KITSAP COUNTY

MANCHESTER GENERAL SEWER PLAN UPDATE

January 2025

PREPARED BY:

Consor
Point of Contact: Erika Schuyler, PE
600 University Street, Suite 300
Seattle, WA 98101
p: 206.462.7030
e: erika.schuyler@consoreng.com

PREPARED FOR:

Kitsap County
Sewer Utility Division of Public Works Department
507 Austin Avenue
Port Orchard, WA 98366

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 Manchester General Sewer Plan Update (Plan) provides a road map for the Manchester 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 Sewer 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 (2029 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 Manchester wastewater system:

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

- **Section 3: Population, Load, and Flow Projections** estimates the current sewer system population, analyzes the impact of projected population growth, and estimates future wastewater flows and loads within the Manchester 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: Existing Conditions – Wastewater Treatment Plant** evaluates existing conditions of the Manchester 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** discusses the modeling completed as a part of the 2014 Manchester Sewer Facilities Strategy Plan (2014 Plan) (BHC Consultants, 2014)
- **Section 8: Wastewater Treatment System Analysis** analyzes improvements needed to maintain and upgrade the Manchester 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 Manchester 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 plan (CIP) projects that improve the operation of the collection and conveyance (C&C) system and Manchester 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 summarizes the requirements and the sections in the 2024 Plan 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 5and 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 (I&I) 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 7and 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 (FWPCA) 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

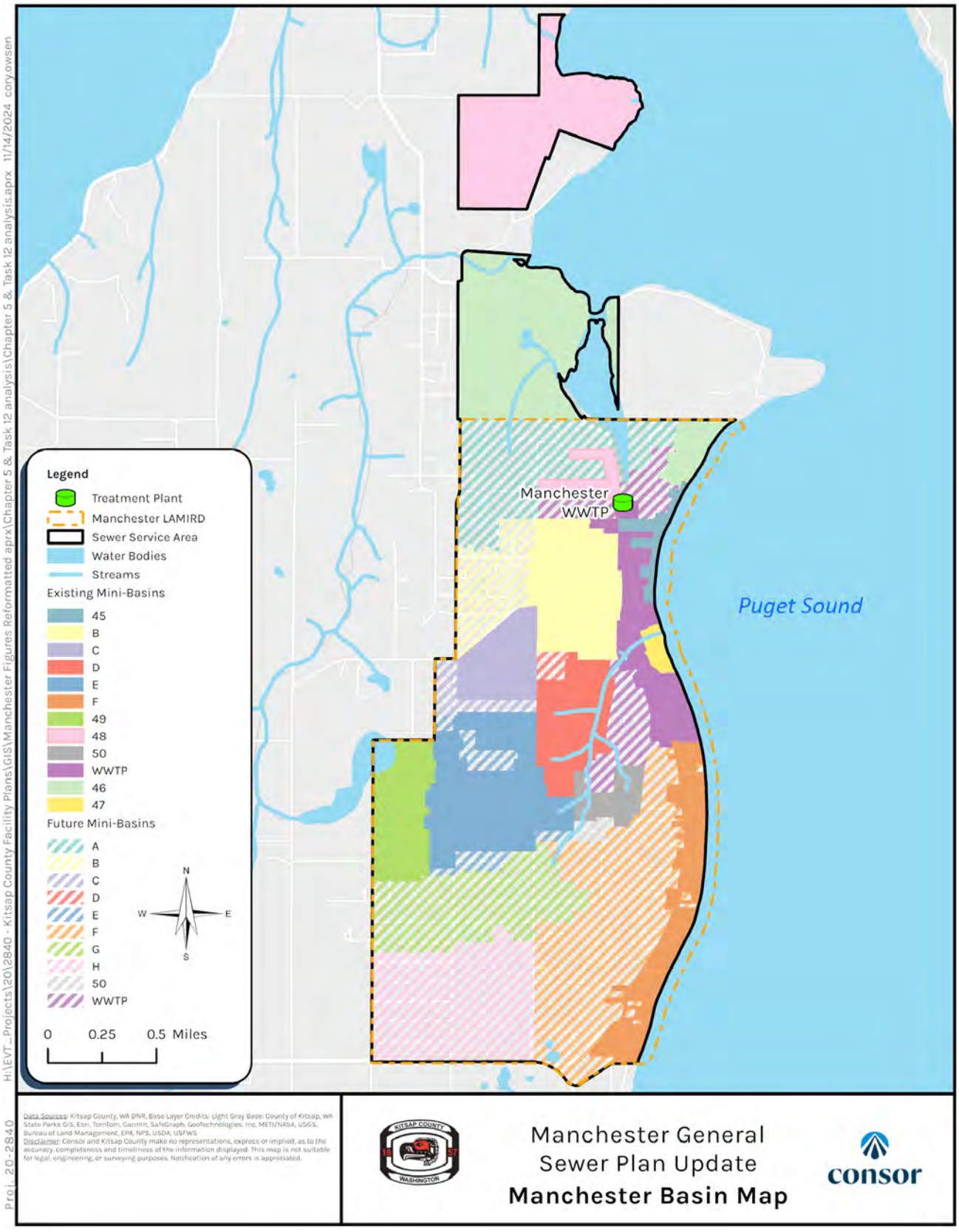
The County provides sewer service within the Manchester basin. The Manchester basin map is shown in **Figure ES-1**. The sewer service area, also referred to as the Manchester Basin in this plan, is approximately

1.8 square miles and is bounded to the east by the Puget Sound, to the south by SE Mile Hill Drive, to the north near E Montana Street, to the northeast by California Avenue East, and to the southeast by SE Nebraska Street. For analysis purposes the basin is divided into 12 existing 'mini-basins' as shown in **Figure ES-1**, and 10 hypothetical future mini-basins basins in unsewered areas. Mini-basins are defined as the area from which the collection system drains to a specified discharge point.

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, are 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. Manchester is recognized as a Type 1 LAMIRD under these regulations.

The County owns and maintains the sewer collection system that provides service primarily along the Puget Sound, with a small portion of the system extending inland in the middle of the LAMIRD. The system includes approximately 64,000 feet of gravity pipe, and approximately 16,200 feet of sewer force mains in the Manchester collection system. All sewer flows within the basin are conveyed and treated at the Manchester WWTP.

Figure ES-1 | Manchester Basin Map



ES.3 Population, Flow, and Load 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 Manchester 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, which the County is in the process of updating. 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 from the 2014 Plan was selected as the basis for the Manchester WWTP flow and load projections to provide a conservative estimate. Based on the estimated sewered population and population growth rate, the current and projected population for the sewer areas in Manchester 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 | Manchester WWTP Current and Projected Sewered Population

Year	Sewered Population
2020	2,613
2028	3,399
2042	4,774
2044	4,971*

Note:
*Extrapolated from 2042 population

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 current flows and loads were evaluated using Discharge Monitoring Reports (DMRs) from January 2018 through June 2020. The projected flows and loads were estimated based on the current flows and anticipated population growth rate. The current and projected flows and loads for the Manchester WWTP over the planning horizon is presented in 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 | Manchester WWTP Current and Projected Flows

Flow Event	2020	2028	2042
AAF (MGD)	0.19	0.24	0.34
MMWWF (MGD)	0.31	0.40	0.57
MMDWF (MGD)	0.20	0.26	0.37
PDF (MGD)	0.71	0.93	1.30
PHF (MGD)	1.00	1.30	1.84

MGD = million gallons per day

Table ES-4 | Manchester WWTP Current and Projected Loads

Parameter	2020			2028			2042		
	AAF	MMWWF	MMDWF	AAF	MMWWF	MMDWF	AAF	MMWWF	MMDWF
BOD (ppd)	356	423	473	462	549	615	650	772	864
TSS (ppd)	373	462	554	485	601	720	682	844	1,012
TKN (ppd)	69.3	77.4	113	90.1	101	147	127	141	207

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 current Manchester WWTP National Pollutant Discharge Elimination System (NPDES) Permit, No. WA0023701, went into effect in 2018 and was set to expire in 2023, but has been 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.

In addition, Ecology recently issued the first Puget Sound Nutrient General Permit (PSNGP), effective as of Jan. 1, 2022. The Manchester WWTP is classified as a small total inorganic nitrogen (TIN) load plant and is required to implement nutrient monitoring and reporting, develop a nutrient optimization plan, prepare and submit an all known and reasonable methods of prevention, control, and treatment (AKART). Ensuring compliance with the new PSNGP and developing options for anticipated future nutrient permit requirements is a key focus of the Manchester WWTP condition assessment and alternative analysis.

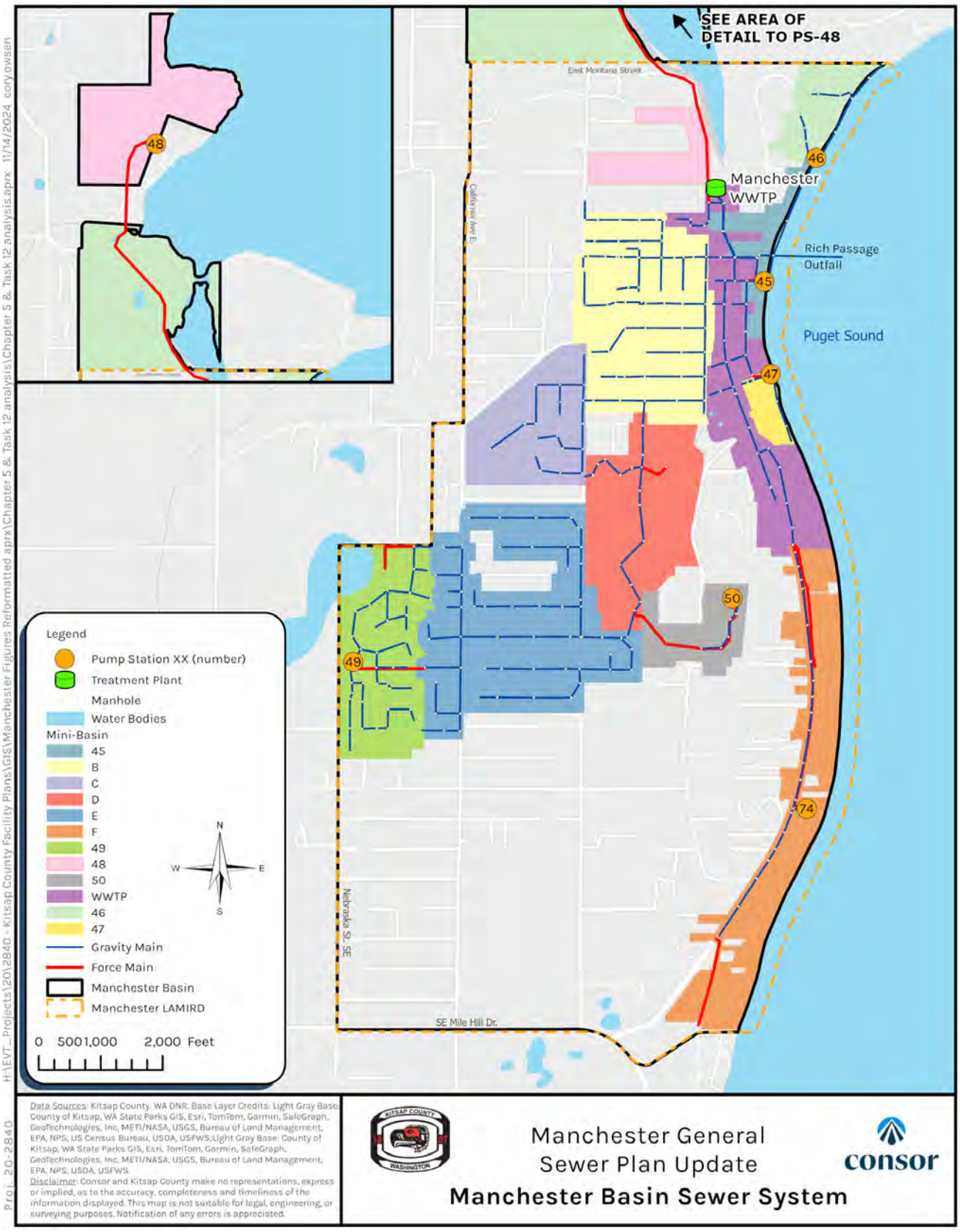
ES.5 Collection and Conveyance Existing Conditions

The Manchester C&C system is comprised of sewer assets owned by the County within the Manchester LAMIRD and upstream of the Manchester WWTP. The Manchester C&C system with sewered mini-basins is shown in Figure ES-2. A detailed review of the existing C&C system is provided in Section 5.

The sewage flows are routed through pump stations to the Manchester WWTP. Effluent from the WWTP is conveyed via a 12-inch diameter gravity main to Rich Passage where it discharges. The Manchester basin currently contains 12 sewered mini-basins; one for each of the seven pump stations, one for the Manchester WWTP, and four others for regions served by gravity sewers. Additionally, there are over 100 individual pump stations within the Manchester Basin, the majority of which are located along the coastline.

There is approximately 64,000 feet of gravity pipe in the Manchester collection system, all of which is county owned. There are approximately 16,200 feet of sewer force mains in the collection system that convey wastewater to downstream gravity conveyance piping and directly to the Manchester WWTP.

Figure ES-2 | Manchester Basin Sewer System



There are seven pump stations within the Manchester sewer system: PS-45, 46, 47, 48, 49, 50, and 74. The firm capacity ranges from 150 gallons per minute (gpm) at PS-50 to 669 gpm at PS-48. Additionally, there is a plant influent pump station at the WWTP that is discussed in the Wastewater Treatment Facilities sections. 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 Manchester basin. Most of the pump stations in the system have a capacity of about 200 gpm.

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

Pump Station Type (from County)	Tributary Pump Stations	Number of Pump Stations in Manchester Basin
Satellite	0	6
Relay	1	0
Regional	2-3	1
Critical	4+	0

The County has 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 and with only one segment of pipe rated as moderate or severe condition.

Table ES-6 | Summary of Pipes OCI Scores

OCI Range	Length (ft)	Percentage of Total
0-20	-	0%
20-40	-	0%
40-60	-	0%
60-80	225	<1%
80-99	7,369	12%
100	63,955	94%

ES.6 Wastewater Treatment Facilities Existing Conditions

The Manchester WWTP was originally constructed in 1969 and after a series of upgrades was converted to a conventional activated sludge treatment system in 1998 with a plant capacity of 0.46 MGD. The

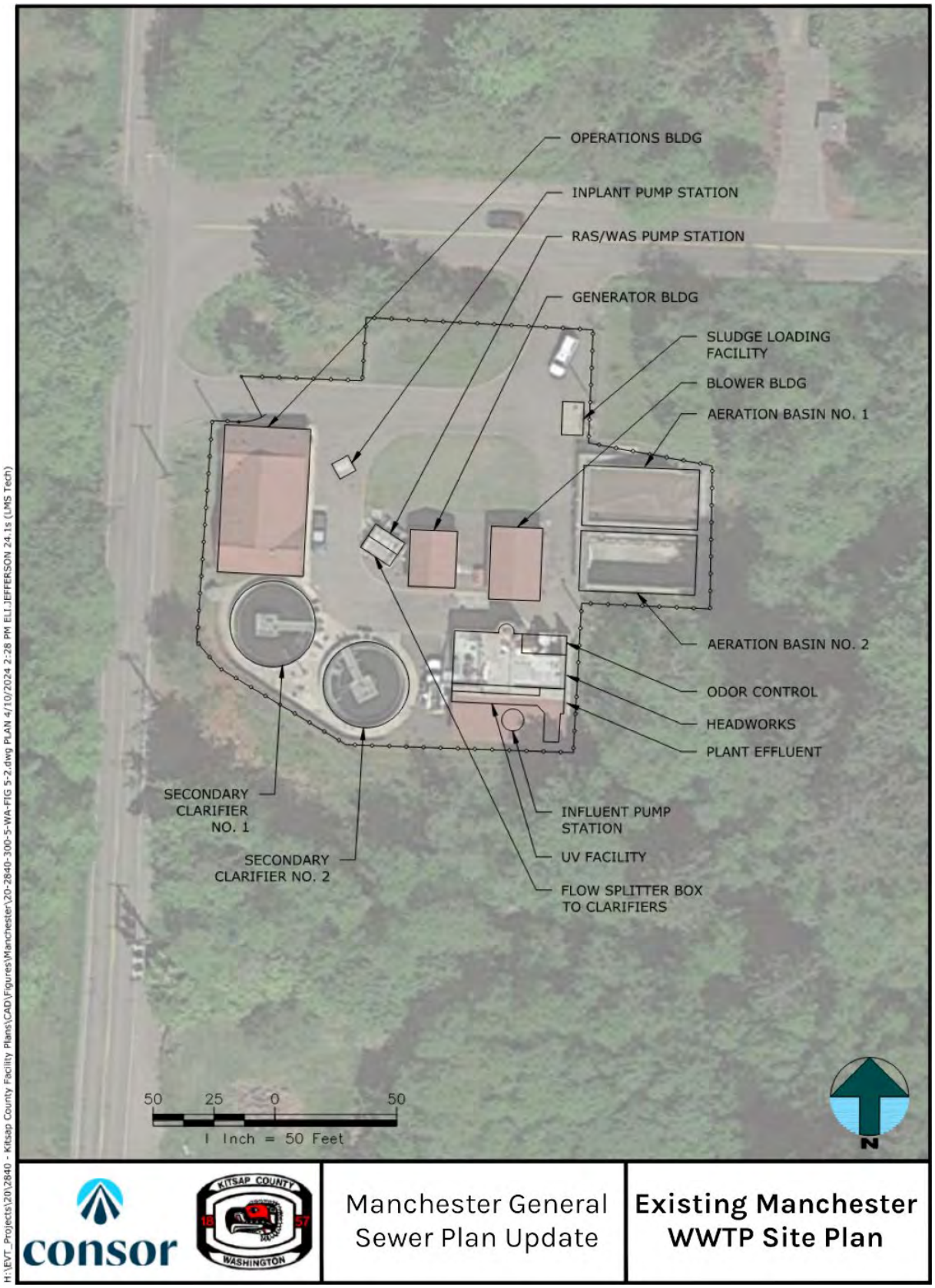
Manchester WWTP site plan is shown in **Figure ES-3**. The plant is located at the corner of Beach Drive E and E Caraway Road. There is a small amount of undeveloped area on the County owned property, which is bounded on the east and south sides by residential homes.

The plant has an influent pump station, headworks, two aeration basins, two secondary clarifiers, ultraviolet (UV) disinfection, and sludge storage and thickening. Treated effluent is discharged to the Rich Passage of the Puget Sound in accordance with the NPDES Permit. Biosolids are thickened using a gravity belt thickener (GBT) and hauled to the Central Kitsap WWTP for treatment.

An evaluation of Manchester WWTP was conducted that consisted of a site review of equipment, facilities, and processes, as well as discussions with WWTP staff to understand operational issues. Overall unit process "asset health" scores were developed to synthesize the likelihood of failure (condition) and consequence of failure (criticality) doe different components of the WWTP. 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 and power distribution components 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. The Civil component is in good condition and scored below 5. The rest of the unit processes, including Influent Pumping, Preliminary Treatment, Disinfection and Effluent, Solids Treatment and Support Systems all scored between 5 and 10, indicating moderate upgrades may be necessary.

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 WWTP unit processes. Model results indicated that all unit processes generally have sufficient hydraulic and biological capacity to handle existing and future flow and loads to meet current permit requirements, except for some portions of the secondary treatment piping that will need to be replaced with larger pipe.

Figure ES-3 | Existing Manchester WWTP Site Plan



ES.7 Collection and Conveyance System Analysis

A C&C system hydraulic analysis was not performed as a part this Plan. Appendix H is Chapter 5 from the 2014 Plan by BHC and includes a summary of the analysis performed at that time. Suggested improvements and the C&C CIP items, less those implemented between 2014 and 2024, are taken from the 2014 Plan. The collection and conveyance modeling and analysis completed as part of the 2014 plan was deemed adequate by the County for the development of this plan.

ES.8 Wastewater Treatment System Analysis

The results from the WWTP Existing Conditions analysis were used to identify processes that require improvement and define feasible alternatives for WWTP improvements for the 6-year and 20-year planning horizons. Minor maintenance, repairs, and direct replacements identified in the condition assessment are briefly discussed but not subject to a full alternatives analysis.

Influent Pumping and Preliminary Treatment

The influent pump station is in good condition and the pumps were replaced in 2015, so no improvements are needed. The preliminary treatment processes were constructed in 1998 and are generally in fair condition, but equipment will need replacement as it reaches the end of its expected service life. Recommended improvements include:

- Plan for mechanical equipment replacement at the end of the expected service life.
- Add a level sensor to the Parshall flume to provide flow monitoring.

Secondary Treatment

The secondary treatment system was constructed in 1998 and the condition of equipment varies with some components in good condition and others in poor condition. Additionally, some portions of the system will reach capacity limitations within the planning period. Recommended improvements include:

- Replace the mixed liquor (ML) pipes to and from the aeration basins with larger pipes to increase hydraulic capacity
- Replace the existing jet aeration system with a new system including new blowers and fine bubble diffusers and add dissolved oxygen (DO) and ammonia/nitrate probes to improve process control.
- General maintenance on the secondary clarifiers.
- As flows approach 2042 conditions, clarifier capacity should be evaluated.

Disinfection

The UV equipment was installed in 1998 and is an older, basic model that is reaching the end of its expected lifespan. Additional control and monitoring capabilities beyond what the current basic controller can offer is desired by the plant staff and will improve energy efficiency. Recommended improvements include:

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

Solids Treatment

The solids treatment processes were constructed in 1998 and are generally in good condition, with only minor upgrades and repairs needed. Recommended improvements include:

- Maintenance of the heating, ventilation, and air conditioning (HVAC) system in the GBT room to fix ventilation, address corrosion, and repair sensors.
- Replace sludge tank blowers in the next 12 to 15 years.
- Replace waste activated sludge (WAS) and thickened waste activated sludge (TWAS) storage tank lower explosive limit (LEL) sensors.

Odor Control

The odor control system is only partially operational and does not have adequate monitoring and control. Recommended improvements include:

- Replace the existing chemical scrubber with an activated carbon scrubber.

Non-Potable Water, Process Water, and Power Distribution Systems

Plant support systems are in good or fair condition and will require replacement as equipment reaches the end of its expected service life. Recommended improvements include:

- Equipment related to these systems will require in-kind replacements as they reach the end of their expected service life.

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. A review of potential uses of recycled water in the Manchester service area was conducted. The County coordinated with water providers and other potential stakeholders to determine if there are opportunities for irrigation of turf and landscaped areas or other recycled water uses in the vicinity of the Manchester WWTP. Entities contacted were:

- Manchester Water District: District staff indicated that there may be potential opportunities, though limited, to use recycled wastewater for irrigation uses in proximity to the Manchester WWTP.
- Environmental Protection Agency (EPA) Region 10 Manchester Environmental Laboratory: The Sustainability Coordinator for Region 10 noted that, although the site is not currently irrigated, they have no plans to modify. No other practical or sizeable uses for recycled water were identified.
- Kitsap County Parks Department: A discussion was held with County Parks Department staff, and it was determined that there are no sites where recycled water use would be cost-effective.
- United States Manchester Naval Fuel Depot: In communication with the facility's Deputy Director, it was determined that the non-potable uses of water at the facility are not likely sizeable enough

to warrant consideration for conversion to recycled water. All other water used at the facility is minimal.

- National Oceanic and Atmospheric Administration (NOAA) Northwest Fisheries Research Station: No successful connections with staff were made by the time this Plan was prepared. Further discussion with the facility is required to identify recycled water applications.

Based on locations of irrigable areas and relatively small amount of water consumption, there are no sites where recycled water use would be cost-effective.

ES.10 Operations and Maintenance

Section 10 includes a summary of the O&M programs for the C&C system, and the Manchester 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 C&C system and Manchester 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 to identify deficiencies that can be mitigated through coordinated CIP projects.

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 presented 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-7,

Table ES-8, **Table ES-9**, and **Table ES-10**. The preliminary timeline to complete these improvements is included in **Section 11**.

Table ES-7 | 6-Year Manchester Collection and Conveyance Capital Improvement Projects

CIP No.	Item	Total Project Cost
CIP-M-CC-DEV-1[1]	Gravity Pipeline and Force Main from PS-A1 in Basin A (Beach Drive)	$0
	Total	**$0**

Note:
1. Project expected to be paid for by developers or through creation of a ULID.

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

CIP No.	Item	Total Project Cost
CIP-M-CC-OM-2	Manchester WWTP Influent Pump Station Rehabilitation	$1,030,000
CIP-M-CC-OM-4	Pump Station 48 ,49 and 50 Rehabilitation	$6,200,000
CIP-M-CC-DEV-5[1]	Gravity Pipeline Expansion in Basin A	$0
CIP-M-CC-DEV-6[1]	Gravity Pipeline Expansion in Basin B	$0
CIP-M-CC-DEV-7[1]	Gravity Pipeline Expansion in Basin C	$0
CIP-M-CC-DEV-8[1]	Gravity Pipeline Expansion in Basin D	$0
CIP-M-CC-DEV-9[1]	Gravity Pipeline Expansion in Basin E	$0
CIP-M-CC-DEV-10[1]	Gravity Pipeline Expansion in Basin F	$0
CIP-M-CC-DEV-11[1]	Gravity Pipeline Expansion in Basin G	$0
CIP-M-CC-DEV-12[1]	Gravity Pipeline Expansion in Basin H	$0
CIP-M-CC-DEV-13[1]	Gravity Pipeline Expansion in Basin 50	$0
CIP-M-CC-DEV-14[1]	Gravity Pipeline Expansion in Basin WWTP	$0
CIP-M-CC-DEV-15[1]	Pump Station PS-A1	$0
CIP-M-CC-OM-16	20 Year Annual Pipe Replacement	$14,000,000
	Total	**$21,230,000**

Note:
1. Project expected to be paid for by developers or through creation of a ULID.

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

CIP No.	Item	Total Project Cost
CIP-M-WWTP-CAP-2	Upsize 10-inch Diameter ML Pipe and 12-inch Diameter Plant Effluent Pipes	$200,000
	Total	**$200,000**

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

CIP No.	Item	Total Project Cost
CIP-M-WWTP-REG-1[1]	Aeration System Optimization	$1,100,000
CIP-M-WWTP-OB-3[1]	Replace Plant Automatic Transfer Switch	$200,000
CIP-M-WWTP-OB-4[1]	Replace Odor Control System	$600,000
CIP-M-WWTP-OB-5[1]	Replace UV System	$1,100,000
CIP-M-WWTP-OB-6	Replace Clarifier Drives	$500,000

CIP No.	Item	Total Project Cost
CIP-M-WWTP-OB-7	Replace Electrical Service, Main Power Distribution, and MCC	$400,000
CIP-M-WWTP-OB-8	Replace Fine Screen	$800,000
CIP-M-WWTP-OB-9	Replace Grit Chamber, Pump, Cyclone, and Classifier	$700,000
CIP-M-WWTP-OB-10	Replace Thickening Equipment	$700,000
CIP-M-WWTP-OB-11	Replace Sludge Tank Blowers and Sludge Pumps	$400,000
CIP-M-WWTP-REG-12[2]	Biological Nutrient Removal	$1,930,000
CIP-M-WWTP-REG-13[2]	Enhanced Biological Nutrient Removal	$2,020,000
	Total	**$10,450,000**

Notes:
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 Manchester 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 11-6 | Recommended CIP Summary

Manchester WWTP 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-M-WWTP-CAP-2	14.5	Upsize 10" Diameter Mixed Liquor Pipe and 12" Diameter Plant Effluent Pipes	$ 200,000					$ 200,000															
20	CIP-M-CC-OM-16	20	Annual Pipe Replacement	$ 18,000,000							$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
20	CIP-M-CC-OM-2	N/A	Manchester WWTP Influent Pump Station Rehabilitation	$ 1,030,000							$ 1,030,000													
20	CIP-M-WWTP-OB-5	9.3	Replace UV System*	$ 1,100,000										$ 1,100,000										
20	CIP-M-WWTP-REG-1	14.5	Aeration System Optimization*	$ 1,100,000											$ 1,100,000									
20	CIP-M-WWTP-OB-3	13	Replace Plant Automatic Transfer Switch*	$ 200,000											$ 200,000									
20	CIP-M-CC-OM-4	N/A	Rehabilitate Pump Station 48, 49, and 50	$ 6,200,000											$ 6,200,000									
20	CIP-M-WWTP-OB-4	9.6	Replace Odor Control System*	$ 600,000											$ 600,000									
20	CIP-M-WWTP-OB-6	14.5	Replace Clarifier Drives	$ 500,000													$ 500,000							
20	CIP-M-WWTP-OB-7	13	Replace WWTP Electrical Service, Main Power Distribution, and MCC	$ 400,000													$ 400,000							
20	CIP-M-WWTP-OB-8	7.2	Replace Fine Screen	$ 800,000													$ 800,000							
20	CIP-M-WWTP-OB-9	7.2	Replace Grit Chamber, Pump, Cyclone, and Classifier	$ 700,000													$ 700,000							
20	CIP-M-WWTP-OB-10	6	Replace Thickening Equipment	$ 700,000													$ 700,000							
20	CIP-M-WWTP-OB-11	6	Replace Sludge Tank Blowers and Sludge Pumps	$ 400,000													$ 400,000							
20	CIP-M-WWTP-REG-12	14.5	Biological Nutrient Removal	$ 1,930,000													$ 1,930,000							
20	CIP-M-WWTP-REG-13	14.5	Enhanced Biological Nutrient Removal	$ 2,020,000																		$ 2,020,000		
			Total Project Cost (2023)	$ 31,880,000	$ -	$ -	$ -	$ -	$ 200,000	$ -	$ 2,030,000	$ 1,000,000	$ 1,000,000	$ 2,100,000	$ 9,100,000	$ 1,000,000	$ 6,430,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 3,020,000	$ 1,000,000	$ 1,000,000
			Assumed Inflation Rate			12%	8%	8%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
			Inflation Multiplier		1	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		$ -	$ -	$ -	$ -	$ 274,337	$ -	$ 3,069,937	$ 1,587,898	$ 1,667,293	$ 3,676,382	$ 16,727,538	$ 1,930,101	$ 13,031,074	$ 2,127,936	$ 2,234,333	$ 2,346,049	$ 2,463,352	$ 7,811,288	$ 2,715,845	$ 2,851,638