KITSAP COUNTY

SUQUAMISH GENERAL SEWER PLAN UPDATE

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Executive Summary

ES.1 Introduction

Since the 1950s, Kitsap County (County) has worked to protect aquifers, surface water, and the Puget Sound by providing wastewater collection, treatment, and discharge. This Suquamish General Sewer Plan Update (Plan) provides a road map for the Suquamish service area's long-term wastewater infrastructure needs for the next 20 years. Planning the wastewater infrastructure needs of a dynamic and fast-growing region is challenging. Expanding populations in the County will require sewer service and the County will be responsible for appropriately collecting, conveying, and treating increasing wastewater flows. Infrastructure design and implementation will be strategically planned to maximize limited fiscal resources. Federal, State, and Local regulations all contribute to a need to be on the cutting edge of emerging technologies and require the utility to continually think ahead. Planning at this level involves weighing a complicated array of interconnected—and often conflicting—factors and variables. This Plan provides a framework for the County to continue to manage growth within the context of a countywide wastewater service network and achieve the overall goal of providing sewerage service to protect public health and the quality of Kitsap and the Puget Sound's water resources.

The State of Washington adopted the Growth Management Act (GMA) with the intent of creating a consistent and unified growth planning process. The GMA requires that the County create and enact a Comprehensive Plan to provide a 20-year blueprint for local policy, planning and capital facility investment. A Comprehensive Plan is used as a guide for local governments through the establishment of vision statements, goals, objectives, policies, and implementing actions. This Plan constitutes the sewer capital facilities element of the Kitsap County Comprehensive Plan (KCCP). At the time of adoption, this Plan is consistent with the other elements of the KCCP.

This Plan is based on planning horizons of a six-year period (2023 to 2028), and a 20-year period (2023 to 2042). An updated KCCP is currently in progress and will cover a 20-year planning period from 2024 to 2044. Therefore, the recommendations and conclusions presented in this Sewer Plan have been reviewed to confirm alignment with the 2044 planning horizon of the KCCP.

This Plan is also aligned with the County's *Water as a Resource* policy, adopted in 2009 and reaffirmed in 2016. One of the aims of *Water as a Resource* policy is to reduce water pollution. Implementation of the projects presented in this Plan are a direct expression of the County's guiding principle to view water as a valuable resource worthy of protection and careful stewardship.

This Plan meets the Washington State Department of Ecology (Ecology) regulations for general sewer plans contained in the Washington Administrative Code (WAC) 173-240-050.

Organization of the Plan

The Plan is organized into twelve sections that cover the Suquamish wastewater system:

- Section 1: Introduction provides an overview of the Suquamish service area, ownership of the system, and contents of the Plan.
- Section 2: Service Area Characterization reviews the physical and administrative characteristics of the Suquamish wastewater collection basin.

- **Section 3: Population, Flows, Load Projections** estimates the current sewer system population, analyzes the impact of projected population growth, and estimates future wastewater flows and loads within the Suquamish service area.
- **Section 4: Regulatory Requirements** identifies relevant federal, state, and local regulatory requirements that affect planning and operations of the wastewater system.
- **Section 5: Collection and Conveyance Existing Conditions** evaluates existing conditions of the system's gravity sewers, pump stations, and force mains based on site visits, video inspections of pipes, and discussion with County staff.
- **Section 6: Wastewater Treatment Plant Existing Conditions** evaluates existing conditions of the Suquamish Wastewater Treatment Plant (WWTP) facilities, processes, and equipment based on site visits, discussion with plant operators, historical plant performance, and modeling of the plant processes.
- **Section 7: Collection and Conveyance System Analysis** analyzes sewer system capacity and alternatives for improvements to the system using a hydraulic model and evaluating system performance during a 25-year, 24-hour storm event.
- **Section 8: Wastewater Treatment System Analysis** analyzes improvements needed to maintain and upgrade the Suquamish WWTP based on condition deficiencies, capacity inadequacies, and regulatory requirements.
- **Section 9: Recycled Water** evaluates opportunities for recycled water reuse so that water treated at the Suquamish WWTP can be used for beneficial purposes instead of discharged to the Puget Sound.
- **Section 10: Operations and Maintenance** documents the County's management structure, details the wastewater system operations and maintenance (O&M) practices, and makes suggestions to improve utility operation practices.
- **Section 11: Capital Improvement Plan** provides a 20-year plan for implementing capital improvement program (CIP) projects that improve the operation of the collection and conveyance system and Suquamish WWTP.
- **Section 12: Financial Strategy** identifies financial approaches to fund the CIP.

General Sewer Plan Requirements

This Plan meets the Ecology regulations for general sewer plans contained in WAC 173-240-050.

Table ES-1 summarizes the requirements and the sections in the 2024 CSP where the requirements are addressed.

Table ES-1 | WAC 173-240-050 Requirements

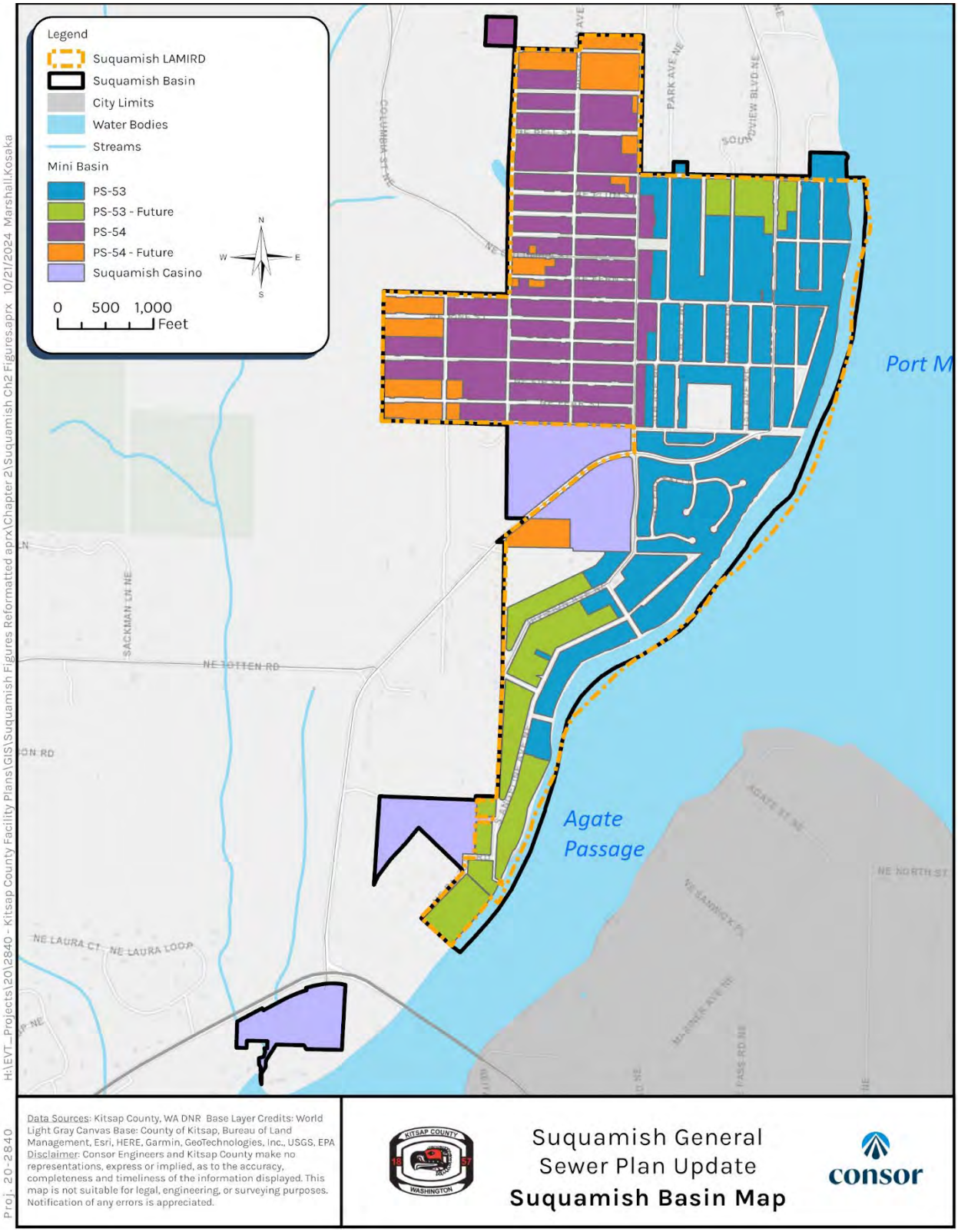
Section	Section Description	Location in Plan
3.a	The purpose and need for the proposed plan.	Section 1.2
3.b	A discussion of who will own, operate, and maintain the systems.	Section 1.5
3.c	The existing and proposed service boundaries.	Figure 2-1

Section	Section Description	Location in Plan
3.d.i	Boundaries. The boundary lines of the municipality or special district to be sewered, including a vicinity map;	Figure 2-1
3.d.ii	Existing sewers. The location, size, slope, capacity, direction of flow of all existing trunk sewers, and the boundaries of the areas served by each;	Section 5 and Section 6
3.d.iii	Proposed sewers. The location, size, slope, capacity, direction of flow of all proposed trunk sewers, and the boundaries of the areas to be served by each;	Section 11
3.d.iv	Existing and proposed pump stations and force mains. The location of all existing and proposed pumping stations and force mains, designated to distinguish between those existing and proposed;	Section 5, Section 11
3.d.v	Topography and elevations. Topography showing pertinent ground elevations and surface drainage must be included, as well as proposed and existing streets;	Figure 2-2
3.d.vi	Streams, lakes, and other bodies of water. The location and direction of flow of major streams, the high and low elevations of water surfaces at sewer outlets, and controlled overflows, if any. All existing and potential discharge locations should be noted;	Figure 2-4
3.d.vii	Water systems. The location of wells or other sources of water supply, water storage reservoirs and treatment plants, and water transmission facilities.	Figure 2-5
3.e	The population trend as indicated by available records, and the estimated future population for the stated design period. Briefly describe the method used to determine future population trends and the concurrence of any applicable local or regional planning agencies.	Section 3
3.f	Any existing domestic or industrial wastewater facilities within twenty miles of the general plan area and within the same topographical drainage basin containing the general plan area.	Figure 1-1
3.g	A discussion of any infiltration and inflow problems and a discussion of actions that will alleviate these problems in the future.	Section 3.4.3
3.h	A statement regarding provisions for treatment and discussion of the adequacy of the treatment.	Section 6
3.i	List of all establishments producing industrial wastewater, the quantity of wastewater and periods of production, and the character of the industrial wastewater insofar as it may affect the sewer system or treatment plant. Consideration must be given to future industrial expansion.	Section 4
3.j	Discussion of the location of all existing private and public wells, or other sources of water supply, and distribution structures as they are related to both existing and proposed domestic wastewater treatment facilities.	Figure 2-5
3.k	Discussion of the various alternatives evaluated, and a determination of the alternative chosen, if applicable.	Section 7 and Section 8
3.l	A discussion, including a table, that shows the cost per service in terms of both debt service and O&M costs, of all facilities (existing and proposed) during the planning period.	Section 10, Section 11, and Section 12
3.m	A statement regarding compliance with any adopted water quality management plan under the Federal Water Pollution Control Act as amended.	Section 4
3.n	A statement regarding compliance with the State Environmental Policy Act (SEPA) and the National Environmental Policy Act, if applicable.	Section 4

ES.2 Service Area Characterization

The County provides sewer service within the Suquamish basin. The Suquamish basin map is shown in **Figure ES-1**. The basin is approximately 470 acres. It is bounded on the east and south by Port Madison Bay and the Agate Passage and extends inland several blocks to encompass a few neighborhood developments.

Figure ES-1 | Suquamish Basin Map



The County has established Urban Growth Area (UGA) boundaries, land use designations, and zoning in accordance with the GMA. Urban level services, including sewer service, is not allowed outside of the UGA with limited exceptions, one of which is within a Limited Area of More Intensive Rural Development (LAMIRD). In these areas, sewers are allowed for the development of necessary public facilities and public services. Suquamish is recognized as a Type 1 LAMIRD.

The County owns and maintains the sewer collection system that provides service primarily to the northern portion of the LAMIRD with a small portion of the system served in the southern portion. The Suquamish Clearwater Casino Resort also pumps wastewater flows to Suquamish collection system. The system includes approximately 55,000 feet of gravity pipe, 9,400 feet of force main pipe, and two pump stations and the Suquamish WWTP. All sewer flows within the basin are conveyed and treated at the Suquamish WWTP.

ES.3 Population, Load, and Flow Projections

Current population and population growth are critical factors when considering required capacity and potential upgrades to the sewer system since sewer flows and population are closely linked.

The current sewered population in the Suquamish basin was estimated based on an average of 2.5 people per equivalent residential unit (ERU). An ERU is a system specific unit of measure used to estimate wastewater volumes in the system based on the flow produced by an average single-family household.

Growth is presumed to occur within the LAMIRD according to the land use designations and zoning in the 2016 KCCP. This plan, at the time of writing, is in alignment with the County's 2024 KCCP effort and is able to support the growth strategies described therein. The sewered population growth rate is estimated to be 0.63 percent based on the Puget Sound Regional Council (PSRC) and Washington State Office of Financial Management (OFM) information. The total current and projected populations for the sewered areas in Suquamish basin are summarized in **Table ES-2**. Additionally, the Kitsap County Department of Community Development (DCD) prepared population projections as part of their update to the KCCP. These were compared to and are consistent with the projections presented in this Plan

Table ES-2 | Suquamish Basin Current and Projected Sewered Population

Year	Sewered Population
2020	2,663
2028	2,814
2042	3,081
2044	3,102*

Note:
*Extrapolated from 2042 population, included for comparison to 2024 KCCP

Wastewater flows and loadings heavily influence WWTP facility design. Consequently, data related to wastewater characteristics and projected flows and loadings affect the selection of key criteria used to select project alternatives for further consideration. The existing flows and loads at Suquamish WWTP were evaluated from January 2018 through June 2020 and correlated to current population to develop per capita values. The existing and projected flows and loads for the Suquamish WWTP over the 20-year planning horizon are presented as **Table ES-3** and **Table ES-4**. Consistent with Ecology guidelines, flows are developed for average annual flow (AAF), maximum month wet weather flow (MMWWF), maximum month

dry weather flow (MMDWF), peak day flow (PDF), and peak hour flow (PHF). Loads are developed for biological oxygen demand (BOD), total suspended solids (TSS), and total Kjeldahl nitrogen (TKN).

Table ES-3 | Suquamish WWTP Current and Projected Flows

Flow Event	2020	2028	2042
AAF (MGD)	0.23	0.24	0.26
MMWWF (MGD)	0.45	0.47	0.50
MMDWF (MGD)	0.30	0.31	0.33
PDF (MGD)	0.69	0.72	0.77
PHF (MGD)	0.97	1.00	1.07

Note:
MGD = million gallons per day

Table ES-4 | Suquamish WWTP Current and Projected Loads

Parameter	2020			2028			2042		
	AA	MMWW	MMDW	AA	MMWW	MMDW	AA	MMWW	MMDW
BOD (ppd)	445	604	528	470	638	558	514	699	611
TSS (ppd)	457	733	602	483	775	637	529	849	697
TKN (ppd)	81.3	109	112	85.9	115	119	94.1	126	130

Note:
ppd = pounds per day

ES.4 Regulatory Requirements

Collection, conveyance, and treatment facilities operation, design, and construction are regulated through federal, state, County, and local regulations. The regulations are detailed in Section 4.

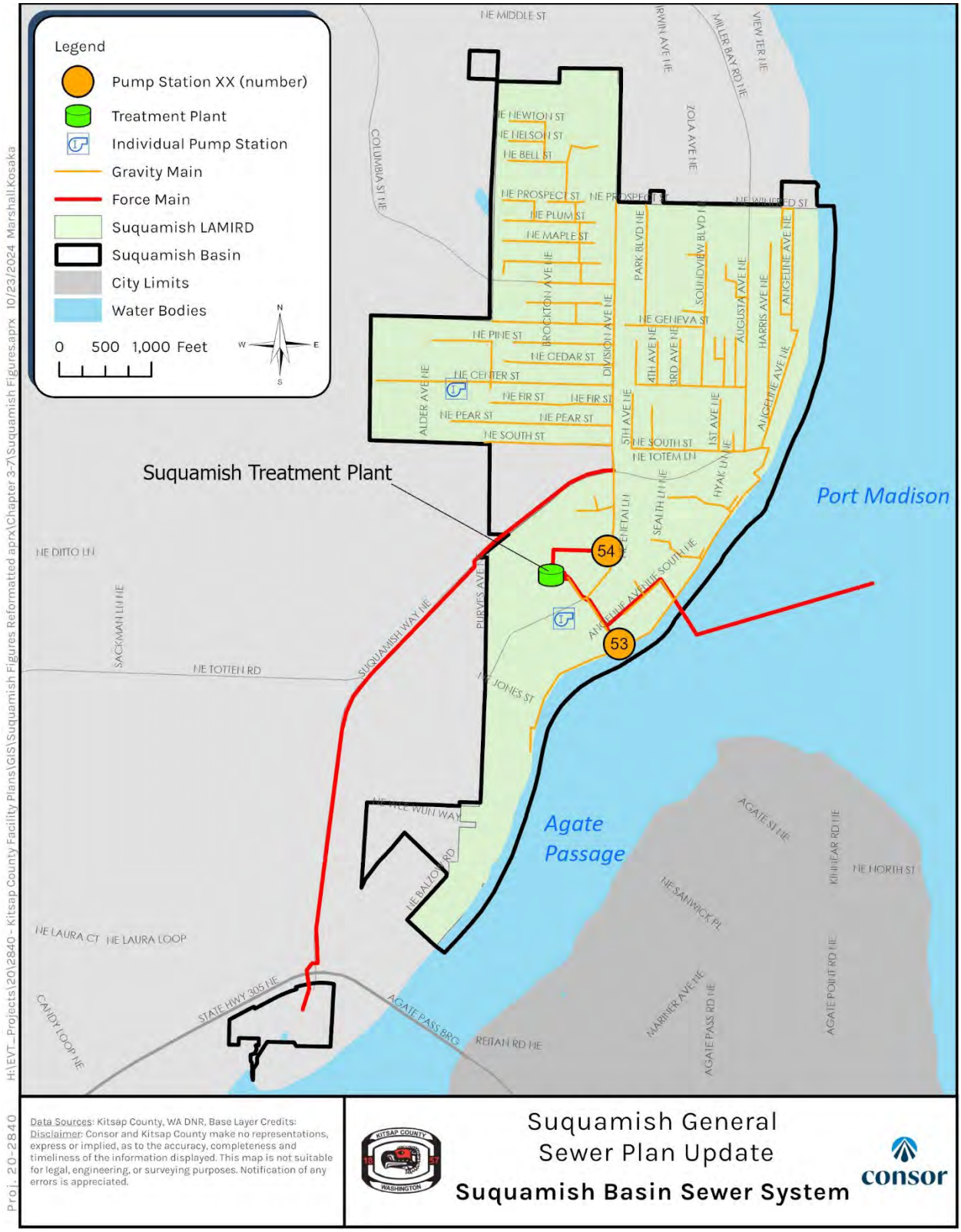
The National Pollutant Discharge Elimination System (NPDES) program, administered by the United States Environmental Protection Agency (EPA), is the primary permit for Suquamish WWTP, which has been issued NPDES Permit No. WA0023256. The permit went into effect in 2008, was set to expire in 2013, was administratively continued, and remains in effect as of the date of this Plan. The permit includes limits on plant capacity and treated effluent discharge, solids disposal requirements, monitoring requirements, recordkeeping and reporting criteria, and O&M requirements.

The EPA issued a draft permit in September of 2019 and re-issued a new draft in May 2024 with new and revised conditions. The re-proposed draft includes amendments and conditions from Ecology related to monitoring total inorganic nitrogen (TIN), planning for optimization of TIN removal, monitoring of per- and polyfluoroalkyl substances (PFAS) and monitoring enterococci bacteria. The re-proposed draft permit has not been finalized at the time of writing.

ES.5 Collection and Conveyance Existing Conditions

The Suquamish collection and conveyance system is comprised of sewer assets owned by the County within the Suquamish LAMIRD. The Suquamish collection and conveyance system is shown in **Figure ES-2.** A detailed review of the existing collection and conveyance system is provided in Section 5.

Figure ES-2 | Suquamish Basin Sewer System



Data Sources: Kitsap County, WA DNR, Base Layer Credits:
Disclaimer: Consor and Kitsap County make no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

Suquamish General Sewer Plan Update

Suquamish Basin Sewer System

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Flows from the western portion of the Suquamish basin generally flow by gravity to PS-54 and flows from the eastern portion of the Suquamish basin generally flow by gravity to PS-53. The Suquamish Casino pumps wastewater, via a privately owned pump station and force main, to a gravity main within the Suquamish collection which is tributary to PS-54. Flows from PS-53 and PS-54 are then pumped to the Suquamish WWTP.

There is approximately 55,000 feet of gravity main in the Suquamish collection system. County owns most of the pipes, 87 percent of which are 8 inches in diameter. Approximately 2,000 feet of pipe are privately owned. There are approximately 9,400 feet of sewer force mains that convey pumped wastewater.

There are two pump stations within the Suquamish sewer system: PS-54 and PS-53. PS-54 has a firm capacity of 350 gallons per minute (gpm) and PS-53 has a firm capacity of 360 gpm. The County classifies their pump stations as Critical, Regional, Relay, or Satellite pump stations based on how many mini-basins (or upstream pump stations) discharge into the pump station. **Table ES-5** shows the classification and number of pump stations in the Suquamish basin.

Table ES-5 | Pump Station Type Consequence of Failure Definitions

Pump Station Type (from County)	Tributary Pump Stations	Number of Pump Stations in Suquamish Basin
Satellite	0	1
Relay	1	1
Regional	2-3	0
Critical	4+	0

The condition of each pump station was evaluated. To better inform the County's prioritization of future asset upgrades and replacements, an overall pump station "asset health" score was developed that synthesizes each pump station's existing likelihood of failure (condition) and consequence of failure (CoF). Each criterion is rated on a 1 to 5 scale where higher numbers indicate worse condition and high criticality, then the scores are multiplied together to get the overall Asset Health score (potential range from 1 to 25). PS-53 has an asset health score of 7 and PS-54 has a score of 7.4. This score is only indicative of the PS condition but does not factor in capacity, which is covered in **Section 7**.

The County has historically conducted pipeline condition assessments through video observation with the ability to examine the entire conveyance system in a 5-year cycle. This process entails inspecting pipes via closed circuit television (CCTV), storing the video in a database, reviewing the video, and assigning an Overall Condition Index (OCI) score based on the observations. The OCI score ranges from 0 to 100 with higher numbers indicating better condition.

The criteria that are scored for the OCI score are:

- Obstruction or Intrusion
- Worn surface
- Belly or sag in pipe
- Crack or fracture
- Break or failure
- Lining or repair failure
- Joint separation or offset

The lengths of pipe in each OCI range are summarized in **Table ES-6**. Overall, the system is in good condition, but one pipe is in poor condition with a score of 51.

Table ES-6 | Summary of Pipes OCI Scores

OCI Range	Length (ft)	Percentage of Total
0-20	-	0%
20-40	-	0%
40-60	212	<1%
60-80	-	0%
80-99	9,400	17%
100	45,200	83%

ES.6 Wastewater Treatment Facilities Existing Conditions

The Suquamish WWTP was constructed as an activated sludge process in 1975 but was reconstructed as a Sequencing Batch Reactor (SBR) system in 1997. A rotary drum thickener (RDT) system, thickened sludge storage tank (TSST), and sludge loadout facility were constructed in 2017. The plant was designed for a maximum monthly flow rate of 0.4 MGD and a peak flow of 1.0 MGD. The Suquamish WWTP site plan is shown in **Figure ES-3** with major structures and processes identified. The plant is accessed via a driveway that is shared with a homeowner from Division Avenue NE. The 7.6 acre lot is bordered by residential properties on the east, south and west sides, and an undeveloped lot owned by the Suquamish Tribal Housing Authority to the north. The lot has frontage along Purves Avenue NE, but this portion of the site has not been developed and is heavily wooded.

Plant treatment processes include preliminary screening and grit removal, biological treatment in two SBRs, an equalization basin, and ultraviolet (UV) disinfection. Waste activated sludge (WAS) is thickened with an RDT, stored at in the TSST, and sent to the County's Central Kitsap WWTP for further treatment and disposal. Treated effluent is discharged to Port Madison of the Puget Sound in accordance with the NPDES Permit.

An evaluation of the Suquamish WWTP was conducted that consisted of a site review of equipment, facilities, processes, discussions with WWTP staff to understand operational issues, and analysis and modeling to determine capacity. Overall unit process "asset health" scores were developed, using the same method as the pump stations, to synthesize the likelihood of failure (condition) and CoF (criticality). Each criterion is rated on a 1 to 5 scale where higher numbers indicate worse condition and high criticality, then the scores are multiplied together to get the overall asset health score (potential range from 1 to 25). Secondary treatment, disinfection and effluent, and power distribution scored higher than 10, which indicates these systems are generally in poor condition and require upgrades and/or rehabilitation to continue effective and reliable operation. Preliminary treatment and solids treatment scored between 5 and 10, indicating moderate upgrades may be necessary. Civil and support systems are in good condition and scored below 5.

A Visual Hydraulics© model was created to determine the hydraulic capacity and a Biowin© biological process model was used to evaluate the biological capacity of the existing Suquamish WWTP and unit processes. Hydraulic deficiencies were noted in the headworks, which does not have sufficient capacity to handle the peak instantaneous flows from both pump stations once upgraded as recommended in **Section 7**, and in the SBR decant mechanism, which does not allow the basins to be decanted quickly enough under peak flow conditions. The biological capacity of the secondary treatment system has the ability to meet current treatment requirements and those in the 2024 draft permit but is unlikely to be able to meet more stringent TIN removal requirements that are expected to be implemented in the future.

Figure ES-3 | Existing Suquamish WWTP Site Plan

Several unit processes will need significant improvements within the 20-year planning period to alleviate hydraulic or biological limitations and continue proper operation:

- The headworks requires additional capacity and a fine screen configuration that meets Ecology redundancy requirements.
- The SBR basins require additional redundancy to meet Ecology requirements.
- Secondary treatment process upgrades will be needed to improve TIN removal when dictated by permit requirements.

ES.7 Collection and Conveyance System Analysis

The Suquamish collection system was modeled using the Danish Hydraulic Institute's (DHI's) MIKE+ hydraulic and hydrologic (H/H) modeling platform to determine capacity deficiencies in the system. The projected population and increased rainfall due to climate change are the basis for establishing future system requirements. The model was developed using geographic information system (GIS) shapefiles, provided by the County, for the collection system, land use, contours, and soils in the Suquamish basin. The model was calibrated to data from flow monitors installed in the collection system. The meters collected flow data from October 2020 through April of 2021. Results were analyzed for the existing, 2042, and 2080 planning horizons using a 25-year 12-hour design storm.

Manholes, pipes, and pump stations were analyzed for deficiencies using the H/H model. Manholes are considered to have sanitary sewer overflows (SSOs) when the simulated water surface elevation in a manhole exceeds the rim elevation. Pipes are considered surcharged when the simulated water surface elevation in the upstream or downstream manhole connection exceeds the pipe crown. Pump stations are under capacity when the simulated flow to a pump station meets or exceeds the pump station firm capacity which is the station capacity with the largest pump out of service.

The total SSO count, surcharged gravity pipes, and velocity exceeded pipes are included in Table ES-7. Detailed maps can be found in Section 7.

The results indicate that both PS-53 and PS-54 are under capacity for all planning horizons. Discussion with the County indicates that they do experience excessive flows at each of these stations.

Table ES-7 | Pipe and Manhole Capacity Criteria

Scenario	Surface Sewer Overflows (SSO)	Number of Pipes Surcharged (Either end)
2022	0	11
2042	0	20
2080	0	45

ES.8 Wastewater Treatment System Analysis

The results in Section 6 were used to identify processes that require improvement and define feasible alternatives for WWTP improvements for the 6-year, 20-year, and 40-year planning horizons. Minor maintenance, repairs, and direct replacements were not subject to a full alternatives analysis due to the relatively simple nature of replacements or expansions.

In 2022, the County began a project to replace the process piping system, evaluate the influent screen for replacement, and rehabilitate the aerated sludge storage tank (ASST) and effluent equalization basin. During preliminary design of these elements several challenges were identified that ultimately caused the project to be put on hold. Several additional items of work were identified that would be required to bring the plant up to the National Fire Protection Association (NFPA) 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities, it was found that the existing influent channel would not accommodate a fine screen with sufficient capacity to meet future peak instantaneous flows from PS-53 and PS-54, and the cost of the plant bypass during construction was much higher than expected. The progress on the project and the challenges encountered are detailed in the *Suquamish WWTP Improvements Design-to-date Summary Memorandum* (Consor, 2024, Appendix A). As of this writing, the project has ended and the County is assessing options to secure funding to enable some or all of the improvements identified to be implemented in future project(s). Each of these upgrades are also included in the projects identified in Section 11.

Preliminary Treatment

The headworks do not have adequate capacity to pass the peak instantaneous flowrate once PS-53 and PS-54 are upgraded as described in Section 7. The existing influent rotary fine screen and grit pumps are in poor condition. Additionally, the fine screen configuration does not provide adequate redundancy in accordance with Ecology requirements. The SBR's also lack adequate redundancy, which can be provided by adding an influent equalization basin. The following improvements are recommended:

- Replacing the entire headworks with a new structure.
- Construct an influent equalization basin.

Secondary Treatment

The secondary treatment was installed in 1997 and is generally in fair condition with adequate capacity. The recirculation piping is in poor condition. There are only two SBR basins and no influent equalization storage, which presents operational challenges if one basin must be removed from service and does not meet Ecology's current redundancy requirements for SBR systems. Additionally, further capacity improvements will be required to accommodate future TIN removal requirements. The following improvements are recommended:

- Replacing existing recirculation piping and electrical actuators.
- Installs dissolved oxygen (DO) and ammonia probes to improve process control.
- If TIN limits become more restrictive in the future, convert the existing SBR system to an aerobic granular sludge (AGS) system.

Disinfection

The UV equipment was installed in 1997 and is nearing the end of its typical design life. Additional control and monitoring capabilities beyond what the current basic controller can offer is desired by the plant staff and will improve energy efficiency. The following improvements are recommended:

- Replace the existing UV system with the upgraded Trojan UV3000Plus system.

Solids Treatment

The ASST was constructed in 1975 and retrofitted in 1997. The tank is in poor condition. The sludge storage blower was installed in 1997 and appears to be in fair condition. The thickened sludge pump is showing significant corrosion despite being installed in 2017. The following improvements are recommended:

- Repair or replace the ASST.
- Replace thickened sludge pump with a larger pump.
- Replace the sludge storage blower in the next 12 to 15 years.

Odor Control & Plant Support Systems

The odor control chemical scrubber was installed in 1997 and is in poor condition. It is only partially operational, and frequently breaks down. The plant's fire alarm system and combustible gas detection system are not functioning and fire protection does not meet NFPA 820 requirements. The process building drain piping has corroded and leaks in some areas. The following improvements are recommended:

- Replace the existing chemical scrubber with an activated carbon scrubber.
- Replace the plant drain piping.
- Implement improvements to ventilation, fire alarms, combustible gas detection, and fire protection to meet NFPA 820.

ES.9 Recycled Water

Recycling treated wastewater can provide numerous benefits, including conservation of limited groundwater resources, reduction of effluent discharge to the Puget Sound, and replenishment of streams and fish habitat. Use of recycled water to replace the use of potable water for non-potable purposes, such as irrigation, toilet flushing, reduces the stress on area groundwater and supports sustainable management of that limited resource. The County has not previously identified or proposed any cost-effective applications of recycled water if it were to be produced by the Suquamish WWTP.

Use of recycled water for managed aquifer recharge was considered as part of a watershed planning effort facilitated by Ecology for Water Resource Inventory Area (WRIA) 15, as directed by the Streamflow Restoration Act (Revised Code of Washington (RCW) 90.94). The evaluation identifies geographic locations that appear promising for both shallow aquifer infiltration and enhancement of stream baseflows, which in turn may provide water to offset to consumptive impacts of new permit-exempt domestic groundwater withdrawals, however no locations in the near vicinity of the Suquamish WWTP were identified. The County also coordinated with water providers and other potential stakeholders to determine if there were opportunities for irrigation recycled water use in the vicinity of the Suquamish WWTP but determined there we no suitable sites at the time of this Plan.

ES.10 Operations and Maintenance

Section 10 includes a summary of the O&M programs for the collection and conveyance system, and the Suquamish WWTP. A review of State and Federal requirements that impact the County's O&M program are also included in Section 10.

The Sewer Utility Division consists of four main work groups: Utilities O&M (WWTPs and pump stations), Field Operations (collection system piping), Engineering and Administration, and Construction Management. A total of 72 staff work in the Sewer Utility Division and oversee O&M across each of the County's four wastewater systems. O&M activities include regular inspection of pump stations, cleaning and inspection of pipes, preventative maintenance of WWTP equipment, ongoing records management for all components of the system, and review and updates to the WWTPs O&M manual.

A staffing analysis was conducted for the collection and conveyance system and Suquamish WWTP and determined that staffing levels and certifications are appropriate and adequate for current operations. No additional staff is expected to be required though the 20-year planning period.

Conclusions and recommendations based on a review of the County O&M practices are:

- Train and certify CCTV operators in National Association of Sewer Service Companies (NASSCO) assessment to improve the consistency of sewer inspecting rating.
- Review spare parts inventories and assess the need for additional spare parts due to supply chain challenges.
- Institute an annual valve exercising and maintenance program.
- Develop a training program to accelerate employees into Operator Certification Group III and prepare for anticipated Puget Sound Nutrient Reduction Goals and facility upgrades.
- Institute an Arc-Flash Analysis and Protection program and incorporate as capital projects are designed and constructed.

ES.11 Capital Improvement Plan

The CIP projects were developed to remedy existing system deficiencies, address regulatory requirements, and provide adequate capacity for projected flows and loads. CIP projects to address immediate needs are planned in a 6-year planning horizon (from 2023 to 2028) and future CIP projects are included in the 20-year planning horizon (from 2029 to 2042). A planning level cost opinion of CIP project implementation is provided. It is assumed that minor projects will be completed with O&M budget, therefore they are not included in the CIP. CIP projects for the 6-year and 20-year planning horizons are presented in **Table ES-8**, **Table ES-9**, and **Table ES-10**. A preliminary implementation timeline of the CIP is provided in **Section 11**.

Table ES-8 | 20-Year Suquamish Collection and Conveyance Capital Improvement Projects

CIP No.	Item	Total Project Cost
CIP-S-CC-CAP-1[1]	Replace PS-54 and Forcemain	$7,000,000
CIP-S-CC-CAP-2[1]	Replace PS-53 and Forcemain	$7,200,000
CIP-S-CC-OM-3	Annual Pipe Replacement	$1,860,000
CIP-S-CC-DEV-4	Extend Gravity Sewers Flowing to PS-53 from the South	$0
CIP-S-CC-DEV-5	Extend Gravity Sewers Flowing to PS-54	$0
CIP-S-CC-DEV-6	Extend Gravity Sewers Flowing to PS-53 from the Northeast	**$ 0**
CIP-S-CC-OM-7	Annual Pipe Replacement	**$4,340,000**
	Total	**$20,400,000**

Note:
1. If funding becomes available, this project should be considered in the 6-year CIP.

Table ES-9 | 6-Year Suquamish WWTP Capital Improvement Projects

CIP No.	Item	Total Project Cost
CIP-S-WWTP-CAP-1	New Influent Equalization Basin	$ 2,850,000
CIP-S-WWTP-OB-2	Replace Headworks	$ 2,090,000
CIP-S-WWTP-OB-3	Replace Odor Control System	$ 510,000
CIP-S-WWTP-OM-4	Replace Process Piping	$ 2,170,000
CIP-S-WWTP-OM-6	Replace Drain Piping	$ 190,000
CIP-S-WWTP-REG-8	NFPA 820 Upgrades	$ 2,300,000
	Total	**$ 10,110,000**

Table ES-10 | 20-Year Suquamish WWTP Capital Improvement Projects

CIP No.	Item	Total Project Cost
CIP-S-WWTP-OB-5[1]	SBR Improvements	$ 720,000
CIP-S-WWTP-OB-7[1]	Effluent Equalization and Sludge Storage Tank Rehabilitation	$ 860,000
CIP-S-WWTP-OB-9[1]	Replace UV System	$ 760,000
CIP-S-WWTP-REG-10[2]	Convert to AGS System	$ 8,120,000
CIP-S-WWTP-OB-11	Replace Thickened Sludge Pump	$ 50,000
	Total	**$10,510,000**

Note:
1. If funding becomes available, this project should be considered in the 6-year CIP.
2. Future nutrient requirements and timing are unknown. Based on the current permit cycle for the PSNGP, it is assumed that effluent TIN restrictions to values below 10 milligrams per liter (mg/L) will not be implemented until 2031 at the earliest.

ES.12 Financial Strategy

Section 12 consists of the financial analysis performed by FCS group to develop a funding plan ("revenue requirement") for the County's sewer utility for the 2024 to 2042 planning horizon. The revenue requirement was identified based on operating and maintenance expenditures, fiscal policies, and the capital funding needs identified in Section 12.

The County sewer system has four basins, each with a treatment plant and corresponding collection system: Central Kitsap, Manchester, Suquamish, and Kingston. While a General Sewer Plan has been developed separately for each basin (this focus of this document is the Suquamish basin), the County does not separate its sewer utility financial information by basin. As such, the information included in Section 12 refers to the County sewer utility as a whole, unless explicitly stated otherwise. The result of the analysis indicates that a Countywide rate adjustment of 6.31 percent for 2025 and 6 percent per year through the remaining forecast period would be sufficient to support the capital program.

Table 11-5 | Recommended Capital Improvement Program Summary

Suquamish Basin CIP Plan

consor

6 or 20 Year CIP	CIP No.	Asset Health Score	Project Name	Total Project Cost	6-Year CIP 2023	2024	2025	2026	2027	2028	20-Year CIP 2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
6	CIP-S-WWTP-CAP-1	14.5	Influent Equalization Basin	$ 2,850,000				$ 950,000	$ 950,000	$ 950,000														
6	CIP-S-WWTP-OM-2	8.1	Replace Headworks	$ 2,090,000				$ 696,667	$ 696,667	$ 696,667														
6	CIP-S-WWTP-OM-3	3.9	Replace Odor Control System	$ 510,000				$ 170,000	$ 170,000	$ 170,000														
6	CIP-S-WWTP-OM-4	14.5	Replace Process Piping	$ 2,170,000				$ 723,333	$ 723,333	$ 723,333														
6	CIP-S-WWTP-OM-5	3.9	Replace Drain Piping	$ 190,000				$ 63,333	$ 63,333	$ 63,333														
6	CIP-S-WWTP-REG-8	3.9	NFPA 820 Upgrades	$ 2,300,000				$ 766,667	$ 766,667	$ 766,667														
20	CIP-S-CC-OM-7	20	Annual Pipe Replacement	$ 4,340,000							$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000
20	CIP-S-WWTP-OM-6	14.5	SBR Improvements*	$ 720,000							$ 720,000													
20	CIP-S-CC-CAP-1	25	Replace PS-S4 and Forcemain*	$ 7,000,000							$ 3,500,000	$ 3,500,000												
20	CIP-S-CC-CAP-2	25	Replace PS-S3 and Forcemain*	$ 7,200,000							$ 3,600,000	$ 3,600,000												
20	CIP-S-WWTP-OM-7	8.7	Effluent Equalization and Sludge Storage Tank Rehabilitation*	$ 860,000										$ 860,000										
20	CIP-S-WWTP-OM-9	8.7	Replace UV System*	$ 760,000										$ 760,000										
20	CIP-S-WWTP-OM-11	6	Replace Thickened Sludge Pump	$ 50,000											$ 50,000									
20	CIP-S-WWTP-REG-10	15.4	Convert to AGS System	$ 8,120,000																	$ 8,120,000			
			Total Project Cost [2023]	$ 39,150,000	$ -	$ -	$ -	$ 3,370,000	$ 3,370,000	$ 3,370,000	$ 8,130,000	$ 7,410,000	$ 310,000	$ 1,930,000	$ 360,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 310,000	$ 8,430,000	$ 310,000	$ 310,000	$ 310,000
			Assumed Inflation Rate				12%	8%	8%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
			Inflation Multiplier		±		1.12	1.21	1.31	1.37	1.44	1.51	1.59	1.67	1.75	1.84	1.93	2.03	2.13	2.23	2.35	2.46	2.59	2.72	2.85
			Future Value Cost		$ -	$ -	$ -	$ 4,402,460	$ 4,622,583	$ 4,853,712	$ 12,294,871	$ 11,766,328	$ 516,861	$ 3,378,770	$ 661,749	$ 598,331	$ 628,248	$ 659,660	$ 692,643	$ 727,275	$ 20,766,055	$ 801,821	$ 841,912	$ 884,008