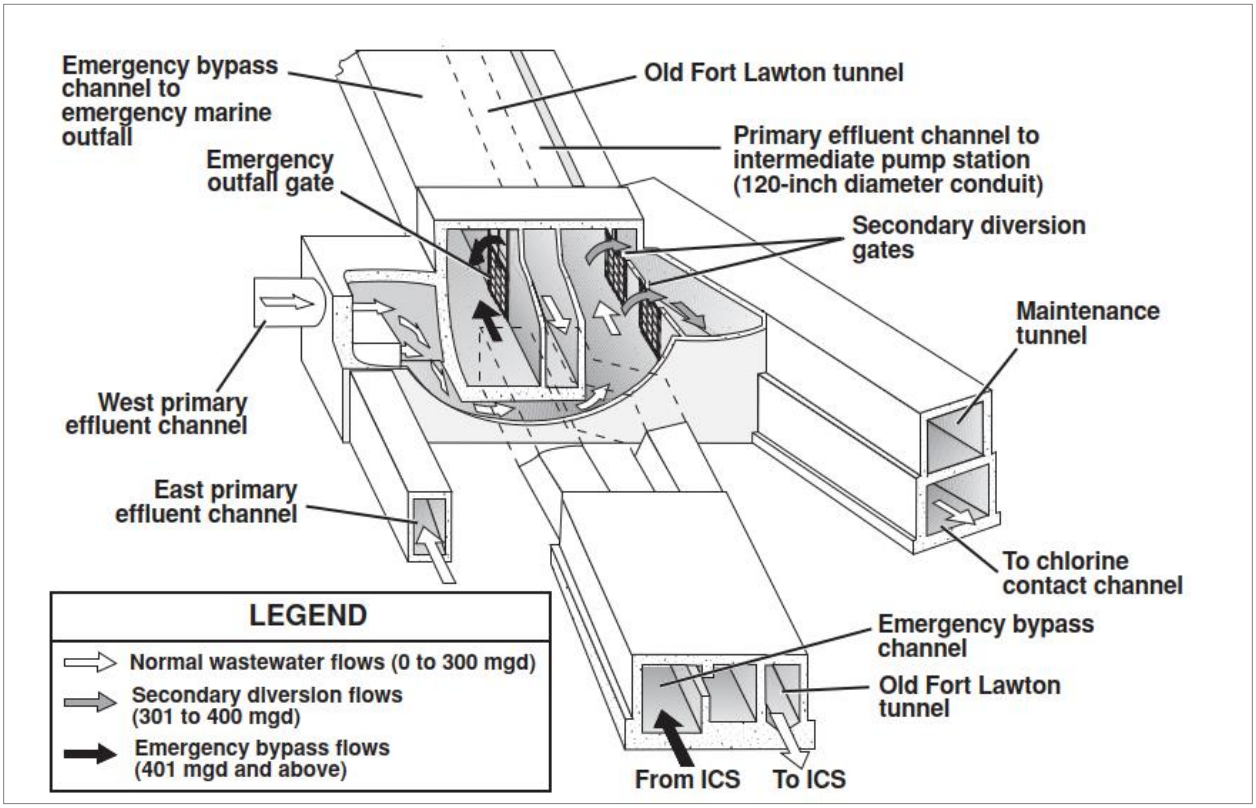

Figure 3-7: Flow Diversion Structure

Table 3-6 lists the FDS gates and their characteristics.

Table 3-4: Flow Diversion Structure Gates

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
721-SG03FB011	FDS- EMERGENCY OUTFALL GATE	A	Refurbish Gate and Upgrade Controls	Sluice	Hydraulic	6 ft x 6 ft
721-GT03FH011	FDS-SECONDARY FLOW DIVERSION GATE NORTH	A	Refurbish Gate and Upgrade Controls	Sluice	Hydraulic	10 ft x 12 ft
721-GT03FH021	FDS-SECONDARY FLOW DIVERSION GATE 2 SOUTH	A	Refurbish Gate and Upgrade Controls	Sluice	Hydraulic	10 ft x 12 ft

Because the FDS is underground and generally inaccessible, access for inspection and construction will require confined space entry permitting. The emergency outfall gate is only in use during high flows and may be accessible without interruption to flows through the FDS. The two flow diversion gates are part of normal operation and accessing these will require bypass pumping to continue plant flows.

3.5 Chlorine Mix Structure (Facility 714)

Chlorine contact channels receive flows from either the secondary sedimentation tanks, the FDS, or a combination of both. Flows coming from FDS are above 300 MGD (the capacity of the secondary treatment system). The secondary treatment excess flow is diverted to the chlorine mix through the secondary diversion line. The diversion is possible due to the LSH03FG021 level switch/transmitter, which diverts the maximum primary effluent to the chlorine mix structures. In the chlorine mix area, the statics mixers rapidly mix the chlorine solution with the secondary effluent to minimize the amount of chlorine needed. The effluent continues through the chlorine contact conduit to the EPS.

This evaluation looked at the repair and replacement options for the two southeast gates (located between the southeast channel and the north and south chlorine mix structures: 714-GT08IN011 [North Gate] and 714-GT08IS011 [South Gate]).

Southeast gate access is available through hatches and grating on top of the north and south chlorine mix structures. These access points are approximately 6 feet wide by 15.5 feet long and generally larger than the areas above the EPS gates (although beams for the grating may somewhat impede access), except that the chlorine mix structures are elevated and accessing these roof hatches with a vehicle is not possible. A significant construction challenge at the southeast gates is that the gates control upstream inflow from the southeast channel, while the gates are installed within the chlorine mix structures, so any isolation would need to occur upstream within the southeast channel, where access is not readily available. Access to the southeast channel on the upstream side of the gates, if needed, might require access through the gates from the chlorine mix structures or potentially by installing new access points through the top of the southeast channel if overhead access is needed.

Draining the chlorine mix structures and southeast channel may be difficult. As part of the future project, County staff should verify that adequate time windows can be provided after draining for construction work, to determine if the repair or replacement of these gates is even feasible in relation to their limited functional necessity.

Table 3-7 lists the chlorine mix structure gates and their characteristics.

Table 3-5: Chlorine Mix Structure Gates

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
712-GT08IN011	SEC-EFFLUENT INLET GATE TO NORTH MIX STRUCTURE	A	Refurbish	Sluice	Manual	6 ft x 10 ft
712-GT08IS011	SEC-EFFLUENT INLET GATE TO SOUTH MIX STRUCTURE	A	Refurbish	Slide	Manual	6 ft x 10 ft
712-GT08JN011	SEC-DIVERSION FLOW TO NORTH MIX STRUCTURE GATE	A	Refurbish	Sluice	Manual	10 ft x 10 ft
712-GT08JS011	SECDIVERSION FLOW TO SOUTH MIX STRUCTURE GATE	A	Refurbish	Slide	Manual	10 ft x 10 ft
712-SG08GN011	NORTH MIX STRUCTURE SEC-EFFLUENT INLET GATE-1	A	Refurbish	Sluice	Manual	6 ft x 10 ft
712-SG08GN021	NORTH MIX STRUCTURE SEC-EFFLUENT INLET GATE-2	A	Refurbish	Sluice	Manual	6 ft x 10 ft
712-SG08GS011	SOUTH MIX STRUCTURE SEC-EFFLUENT INLET GATE-1	A	Refurbish	Sluice	Manual	6 ft x 10 ft
712-SG08GS021	SOUTH MIX STRUCTURE SEC-EFFLUENT INLET GATE-2	A	Refurbish	Sluice	Manual	6 ft x 10 ft
712-GT08KS011	SOUTH STRUCTURE SEC-SCUM WEIR GATE	A	Refurbish	Weir	Manual	12 ft x 30 in
712-GT08KN011	NORTH STRUCTURE SEC-SCUM WEIR GATE North	A	Refurbish	Weir	Manual	12 ft x 30 in
712-SG08HN011	NORTH MIX STRUCTURE- DRAIN GATE-1	B	Refurbish	Sluice	Manual	12 ft x 12 in
712-SG08HN021	NORTH MIX STRUCTURE DRAIN	B	Refurbish	Sluice	Manual	12 ft x 12 in

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
712-SG08HN031	SEC-SOLIDS NORTH MIX STRUCTURE VAULT DRAIN GATE	B	Refurbish	Sluice	Manual	12 ft x 12 in
712-SG08HS011	SOUTH MIX STRUCTURE DRAIN GATE-1	B	Refurbish	Sluice	Manual	12 ft x 12 in
712-SG08HS031	SOUTH MIX STRUCTURE VAULT DRAIN GATE	B	Refurbish	Sluice	Manual	12 ft x 12 in
712-SG08HS021	SOUTH MIX STRUCTURE DRAIN GATE-2	B	Refurbish	Sluice	Manual	12 ft x 12 in

3.6 Secondary Sedimentation (Facility 712)

The IPS, located at the northeast corner of the secondary sedimentation tanks, receives primary effluent from the FDS and conveys it to the secondary treatment aeration tanks. The mixed liquor flows from the aeration tanks and continues to the secondary sedimentation tanks via the mixed liquor channel. The mixed liquor channel serves as a larger “splitter box” to evenly split flow to the thirteen secondary sedimentation tanks. The circular secondary sedimentation tanks are sensitive to changes in flow, and therefore flow control is important. Dividing orifices and weirs keep the flows uniformly divided among the secondary sedimentation tanks.

Table 3-8 lists the secondary sedimentation gates and their characteristics.

Table 3-6: Secondary Sedimentation Gates

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
712-SG07AC011	SEC-SCC/DEWTR, Tank 1 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC021	SEC-SCC/DEWTR, Tank 2 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC041	SEC-SCC/DEWTR, Tank 4 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC051	SEC-SCC/DEWTR, Tank 5 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC061	SEC-SCC/DEWTR, Tank 6 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC071	SEC-SCC/DEWTR, Tank 7 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC081	SEC-SCC/DEWTR, Tank 8 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC091	SEC-SCC/DEWTR, Tank 9 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC101	SEC-SCC/DEWTR, Tank 10 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC111	SEC-SCC/DEWTR, Tank 11 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC121	SEC-SCC/DEWTR, Tank 12 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC131	SEC-SCC/DEWTR, Tank 13 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AC031	SEC-SCC/DEWTR, Tank 3 Drain Gate	B	Inspect	Sluice	Unknown	8 in x 8 in
712-SG07AB011	SEC, Tank 1 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB021	SEC, Tank 2 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB031	SEC, Tank 3 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB041	SEC, Tank 4 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB051	SEC, Tank 5 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB061	SEC, Tank 6 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
712-SG07AB071	SEC, Tank 7 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB081	SEC, Tank 8 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB091	SEC, Tank 9 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB101	SEC, Tank 10 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB111	SEC, Tank 11 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB121	SEC, Tank 12 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG07AB131	SEC, Tank 13 Effluent Gate	B	Inspect	Sluice	Unknown	3 ft x 3 ft
712-SG08LL011	SEC-SLUICE GATE	A	Inspect	Sluice	Unknown	12 in x 12 in
712-SG08LL021	SEC-SLUICE GATE	A	Inspect	Sluice	Unknown	12 in x 12 in
712-SG08LL041	SEC-SOLIDS-SLUICE GATE	A	Inspect	Sluice	Unknown	12 in x 12 in
712-SG08SC011	SEC-SOLIDS-SLUICE GATE	A	Inspect	Sluice	Unknown	12 in x 12 in
712-GT07AD011	SEC-SSC ML/SCU	B	Inspect	Weir	Unknown	12 in x 12 in
712-GT07AD031	SEC-SSC ML/SCU	B	Inspect	Weir	Unknown	12 in x 12 in
712-SG08LL031	SEC-SOLIDS GATE	B	Inspect	Sluice	Unknown	12 in x 12 in
712-SG07AA071	SEC- ML CHAN, Tank 7 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA011	SEC- ML CHAN, Tank 1 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA021	SEC- ML CHAN, Tank 2 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA031	SEC- ML CHAN, Tank 3 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA041	SEC- ML CHAN, Tank 4 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA051	SEC- ML CHAN, Tank 5 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA061	SEC- ML CHAN, Tank 6 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA091	SEC- ML CHAN, Tank 9 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
712-SG07AA111	SEC- ML CHAN, Tank 11 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA121	SEC- ML CHAN, Tank 12 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA131	SEC- ML CHAN, Tank 13 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA081	SEC- ML CHAN, Tank 8 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft
712-SG07AA101	SEC- ML CHAN, Tank 10 Influent Gate	B	Inspect	Sluice	Unknown	4 ft x 4 ft

Similarly, to the primary sedimentation channels, the secondary sedimentation tanks will be drained for gate inspection and construction, but the separate tanks should be capable of isolation without interrupting flows through the facility. It may be necessary to use diversion upstream of some gates. Accessing the tanks in this facility will require confined entry permitting.

3.7 Solids Handling Building (Facility 715)

The four-level solids handling building houses the solids handling equipment for the thickening process, the dewatering process, the polymer storage and mixing process, and the odor control system. The thickened sludge blend/storage tank, which follows the gravity belt thickener and precedes sludge transfer to the anaerobic digester (Figure 3-8), contains a center wall that separates two sides of the tank. The center wall contains a small gate that allows the two sides of the tank to vary between hydraulic connectivity and isolation. This provides the option for one side of the tank to be isolated for dewatering while the other half remains in service. Table 3-9 lists known details of this gate, which will require inspection as part of the projects condition assessment. Jacobs assumes this gate is in the "small" category based on its location and use.

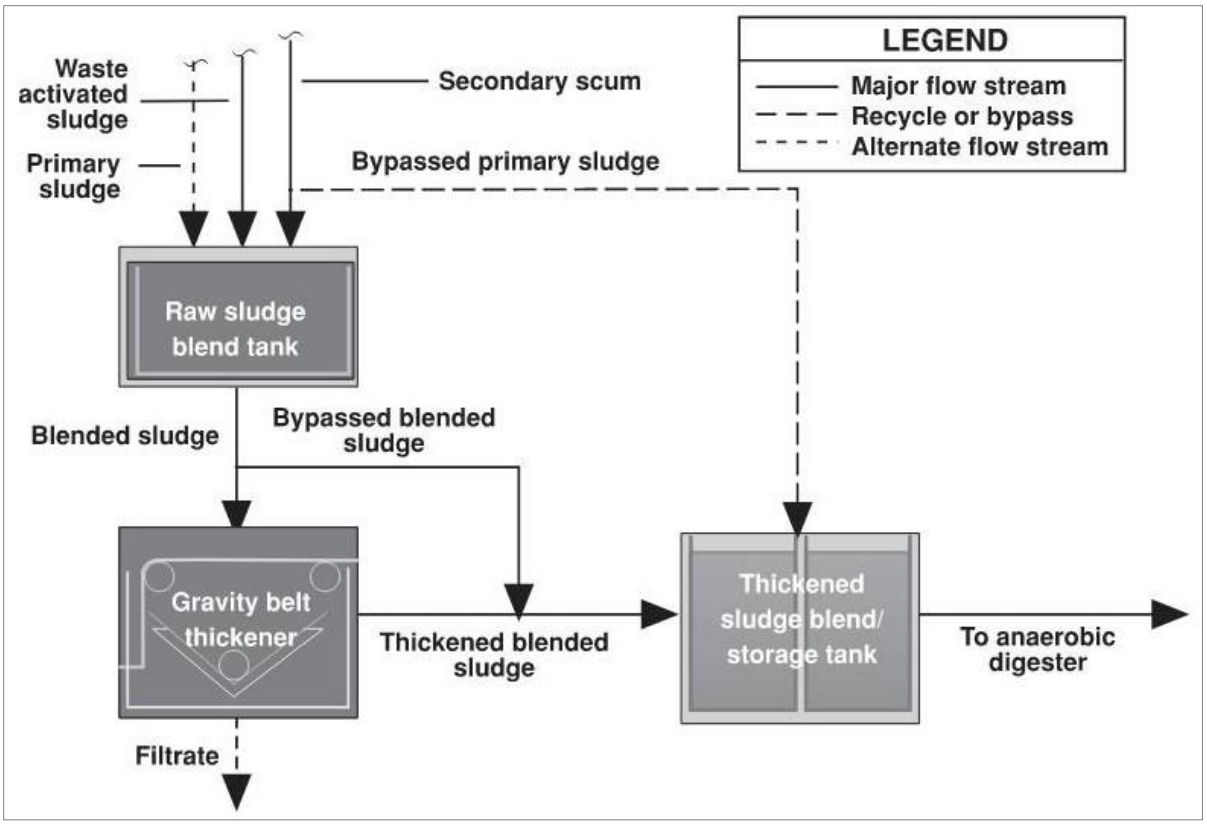

Figure 3-8: Sludge Handling Process

Table 3-7: Solids Building Gates

Asset No.	Name	Priority	Preliminary Assessment	Gate Type	Actuator Type	Size
715-SG14BM011	SOLIDS-THICK SLUDGE BL T GATE	B	Inspect	Sluice	Unknown	Unknown

4 PERMITTING, PROPERTY NEEDS, ENVIRONMENTAL CONSIDERATIONS, AND COMMUNITY RELATIONS

Based on review of the proposed inspection and repair or replacement work associated with the gates, County permitting staff believe the work would be classified as routine repair or maintenance of existing facilities, and permits should not be required other than permits associated with access to permit-required confined spaces. Permits associated with work within shoreline buffers would not apply to this work and this assumption should be verified as part of the design effort.

5 PRELIMINARY RISKS, OPPORTUNITIES, AND CONSTRUCTABILITY

The design effort will require a robust condition assessment to determine the extent of the work required, as there are special construction considerations with a large number of the gates (confined space entry, bypass pumping, limited space, etc.). Construction will require careful sequencing and planning in close coordination with plant staff and the Project Representative as several of the gates will be disruptive to plant operations and processes. This formulation assumes full replacement of the gates since a condition assessment was not completed as noted in Section 3. This formulation also discusses the preliminary inventory condition assessment data provided by the County that identifies some gates that may only require refurbishment. During design, there is potential that rehabilitation or replacement of gate components may be possible (seal replacement, actuator replacement, etc.) to extend the life of the gates, which could result in lower construction costs. In addition, a field inspection may determine that conditions are different or worse than expected. The future project team will conduct field engineering prior to design, which will clarify existing conditions, reveal opportunities, and mitigate some of these risks.

Options will be assessed for overall constructability. This assessment will inform an overall project duration and influence opinions of probable cost.

The following preliminary threats were identified for consideration by the future design team; field engineering will provide certainty and allow for mitigation of these risks:

- The critical gates could fail prior to project completion or during construction activities.
- There is a potential of a high flow event occurring during construction. The dry weather season does experience summer storms that will require planning and mitigation for such an event.
- The high number of concurrent projects at West Point Treatment Plant (WPTP) during the short dry weather season could cause delays and/or staffing limitations.
- Unexpected field conditions can occur that are different than as-builts or anticipated work completed during design.
- WPTP is a constrained site with limited parking, laydown areas and areas for contractor trailers onsite.
- The ramifications of the COVID-19 pandemic are still being realized and include labor and materials shortages, price increases, and other related issues.
- The replacement of the critical gates and associated controls will require bypass pumping. The planning, operation and maintenance of bypass pumping system poses risks.
- The nearby electrical or mechanical equipment may need to be upgraded to meet the NFPA 820 standard. This is a risk that the future design team will need to consider.

The following opportunities were identified for consideration by the future design team; field engineering completed during alternatives analysis and preliminary design will likely maximize these opportunities:

- The preliminary inventory provided by the County and summarized in the facility gates tables above has identified many gates that may be restored to full function without replacement. As part of the field engineering effort completed by the future project team, the future condition assessment may reveal differing gate, frame and actuator conditions and refurbishment may be a cost opportunity for several gates over gate and associated appurtenance replacement.
- Future project teams may realize an opportunity to further update some gates beyond an in-kind replacement, such as the discussion of debris screens on raw sewage pump (RSP) wet well sluice gates mentioned in Section 3.2.
- WPTP is currently addressing some gate control issues and may be upgrading gate controls concurrent with the development of this project. It is unknown how any changes to existing control assets may impact this project's costs.

Threats and opportunities will be documented, and in some instances monetized, in the Basis of Estimate document. Costs will be prepared at an AACE International Class 5 (0 to 2 percent level of design, planning) using County's PRISM model.

6 REFERENCES

Farmer, B., and Moffat, K. 2020. *West Point Treatment Plant Raw Sewage Pump Replacement Project TM*. King County WTD. March 17, 2020.

7 LIMITATIONS

This document was prepared solely for King County Department of Natural Resources and Parks, WTD in accordance with professional standards at the time the services were performed and in accordance with the contract between King County and Jacobs Engineering Group Inc. dated September 24, 2021. This document is governed by the specific scope of work authorized by King County; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by King County and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.